DIESEL FUEL HEATERS
for cars and trucks

ELECTROLUX HEATING ELEMENTS

CONTENT:

ELECTROLUX HEATING ELEMENTS

FUEL FILTER HEATING
DIESEL FUEL BAND HEATERS

Electric strap (band) heaters ПБ-100 are implemented for the fine filter body pre-heating at the ambient temperature from -40 to +5°C to provide the required filter efficiency by fuel viscosity reduction and dissolution of the petroleum waxes formed therein under the temperature conditions below freezing.

Coaxial heat-release surface peculiarities and advanced heater installation technologies eliminate the overheating, provide appropriate power consumption from vehicle car-system and maintain high reliability and products life.

Power-supply system of the heating elements possesses intrinsically safe ib-level design in accordance with the state technical requirements 22782.5.

Various bore diameters and height of the heaters allows selecting and adjustment of the product to any filter body. For the purpose of heat-transfer efficiency improvement and pre-heating period reduction the heater is equipped with special heat-conducting paste (КПТ-8 ГОСТ 19783) or with paste (КПТД-3/1 ТУ РБ 100009933.004-2001) spread over the heat-release surface during assembling process.

The heater has a climatic modification ХЛ2 in accordance with the state technical requirements 15150.

The heater sealing protection from dust and water penetration corresponds to the IP55 level in accordance with the state technical requirements 14254.

The heater maintains operating capability at power-supply variation within the range of 90-125% of nominal voltage.

The service life is at least 5 years; mean time between failures is at least 3000 h.

The heaters ПБ-101 by NOMACON™ are mounted over the filter frame and connected to the on-board power system at manual control or to the automatic heating control system СПА-101 (201). In the case of manual control a switch with indication is mounted in the cabin within visibility zone from the driver's seat. The switching-on of the heater is conducted by pressing the button of the switch. Depending on the ambient temperature the recommended duration of the filter pre-heating from the battery is about 5-10 minutes. The heater may be switched on permanently with a running generator.

Vehicles with 24V on-board system voltage are equipped with 2 series connected heaters.

Under the order the heater is equipped with relay providing heat-up time targeting and subsequent automatic shutdown (version 1).

Main technical specifications of the band heaters НОМАКОН™ ПБ ТУ РБ 100009933.002-2000							
Description	Model						
	ПБ-101	ПБ-102	ПБ-103	ПБ-104	ПБ-105	ПБ-106	ПБ-107
Filter body diameter (the heater bore diameter), mm	68-73	73-86	78-91	90-105	73-86	90-105	117-125
Heating surface height, mm	52	67	52	82	67	82	80
DC power-supply voltage, V	12				24		
Nominal electric power, W, not less	70	90	100	120	100	120	150
Heating element maximum temperature, °C, not more	130						
Operating temperature range, climatic modification	от -40 до +45 °С,ХЛ2						
Weight, kg, not more	0,18	0,25	0,27	0,35	0,25	0,35	0,41
Heating control	Manual, automatic with the connection to the СПА						
Operation mode	Temporary (5-10 minutes from the battery), continuous from vehicle generator						

НОМАКОН™ ПБ-101-73-86/67-1-А1 12В ТУ РБ 100009933.002-2000

where ПБ-1 – heater's model designation;
01 – modification number;
73-86- internal bore diameter (the filter body diameter), mm;
/67 - heater height (heating surface), mm;
- 1 – wiring kit for manual control,
or -2 – wiring kit for connection to the СПА;
А1 - relay for the automatic release at the pre-heating time target expiration (version 1) at manual control;
12В – power-supply system voltage, 12 or 24 V.

MANUALLY CONTROLLED BAND HEATER INSTALLATION AND OPERATION

INSTALLATION

Fig. 1

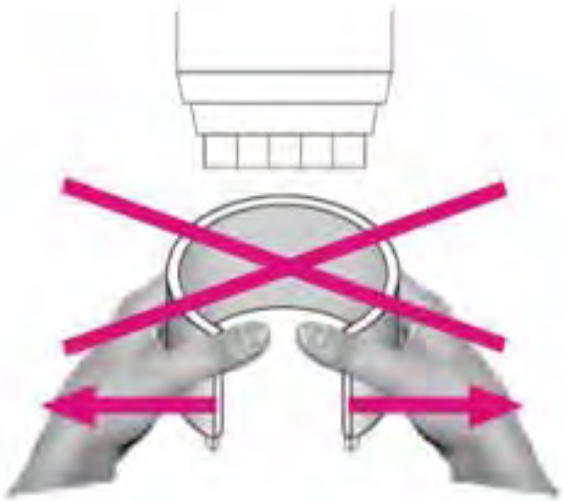


Fig. 2

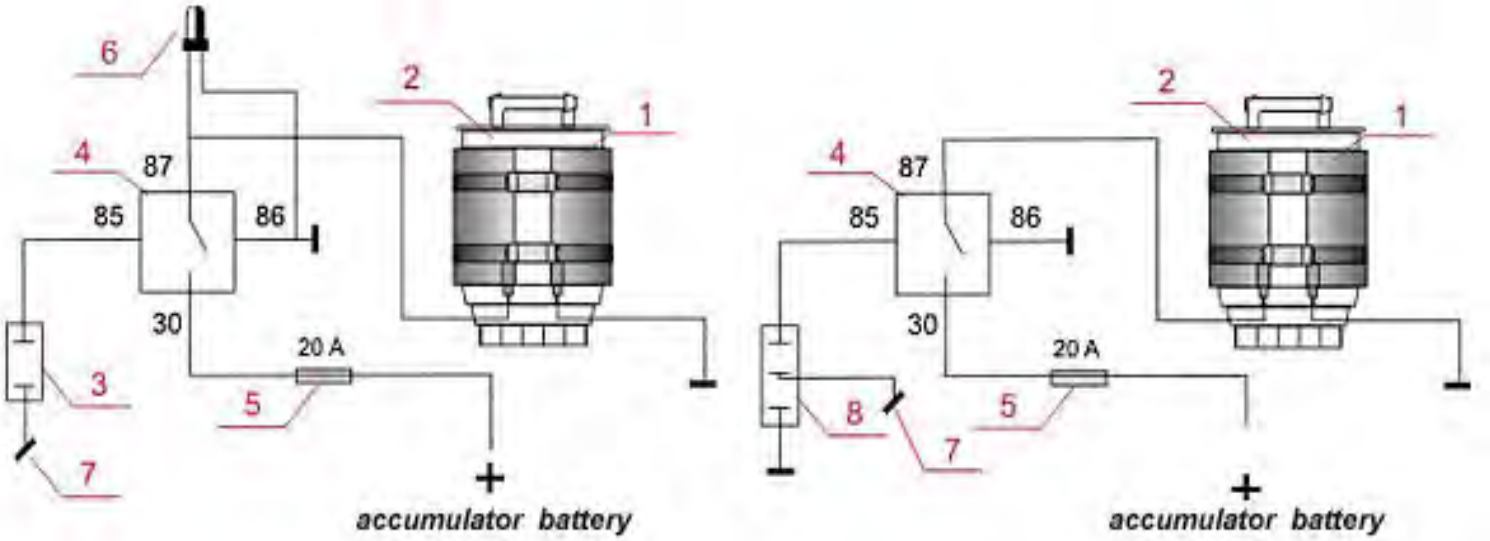


Fig. 3

1 – heater; 2 – fuel fine filter; 3 – switch; 4 – relay; 5 – fuse; 6 – light-emitting diode; 7 – ignition switch; 8 – switch with indication

The heater is mounted over the fine filter as indicated in Fig. 1.

Warning! Do not extend the heater (Fig. 2) or mount it on the filter with the diameter exceeding the maximum possible.

Switch with indication is mounted in the cabin within visibility zone from the driver's seat.

The heater connection is conducted according to the scheme (Fig. 3).

OPERATION

- The switching-on of the heater is conducted by pressing the switch or button 3 (see the scheme).
- Depending on the ambient temperature the recommended pre-heating duration is about 3-6 min.
- The heater may be switched on permanently with a running generator.
- Vehicles with 24V on-board system voltage are equipped with 2 series connected heaters.
- The service life is at least 5 years.

TIMING BAND HEATER INSTALLATION AND OPERATION

INSTALLATION

Fig. 1

Fig. 2

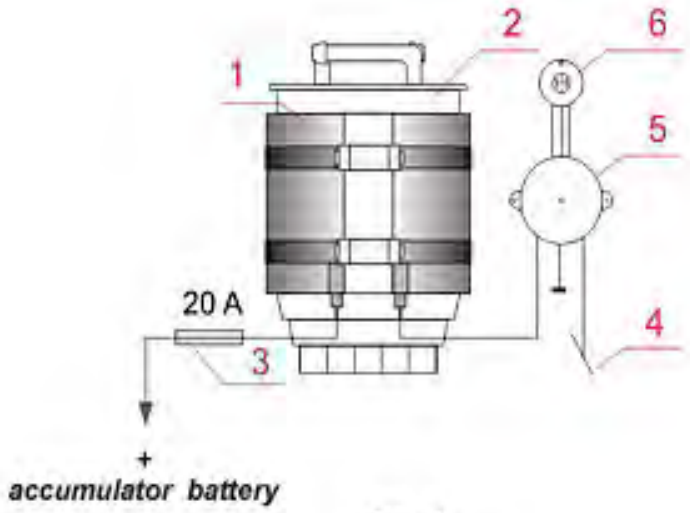


Fig. 4

1 – heater; 2 – fuel fine filter; 3 – fuse; 4 – ignition switch; 5 – control unit; 6 – button.

- The heater is mounted over the fine filter as indicated in Fig. 1.

Warning! Do not extend the heater (Fig. 2) or mount it on the filter with the diameter exceeding the maximum possible.

- Switch with indication is mounted in the cabin within visibility zone from the driver's seat
- The heater connection is conducted according to the scheme (Fig. 4).

OPERATION

- The heater is recommended to apply at ambient temperatures below +5°C. Depending on the air temperature pre-heating period is 3-6 minutes.
- The switching-on of the heater is conducted at started ignition by pressing the button 6 (Fig. 6). In such case the light-emitting diode is switching-on in a flashing mode.
- The turn off is conducted by pressing the same button or by key off. In case of the ignition system operating and the heater failed to turn off by pressing the button, it automatically shuts off in 10 minutes.
- • In case of necessity the heater may be switched on permanently with a running generator: the button on the control unit must be pressed for at least 2 seconds until LED lighting up. The turn off in this case is conducted by pressing the same button or by key off.

Warning! Do not leave the powered heater for a long time at dead engine.

FUEL LINE HEATING
FLOW-TYPE IN-LINE HEATERS

Vehicular electric flow-type heaters ПП-100 and ПП-200 are designed for continuous propulsion diesel fuel heating in the fuel line ahead of the engine fine filter. The heaters ПП-101 and ПП-201 are applicable for 12V car-voltage vehicles with diesel fuel consumption in the fuel main line (with account of the return fuel) up to 150 l per h. The heaters ПП-102 and ПП-202 are implemented for trucks, buses and tractors with 24V vehicle-system voltage and with diesel fuel consumption in the fuel main line up to 420 l per h.

Design peculiarities and advanced heater installation technologies provide automatic adjustment of the heater operating temperature depending on the fuel consumption and its temperature that eliminates the heating elements and fuel overheating, provides appropriate power consumption from vehicle car-system and maintains high reliability and products life.

The frame structure eliminates the gaseous cavities presence at the fuel flow through the heater. The heating elements are kept immersed in the fuel at fuel supply shutoff. When cold engine starting the heating occurs with a delay up to 20 seconds for the heating elements filling with the fuel in case of initially unfilled fuel line. The mentioned-above technical features eliminate entirely the possibility of diesel fuel vapor generation inside the heater with a temperature above the flashpoint.

Electric circuits of the control unit and the heater leads possess intrinsically safe ib-level design in accordance with the state technical requirements 22782.5.

Minimal dimensions, low weight and special brackets provide simple assembling of the heater in the vehicular engine compartment as close to the fuel fine filter as possible.

The heater has a climatic modification ХЛ2 in accordance with the state technical requirements 15150.

Control unit sealing protection from dust and water penetration corresponds to the IP55 level in accordance with the state technical requirements 14254.

The heater maintains operating capability at power-supply variation within the range of 85-125% of nominal voltage.

The service life is at least 5 years, mean time between failures is at least 3000 h.

The service life is at least 5 years, mean time between failures is at least 3000 h. The heaters are installed in the standard fuel line gap in the front of the fine filters. The heaters ПП-100 are connected to the vehicle power system with manual heating control or to the automatic heating control system СПА-101 (201). In the case of manual control a switch with indication is mounted in the cabin within visibility zone from the driver's seat. The switching-on of the heater is conducted by pressing the button of the switch.

The heaters ПП-200 have an electronic unit for the automatic independent heating control. The electronic control system starts to operate at engine starting, constantly monitors the fuel temperature and switches on heating at a fuel temperature below +5°C. Heating is disabled at an inlet fuel temperature above +5°C.

Main technical specifications of the flow-type in-line heatersx
НОМАКОН™ ПП-101 (102), ПП-201 (202) ТУ РБ 100009933.008-2002

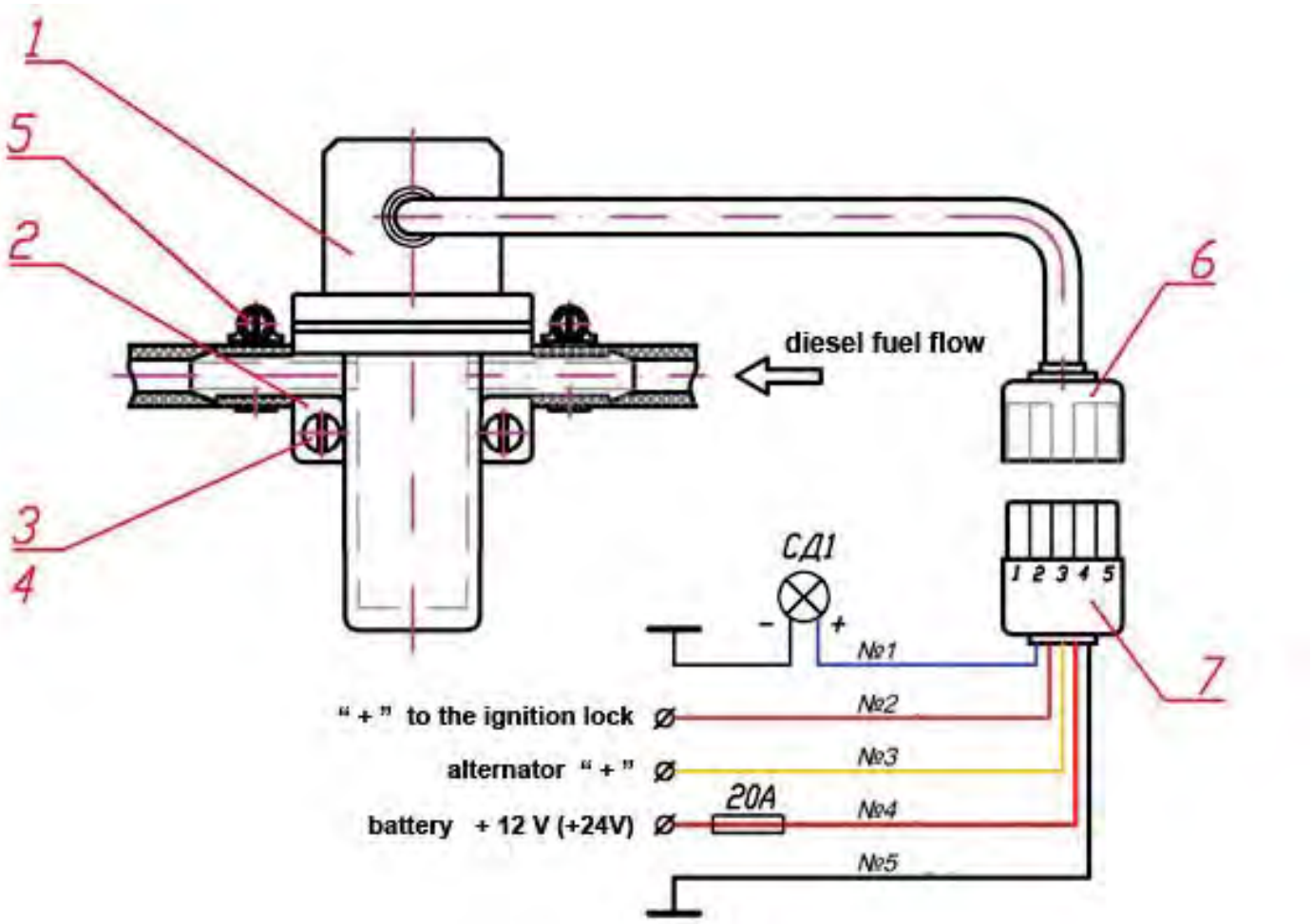
Description	Model, modification			
	ПП-101	ПП-102	ПП-201	ПП-202
DC power-supply voltage, V	12	24	12	24
Nominal input electric resistance, Ohm	0,55-0,70	1,5-2,0	0,55-0,70	1,5-2,0
Nominal electric power, W, not less, at a fuel temperature -20 °C +5 °C	 220 180	 350 300	 220 180	 350 300
Maximum diesel fuel consumption through the heater, l per h	150	420	150	420
Heating element maximum temperature, °C, not more	130			
Operating temperature range, climatic modification	-40 до +45 °C,ХЛ2			
Diameter of nipples for the diesel fuel inlet and outlet, mm				
Dimensions (overall – length x width x height), mm	60x52x110	x52x1250	x52x110	11x52x110
Loaded weight, kg, not more - without fuel filling - with fuel filling	 0,190 0,220	 0,210 0,240	 0,250 0,280	 0,270 0,310
Heating control	Manual, automatic with the connection to the СПА		Automatic independent	
Operation mode	Temporary (5-10 minutes from the battery), continuous from vehicle generator			

- The delivery set includes:
- packed heater, brackets, cable and wiring kit for connection to the power-supply system or to the СПА, certificate, installation and maintenance manual.

Flow-type in-line heater
НОМАКОН™ ПП-101-1 12В ТУ РБ 100009933.008-2002

where ПП-1 – model designation;
01 - modification number;
- 1 – wiring kit for manual control, or -2 – wiring kit for connection to the СПА (for the heaters ПП-100);
12В – power-supply system voltage, 12 and 24 V.

INSTALLATION



-
- D (Ч) – dark grey
- Y (Ж) - yellow
- B (С) – blue
- R (К) - red

Warning! All assembly operations are strongly recommended to conduct at the maintenance centers or service stations by the specialists in electrical equipment installation!

The heater connection to the vehicle power system is conducted according to the circuit diagram (see Fig. 1).
The heater is mounted in the fuel line gap in the front of the fine filter. Fuel inlet and outlet are specified on the heater nipples by arrows with the appropriate direction.
Operative position of the heater is vertical. The heater is mounted in the engine compartment to the bracket by two screws (M5 ГОСТ 1491-80) with lockwashers (ГОСТ 6402 70). Permissible heater shell variation from the vertical position should not exceed 5-10°.

FUEL LINE HEATING
FLEXIBLE TAPE HEATERS

Flexible tape heaters ЭНГЛ-1 are intended for external heat-insulation and electrical heating of the fuel engine line elements (fuel lines, filters' and filter-separators' bodies, fuel tank) as well as seats and other vehicle elements exposed to freezing under low temperature conditions. The heaters can be implemented for pre-heating and propulsion heating of the fuel equipment. Polymeric material of the heater is resistant to aggressive media, diesel fuel, solvents and retains flexibility under low temperature (down to -60°C).

The heater ЭНГЛ-1 is laid along the fuel main line, clenched and fixed by plastic clamps or sticky interconnect tape. Efficient warming is provided by close contact of the heater surface and fuel line surface as well as by additional external heat-insulation. The heater is universal for its adjustment to any vehicle with the 12 and 24 V power-supply voltage of the car system.

The heaters ЭНГЛ-1 have manual heating control and enter to the automatic heating control system СПА-101 (201). Flexible heaters can replace band heaters ПБ-101 and flow-type heaters ПП-101 (102) in the fuel heating system. In the case of manual control the heater is connected to the power-supply system, and switch with indication is mounted in the cabin within visibility zone from the driver's seat. The switching-on of the heater is conducted by pressing the button of the switch.

Main technical specifications of the flexible tape heaters ЭНГЛ-1 12В (24В)

Description	Type	
	ЭНГЛ-1 12В	ЭНГЛ-1 24В
DC power-supply voltage, V	12	24
Length, m	1 / 2 /4	
Profile dimensions (width x thickness), mm	24 x 3,3	
Nominal electric power, W, at a length of the heater, m 1 2 4	 30 60 120	 30 60 120
Heating element maximum temperature, °C	180	
Heating control	СПА	Manual, automatic at connection to the

The delivery set includes:
packed heater, wiring kit for connection to the power-supply system or to the СПА, certificate, installation and maintenance manual.

FUEL TANK HEATING
HEATED IN-LINE DIESEL FUEL STANDPIPES

Heated in-line fuel standpipes (ТП) are intended for the diesel fuel intake from the tank under extended ambient temperature range including under low temperature conditions down to -40°C when the intake of the frozen and condensed fuel is impossible by standard fuel standpipes. The pre-starting period fuel and slotted filter heating is conducted by electric heater operating on car battery (car system) power. During engine operation fuel heating is conducted by heated return fuel in the ТП-101 (102) as well as by heated fluid – engine cooling system antifreeze in the ТП-201 (202) and ТП-301 (302). Liquid heating maintains battery power capacity and depending on temperature and applied ТП model usually provides fuel patency along the entire fuel main line. Under low temperature conditions the simultaneous electric and liquid heating is provided.

Heated fuel standpipes ТП-100, ТП-200, ТП-300 by ELECTROLUX in their modifications have the same length and the same mounting dimensions over flanges and nipples as standard fuel in-line standpipes in the MAZ, KAMAZ trucks and others. Consequently, ТП may be installed instead of a standard fuel standpipe as well as a special spare fuel standpipe for winter conditions.

ТПs have manual heating control and are also connected to the system of automatic heating control system СПА-101 (201). In the case of manual control a switch with indication is mounted in the cabin within visibility zone from the driver's seat. The switching-on of the heater is conducted by pressing the button of the switch.

The in-line standpipe consists of a fuel slot-type filter, vibration-resistant fire- and explosion-proof posistor electric heater for the slotted filter and fuel heating, a surface film liquid flow-type heater of intake fuel by hot return fuel or hot coolant, a flange with manifold and nipples for liquid media inlet and outlet, electric cable input nipple;

The nozzles are designed for the fuel intake under the temperature from -40°C to +45°C;

The electric heater has 12V and 24V supply voltage and maintains operating capability at power-supply variation within the range of 70-125% of nominal voltage;

The warm-up time of the slotted filter and fuel in the standpipe with electric heater in the pre-starting period until the paraffin melting (dewaxing) temperature is less than 5-10 minutes;

At a hot coolant temperature of more than +60°C at the fuel standpipe inlet, the latter provides diesel fuel heating by more than 30°C at temperature in the fuel tank below freezing point;

FUEL TANK HEATING
HEATED IN-LINE DIESEL FUEL STANDPIPES

Depending on the operating mode S1, location in the automotive machinery and operating conditions in-line standpipes have the group Ж modification in accordance with the state technical requirements 3940 and climatic modification ХЛ2 in accordance with the state technical requirements 15150 at an ambient temperature from -40°C up to +45°C;

Protection rate of the enclosure contacting with the fuel inside the fuel tank is not less than IP68-level, outside the fuel tank (outer part) is not less than IP67-level in accordance with the state technical requirements 14254;

Mean time between failures is at least 3000 h, average service life is at least 5 years and average storage life is at least 2 years from the date of production and packaging.

Main technical specifications of the heated fuel standpipe ТУ РБ 100009933.005-2002 with modification 1

Description	Model, modification					
	ТП-101	ТП-102	ТП-201	ТП-202	ТП-301	ТП-302
DC power-supply voltage, V	12/24	12/24	12/24	12/24	24	24
Electric heater resistance, Ohm	2,2/4,7	1,1/3,5	2,2/4,7	1,1/3,5	3,5	3,5
Maximum starting current, A, not more	10/7,5	15/10	10/7,5	15/10	10	10
Nominal electric power, W	70/100	120/150	70/100	120/150	150	150
Surface fluid heater rated output, W, not less, at hot coolant temperature of 60C ° and immersion part length, mm, 340 430 520 690	-	-	250	350	500 610 690 800	750 900 1000 1200
Maximum diesel fuel consumption, l/h	420	420	420	650	420	650
Hot coolant consumption, l/h	-	-	200-500	350-900	200-500	350-900
Operating temperature range, climatic modification	от -40°С до +45°С,ХЛ2					
Minimal diameter of fuel tank bore for installation of a fuel standpipe, mm	39,0		39,0/46,0		39,0	46,0
Maximum height over a fuel tank, mm	55,0-60,0*				47,0-55,0*	
Nipples diameters, mm: - for fuel intake and return fuel inlet - for hot coolant supply and bleed	10x1** (12x1)		10x1** 14x1	12x1** 16x1	10x1** 14x1	12x1** 16x1
Loaded weight, kg, at immersion part length, mm of 340-690, mm	0,4-0,65		0,7-1,2	0,9-1,4	1,5-2,2	1,7-2,8
Frame and nipples material	Stainless steel 12X18H10T-type			Stainless steel 12X18H10T -type, heat-resistant and petrol-proof plastics		
Heating control	Manual, automatic with the connection to the СПА					
Operation mode	Continuous					

The delivery set includes:
packed fuel standpipe, wiring kit for connection to the power-supply system or to the СПА, mounting kit for the tank and hot coolant feeding pipes (fixing pads, screws, tees, ball valves, clamps, gaskets), certificate, installation and maintenance manual.

INSTALLATION AND OPERATION

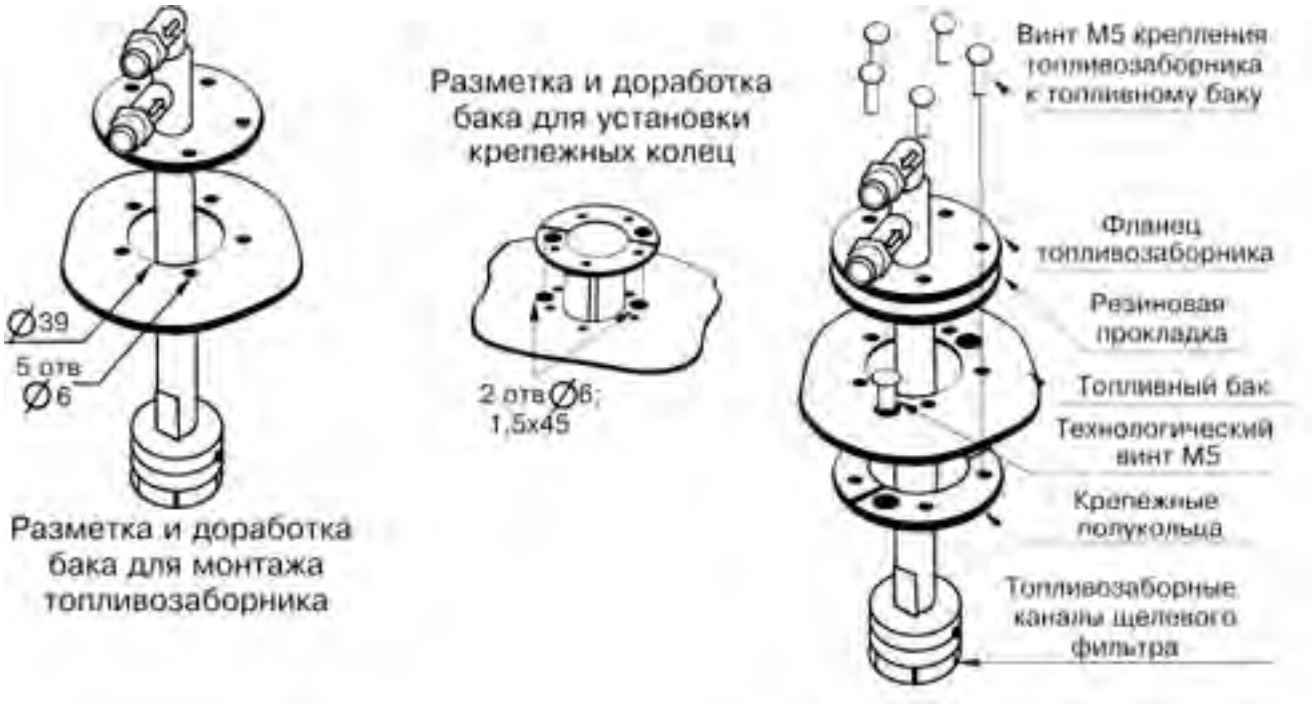


Fig. 1. Nozzle assembly on the fuel standpipe ТП-100

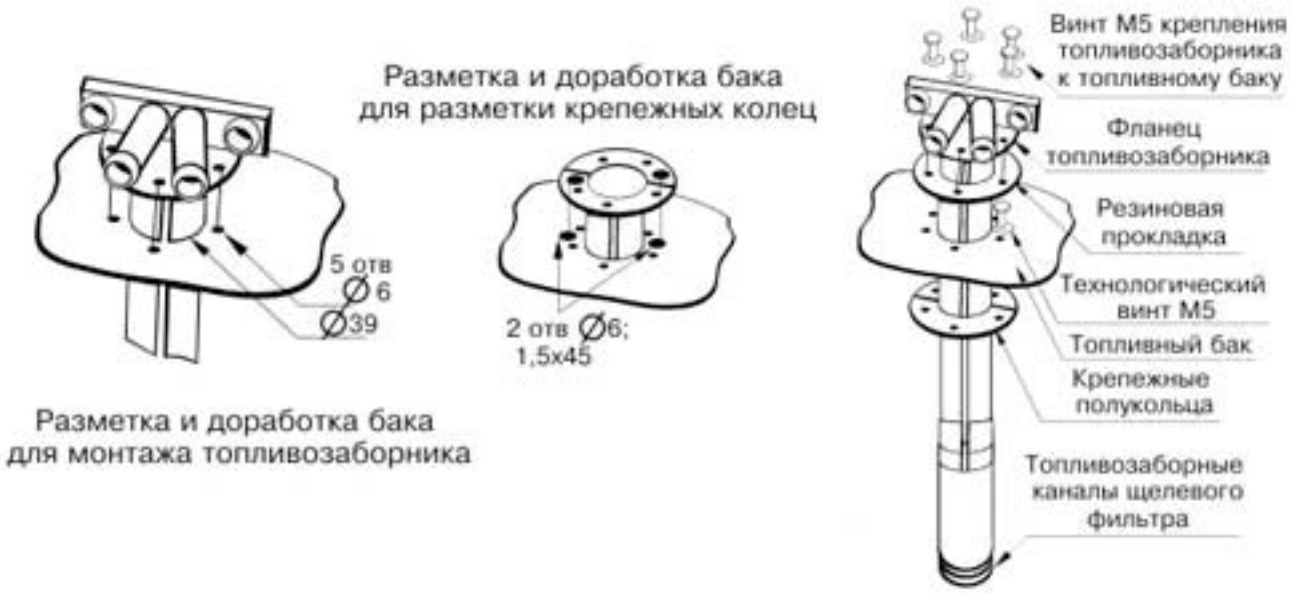


Fig. 1a. Nozzle assembly on the fuel standpipe ТП-200

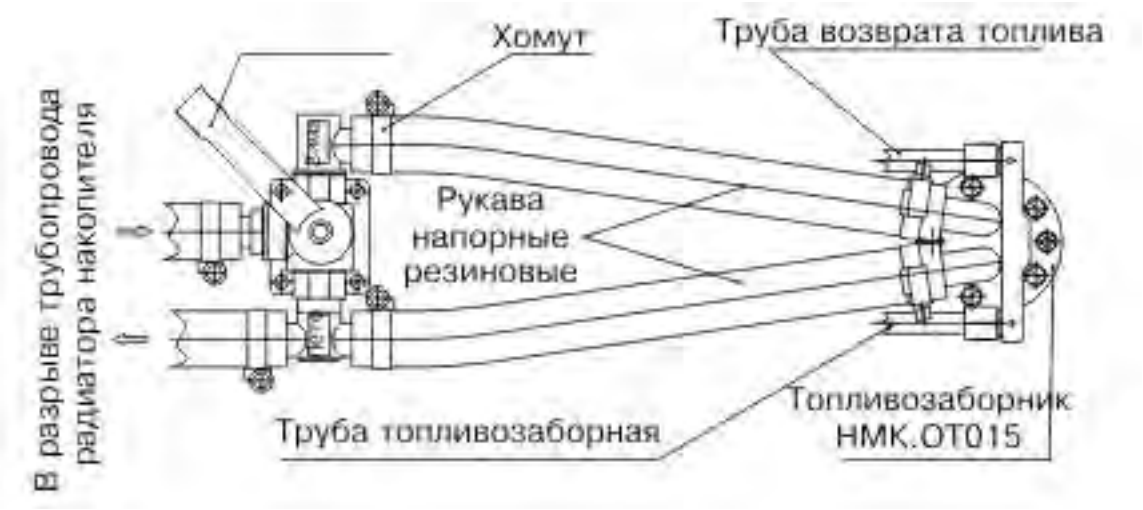


Fig. 1b. Fuel standpipe ТП-200 connecting diagram to the cooling and engine fuel system

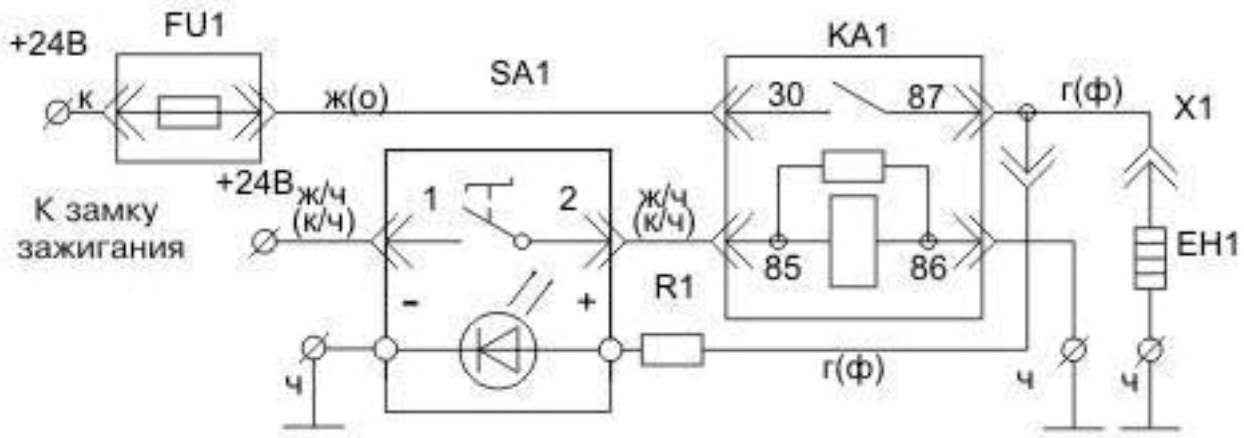


Fig. 2. Single-line schematic electrical diagram of fuel standpipe connection (switch with indication)

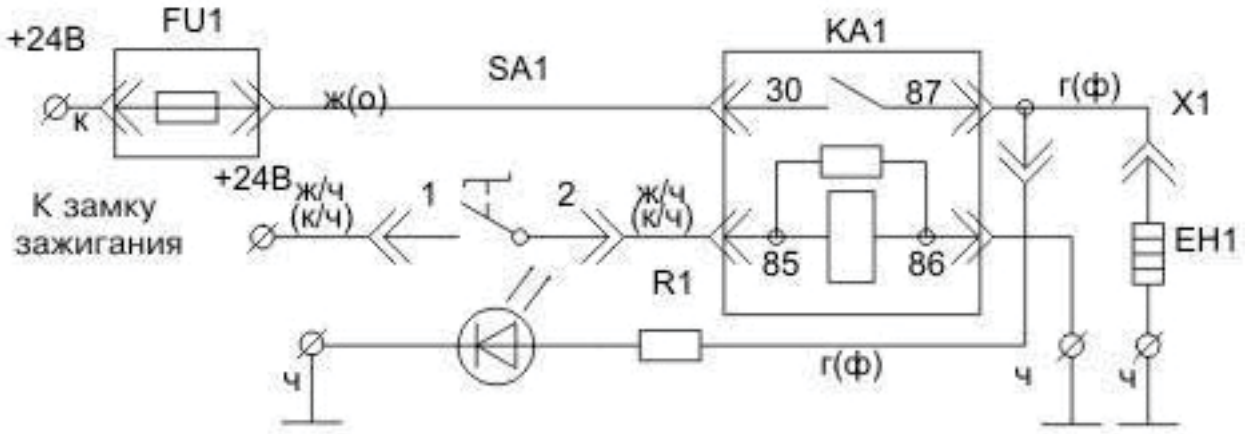


Fig. 3. Single-line schematic electrical diagram of fuel standpipe connection (switch without indication)

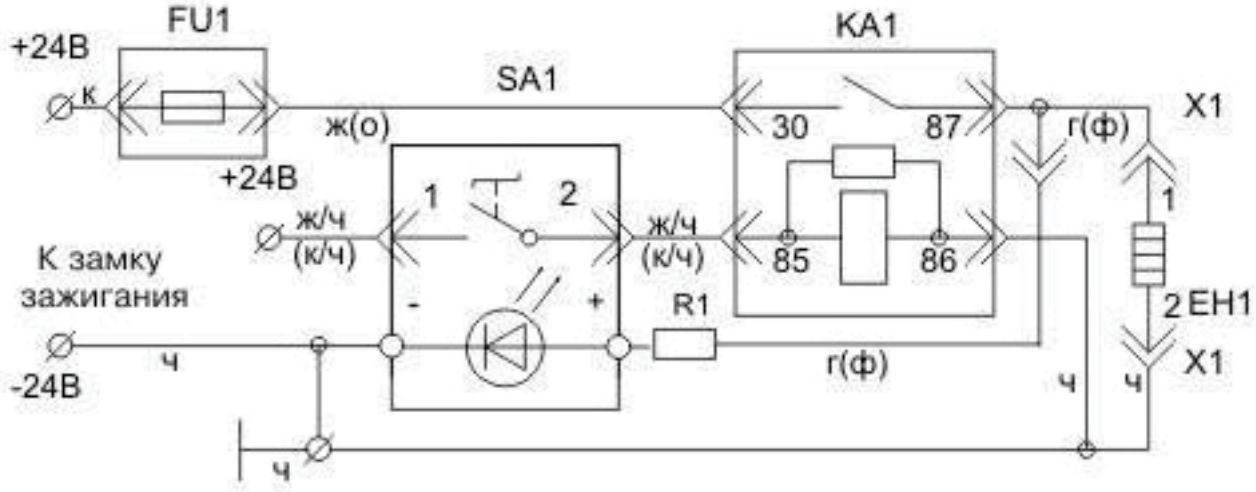


Fig. 4. Double-line schematic electrical diagram of fuel standpipe connection (switch with indication)

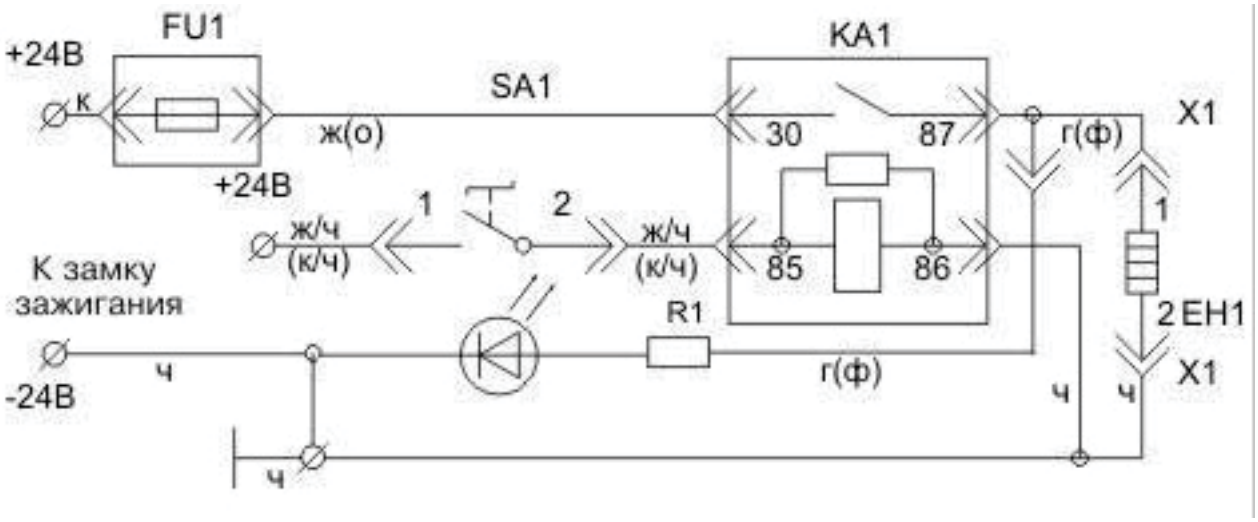


Fig. 5. Double-line schematic electrical diagram of fuel standpipe connection (switch without indication)

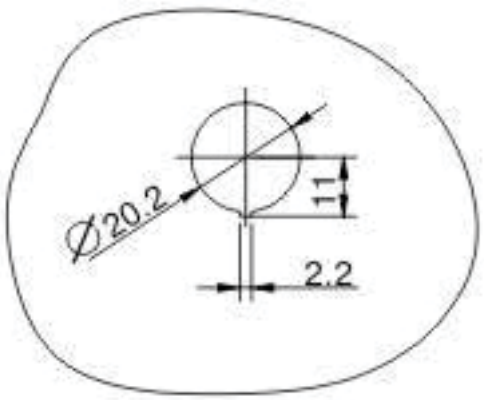


Fig. 6. Bore for switch mounting

Literal wire marking interpretation:
r (к) - red or brown
b(p) (г(ф)) - blue or purple
y (ж) - yellow or orange
d (ч) - dark grey
y/b (r/b) (ж/ч (к/ч)) - yellow-black or red-black
EH1 - Posistor heater НМК.ОТ015.200.000.00
FU1 - Fuse 15A
KA1 - Relay
SA1 - Switch with indication
R1 - Resistor
X1 - Plug connection

The fuel standpipe is installed vertically in the fuel tank. The fuel standpipe construction has modification with the same mounting dimensions over flanges and nipples as standard fuel in-line standpipes in the MAZ, KAMAZ trucks and others. Any other modification of the fuel tank for the fuel standpipe mounting is not required. Consequently, heated fuel standpipe may be installed instead of a standard fuel standpipe.

If maintaining of the standard multipurpose fuel standpipe (for example, in the imported vehicles) is needed, the heated fuel standpipe installation on the fuel tank is conducted through the specially prepared extra hole using mounting half-rings (supplied with the fuel standpipe) in the following sequence (see Fig. 1):
1. Choose an appropriate place for fuel standpipe installation and cut out a Ø 39mm hole in the tank;
2. Set the fuel standpipe into the tank and mark the sites for five Ø 6 mm holes drilling. The drilling is conducted after the fuel standpipe extraction from the tank;
3. Overlay the fixing half-rings over the bearing surface outside the tank to the intent that the holes axis in the tank coincided with the holes axes in the half-rings. Without changing the half-rings position mark for the drilling of two Ø 6mm holes with the countersunk 1,5x45 for the sunk screws M5 head;
4. Remove drillings and sawdust from the tank appeared there during modification;
5. Establish two fastening half-rings through the Ø 39mm hole inside the tank and secure by two screws M5 with flat head;
6. Establish the fuel standpipe into the prepared hole on the rubber gasket and fix to the half-rings by screws.

Fuel in-line standpipe ТП-100 connection
The electric heater connection to the vehicular power-supply system is conducted according to the single-line schematic electrical diagram (see Fig. 2) using the wiring kit (wire color marking is shown in the diagram). In this case the wires, connected with the negative pole of the power-supply system, are connected to the vehicle body (cabin, frame, etc.) very close to the connected nodes. The relay and fuse are fixed under the cover on the dashboard.

The wire from the nozzle's connection plug to the cabin is laid along the existing wiring harness and fixed thereto by clamps. The illuminated switch is mounted in a convenient for the driver point on the dashboard (bore dimensions for switch mounting are shown in Figure 6). At a fuel standpipe complete set by switch without indication the LED with the holder is installed next to the switch. Thereby the connection to the vehicular power-supply system is conducted according to the schematic diagram (see Fig. 3) and Ø6,5 mm holes are drilled for the LED holder installation. The custom-made fuel standpipes may be connected to the power-supply system according to the double-line schematic electrical diagram (at a complete set by switch with indication – see Fig. 4, at a complete set by switch without indication – see Fig. 5).

Fuel in-line standpipe ТП-200 connection

Fuel standpipe connecting to the engine cooling system is conducted by the flow-type rubber tubes (not included in the delivery set) according to the schematic diagram scheme – see Fig. 2. Bypass group is attached to the car body with the M6 screws and rubber tubes mounting is performed by clamps from the wiring kit.

At rubber tubes mounting it is necessary to provide:

- lack of kinks reducing the tube's cross-section;
- protection from abrasion in the field of attachment to the vehicle body, for example, with rubber gaskets;
- protection from high temperature exposure in the exhaust manifold area.

The electric heater connection to the vehicular power-supply system is conducted according to the single-line schematic electrical diagram (see Fig. 3) using the wiring kit (wire color marking is shown in the diagram). In this case the wires, connected with the negative pole of the power-supply system, are connected to the vehicle body (cabin, frame, etc.) very close to the connected nodes. The switch and LED with holder are mounted in a convenient for the driver point on the dashboard (bore dimensions for switch mounting are shown in Figure 7 and Ø 6,5 mm holes are drilled for the LED holder installation). The relay and fuse are fixed under the cover on the dashboard. The wire from the nozzle's connection plug to the cabin is laid along the existing wiring harness and fixed thereto by clamps. The custom-made fuel standpipes may be connected to the power-supply system according to the double-line schematic electrical diagram (see Fig. 5).

FUEL TANK HEATING
HEATED DIESEL FUEL STANDPIPE NOZZLES

Heated fuel standpipe nozzles НТП-100 and НТП-200 are developed for installation on regular vehicular fuel standpipes to ensure diesel fuel intake from the tank under low temperature conditions when the intake of the frozen and condensed fuel is impossible by standard fuel standpipes. Diesel fuel pre-heating and accordingly its viscosity reduction and dewaxing before engine starting are conducted by the nozzle's electric heater operating on car battery (car system) power.

The nozzles НТП-101 (102) and НТП-201 (202) by HOMAKOH™ have alternate designs for installation on the fuel in-line standpipes with the diameters of the fuel standpipe tubes in 10 and 12 mm under 12 and 24V operating supply voltage. The nozzles consist of a fuel slot-type filter, vibration-resistant fire- and explosion-proof posistor electric heater for the slotted filter and fuel nozzle heating, nozzle attachment device to the end of the fuel standpipe tube.

The nozzles are connected to the vehicular power-supply system with manual heating control or to the automatic heating control system СПА-101 (201).
In the case of manual control a switch with indication is mounted in the cabin within visibility zone from the driver's seat. The switching-on of the heater is conducted by pressing the button of the switch.

The nozzles are designed for the fuel intake up to 420 liters per hour under the temperature from -40°C to +45°C;
The electric heater has 12V and 24V supply voltage and maintains operating capability at power-supply variation within the range of 75-125% of nominal voltage;
The warm-up time of the slotted filter and fuel in the standpipe tube with electric heater in the pre-starting period until the paraffin melting (dewaxing) temperature is less than 3-5 minutes;
Continuous fuel heating during engine operation is possible under low temperature conditions;
Depending on the operating mode S1, location in the automotive machinery and operating conditions nozzles have the group Ж modification in accordance with the state technical requirements 3940 and climatic modification ХЛ2 in accordance with the state technical requirements 15150 at an ambient temperature from -40°C up to +45°C;
Protection rate of the enclosure contacting with the fuel inside the fuel tank is not less than IP68-level, outside the fuel tank (outer part) is not less than IP67-level in accordance with the state technical requirements 14254;
Mean time between failures is at least 3000 h, the service life is at least 5 years and the storage life is at least 2 years from the date of production and packaging.

Main technical specifications of the heated fuel standpipe nozzles НТП-101 (102), НТП-201 (202) ТУ РБ 100009933.009-2009				
Description	Model			
	НТП-101	НТП-102	НТП-201	НТП-202
DC power-supply voltage, V	12	24	12	24
Inlet electric heater resistance, Ohm	2,2	4,7	1,1	3,5
Maximum starting current, A, not more	10	7,5	15	10
Nominal electric power, W	70	100	120	150
Maximum diesel fuel consumption, l/h	420			
Operating temperature range, climatic modification	от -40 до +45 °С,ХЛ2			
Minimal diameter of fuel tank bore for installation of a fuel standpipe with nozzle, mm	39,0			
Fuel standpipe tube diameter, mm	10, 12*			
Loaded weight, kg, not more	0,13		0,18	
Frame material	Aluminum alloy		Aluminum alloy, heat-resistant and petrol-proof plastics	
Heating control	Manual, automatic with the connection to the СПА			
Operation mode	Temporary (5-10 minutes from the battery), continuous from vehicle generator			

The delivery set includes:
packed nozzle, wiring kit for connection to the power-supply system or to the СПА, certificate, installation and maintenance manual.

INSTALLATION AND OPERATION

Fig. 1. Nozzle assembly on the fuel standpipe

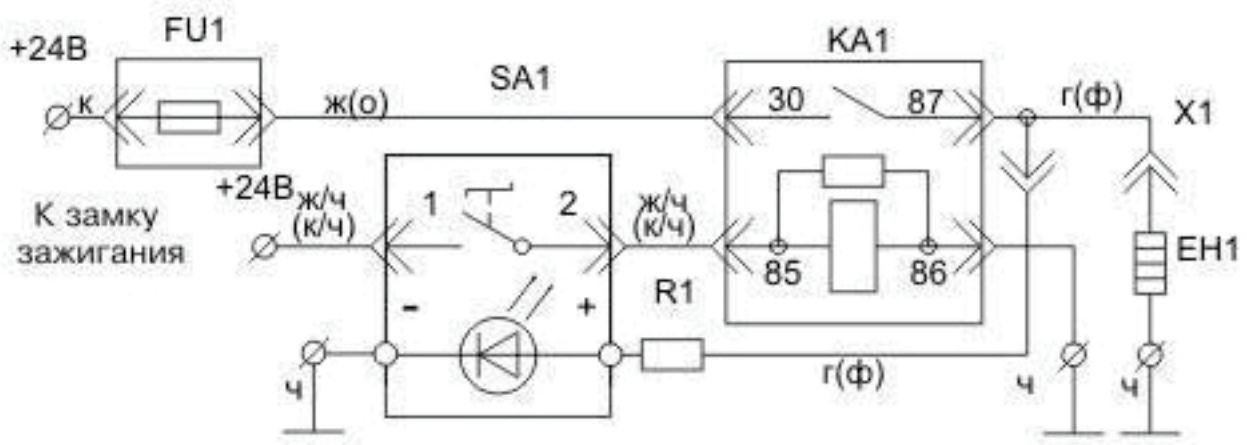


Fig. 2. Single-line schematic electrical diagram of fuel standpipe connection (switch with indication)

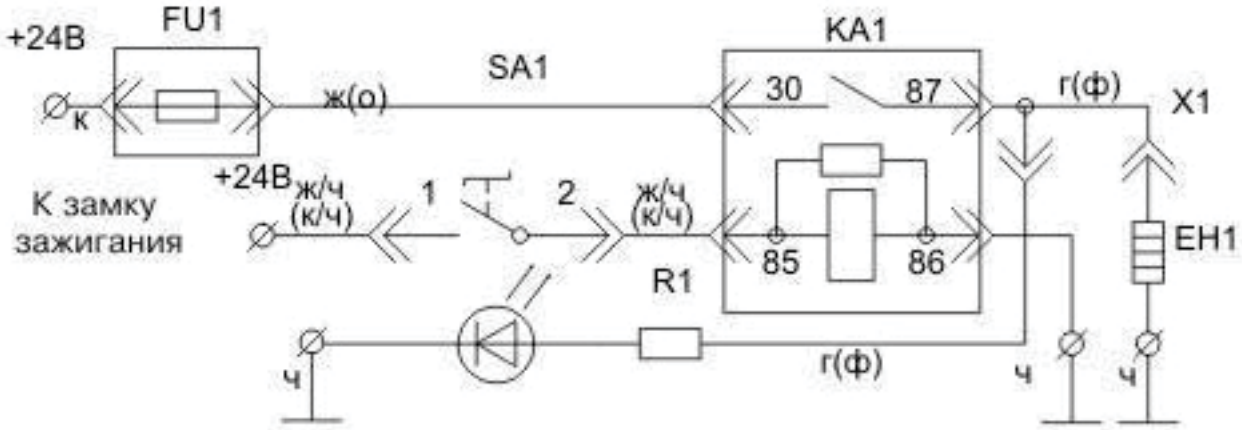


Fig. 3. F Single-line schematic electrical diagram of fuel standpipe connection (switch without indication)

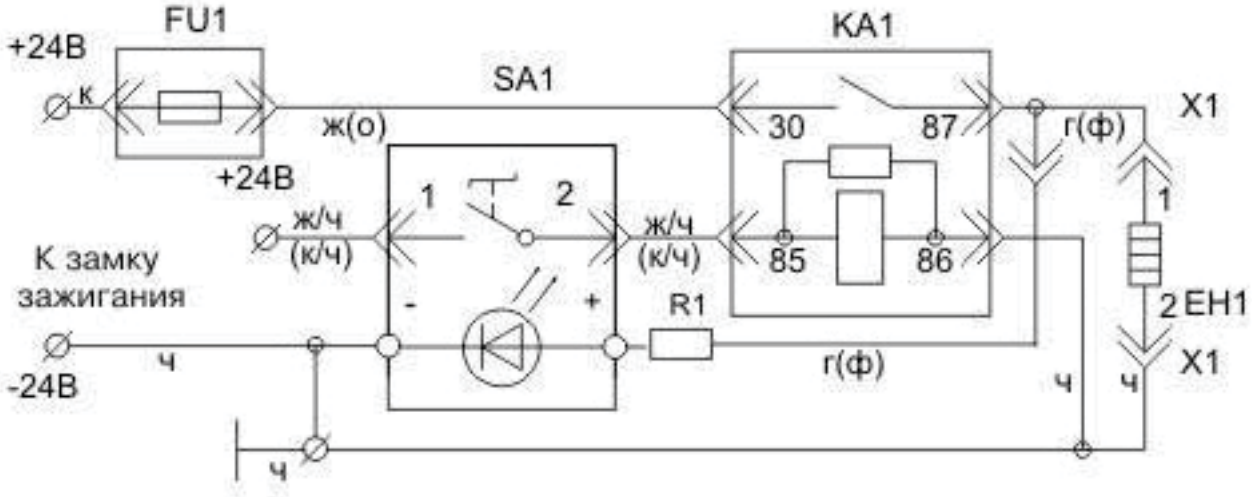


Fig. 4 . Double-line schematic electrical diagram of fuel standpipe connection (switch with indication)

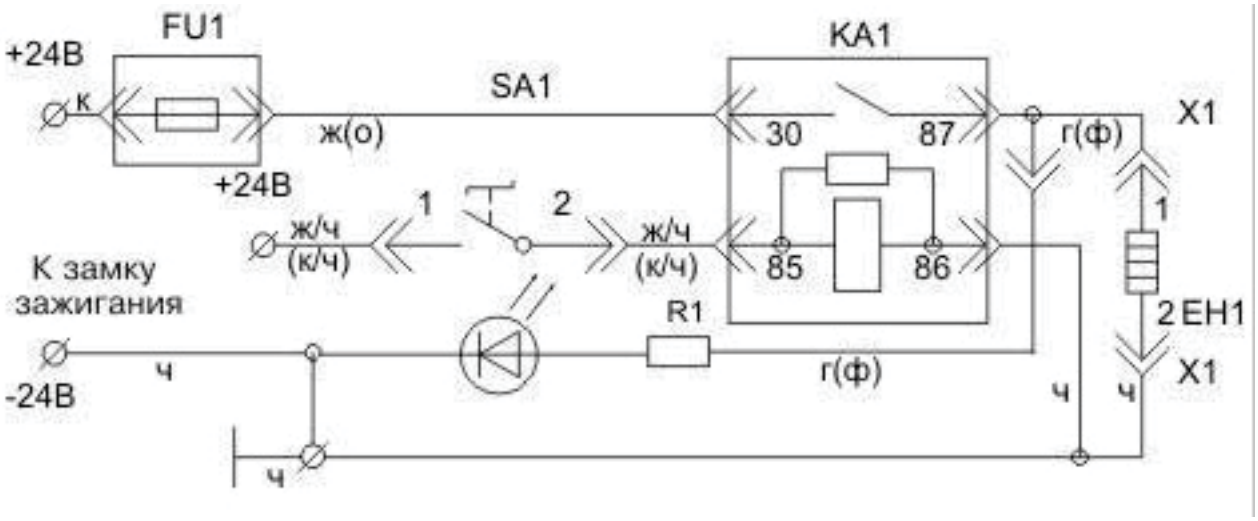


Fig. 5. Double-line schematic electrical diagram of fuel standpipe connection (switch without indication

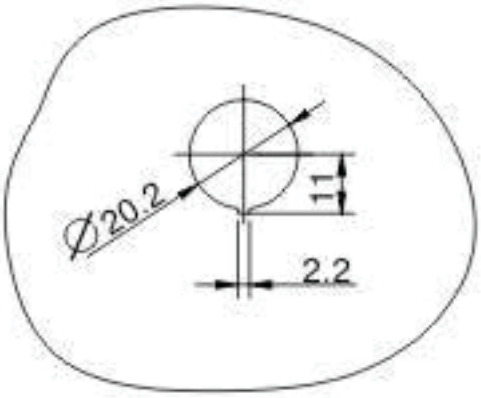


Fig. 6. Bore for switch mounting

Literal wire marking interpretation:
r (к) - red or brown
b(p) (г(ф)) - blue or purple
y (ж) - yellow or orange
d (ч) - dark grey
y/b (r/b) (ж/ч (к/ч)) - yellow-black or red-black
EH1 - Posistor heater НМК.ОТ015.200.000.00
FU1 - Fuse 15A
KA1 - Relay
SA1 - Switch with indication
R1 - Resistor
X1 - Plug connection

The nozzle is mounted to the standard fuel standpipe tube installed vertically in the fuel tank.

At the nozzle assembly on the standard fuel standpipe with a gasket of 1 mm in thickness its standpipe tube should be shortened by 4 mm for the purpose to maintain the depth of immersion into the fuel tank. In this case instead of regular gaskets two supplied pads with grooves are installed in such a position that they form a circular channel for the wires.

The nozzle assembly on the fuel standpipe is performed using wired and fixing arrangements of the delivery kit. Before nozzle assembly put insulation tube on the fuel standpipe tube, and thereafter set the nozzle on the same tube until bumping, secure it with two locking screws as shown in Figure 1. At the screws tightening it is required to install their splines in parallel with nozzle's circular slots. For the locking screws fixation from self-unfastening set nozzle's locking ring into the circular slot. If at the starting ignition the heater is not turned off by pressing the button it automatically shuts off in 10 minutes. Pass the wires through the channels in the rubber gaskets as shown in Figure 1. The wire length from the gasket edge to the male connector should be approximately 150 mm. The wire surplus wrap around the fuel standpipe tube over the insulation tube. Attach the wires with clampbands. The wire fixation to a metal pipe is implemented at insulation tubes' location sites. Then attach the fuel in-line standpipe on the tank.

WARNING! At wire fixating stress application breaking them away from the nozzle is prohibited.

The nozzle connection to the vehicular power-supply system is conducted according to the single-line schematic electrical diagram (see Fig. 2 and Fig. 3) using the wiring kit (wire color marking is shown in the diagram). In this case the wires, connected with the negative pole of the power-supply system, are connected to the vehicle body (cabin, frame, etc.) very close to the connected nodes. The switch and LED with holder are mounted in a convenient for the driver point on the dashboard (bore dimensions for switch mounting are shown in Figure 6 and Ø6,5 mm holes are drilled for the LED holder installation). The relay and fuse are fixed under the cover on the dashboard. The wire from the nozzle's connection plug to the cabin is laid along the existing wiring harness and fixed thereto by clampbands. The custom-made nozzles may be connected to the power-supply system according to the double-line schematic electrical diagram (see Fig. 4. or Fig. 5).

FILTER-SEPARATOR HEATING
ROD POSISTOR DIESEL FUEL HEATERS

Electric rod heaters with posistor heating elements ПС-101 (102), ПС-201 (202) by NOMACON™ are developed for continuous propulsion diesel fuel heating in various types of filter-separators of the engine fuel line. The heaters ПС-100 and ПС-200 are analogues of the well-known models of the fuel filter-separator heaters of Fleetguard FuelPro, Fleetguard DieselPro, Mann-Hummel PreLine system and their analogues.

The heaters ПС-101 and ПС-201 have manual heating control and enter to the automatic heating control system СПА-101 (201). In the case of manual control the heater is connected to the power-supply system, and switch with indication is mounted in the cabin within visibility zone from the driver's seat. The switching-on of the heater is conducted by pressing the button of the switch.

The heaters ПС-102 and ПС-202 have an electronic unit with remote digital temperature sensor for the automatic independent heating control. The heater with the control unit is mounted over the fine filter frame. The electronic control system starts to operate at engine starting, constantly monitors the fuel temperature at the filter-separator inlet and switches on heating at a fuel temperature below +5°C. Heating is disabled at an inlet fuel temperature above +5°C.

Heat-release rod peculiarities and advanced heater installation technologies provide automatic adjustment of the heater operating temperature depending on the fuel consumption and its temperature that eliminates the heating elements and fuel overheating, provides appropriate power consumption from vehicle car-system and maintains high reliability and products life;

Electric circuits of the control system and the heating elements possess intrinsically safe ib-level design in accordance with the state technical requirements 22782.5;

The heater assembly (on the flange, on the threaded connector) adjusts to any cabinet by the manufacturer at the consumer request

The heater has a climatic modification ХЛ2 in accordance with the state technical requirements 15150;

Control unit sealing protection corresponds to the IP55 level in accordance with the state technical requirements 14254;

The heater maintains operating capability at power-supply variation within the range of 85-125% of nominal voltage;

The service life is at least 5 years, mean time between failures is at least 3000 h.

The heaters ПС-100 have a tubular heating element in an aluminum or stainless steel shell and operate with specific heat load over the heat-release surface up to 5,0 W/cm².

FILTER-SEPARATOR HEATING
ROD POSISTOR DIESEL FUEL HEATERS

The heaters ПС-200 have an aluminum-alloy heating element with heat-release longitudinal ribs and are intended to the operation at high specific heat load condition, for example, at diesel fuel heating up to 7,5 W/cm².

Main technical specifications of the heated fuel standpipe nozzles НТП-101 (102), НТП-201 (202) ТУ РБ 100009933.009-2009

Description	Model, modification			
	ПС-101	ПС-102	ПС-201	ПС-202
DC power-supply voltage, V	12/24		24	
Nominal input electric resistance, Ohm	0,6 / 2,3		1,5	
Peak switching current, A, not more	25 / 16		20	
Nominal electric power, W, not less, at a fuel consumption through the filter-separator in 200 l per h and input fuel temperature -20°C +5°C	220 170		350 280	
Heating element (rod) dimensions, mm: - diameter - length	20 85		21,5 72	
Heating element maximum temperature, ℃, not more	150		130	
Operating temperature range, climatic modification	От -40°С до +45°С,ХЛ2			
Explosion protection marking	1ExibIIT3		1ExibIIT4	
Heating control	Manual, connection to theСПА	Automatic independent	Manual, connection to theСПА	Automatic independent
Operation mode	Continuous from vehicle generator			
Application field: diesel fuel filter-separator models applied this heater	Fleetguard FuelPro FH230, DieselPro FH232 and their analogues		Mann-Hummel PreLine 270, PreLine 420 and their analogues	

The delivery set includes:
packed heater, wiring kit for connection to the power-supply system or to the СПА, adapter with remote fuel temperature sensor for the ПС-102 and ПС-202, certificate, installation and maintenance manual.
Rod heater
ELECTROLUX ПС-201-1 24В ТУ РБ 100009933.010-2009,

where ПС-1 – model designation;
01 - modification number;
- 1 – wiring kit for manual control,
or -2 – wiring kit for connection to the СПА
(for ПС-101, ПС-201 models);
24В – power-supply system voltage, 12 and 24 V.

Automatic diesel fuel heating systems (СПА) are intended for the integrated solution of the diesel fuel heating using the above-mentioned separate heaters combined into the integrated system controlled by autonomous electronic unit. СПА perform a pre-starting and propulsion fuel heating without a driver and facilitate significantly diesel-powered vehicle operation in winter season. In addition to the heaters СПА include fuel temperature sensor (Д1) and control unit (БУ1) mounted in the engine compartment as well as remote control panel (ПУ1) mounted in the driver's cabin. For the automatic control over a liquid fuel heating in the heated standpipes СПА are equipped with tee electromagnetic valve (КР1).

The СПА control unit has 12V supply voltage for the СПА-101 and 24V – for the СПА-201. БУ1 is connected directly to the vehicle battery (power supply) and to the ignition key (switching-on). The СПА control panel has a mode switch for automatic heating control and manual heating control – each heater is switching-on and off manually.

Fuel heating system provides:
automatic heating switching-on at fuel temperature drop below the heating temperature limit;
automatic heating switching-off at fuel temperature increase above the heating temperature limit;
operational programmed control with heating mode and time modification depending on a fuel temperature;
heating shutoff at vehicle-system voltage drop below threshold level, at the heater failure, at short circuit.

Under the automatic control mode БУ1 is activated when you turn the ignition key at the first operating position. At the initial time the current temperature of the fuel in the target fuel line point is determined by the temperature sensor Д1 (usually in the front of the fine filter, at the flow-type heater inlet or in the front of the filter-separator). At the engine starting after long-term interruption this temperature is identified by БУ1 as the cold engine temperature or as the engine starting ambient temperature. Then depending on the fuel temperature value and the СПА configuration БУ1 develops the required pre-heating algorithm and implements it according to the specified СПА program. At this time powered-on heaters indication is lighted on the ПУ1. A signal to start the engine is appeared on the remote control panel after the pre-heating. If the pre-heating is not required by temperature fuel value on the Д1, the ПУ1 signals immediately to start the engine. At the propulsion heating БУ1 constantly monitors the fuel temperature from the sensor Д1 and according to the СПА configuration switches on electric or combined electrical and fluid heating when the temperature drops below the maximum heating temperature equal usually to plus (5±3)°C. The heating is automatically turned off when the fuel temperature in the fuel line is above the heating temperature limit.

Main technical specifications of the automatic diesel fuel heating systems НОМАКОН™ СПА-101 12В, СПА-201 24В

Description	Model, modification	
	ПС-101	ПС-102
DC power-supply voltage, V	12	24
Maximum electric power consumption, W, at automatic control mode	300	425
Maximum electric power consumption, W, at manual control mode	575	825
Heater connection channels number / additional control device channels number	4 / 1	
Maximum electric power, W, at the channel, designation 1 (ПБ) – fine filter heater ПБ -101, ЭНГЛ-1 2 (ПП) – flow-type heater ПП-101 (102), ЭНГЛ-1 3 (ПФ) – filter-separator heater ПС -101, ПС-201 ЭНГЛ-1 4 (НЭ) – heated fuel standpipe nozzle НТП -101 (102), НТП-201 (202), electric fuel standpipe heater 5 (КР) – electromagnetic valve of the liquid fuel standpipe heating control	150 250 250 150 25	250 400 400 150 25
Operating temperature range, climatic modification	От -40°С до +45°С,ХЛ2	
Operating temperature range, climatic modification	Automatic, manual	
Explosion protection marking	1ExibIIT3	
Operation mode	Continuous from vehicle generator	

Examples of the automatic СПА operation mode.

Example 3. When you run the diesel engine with the СПА configuration presented in the Example 1 («Usability guideline» section) the fuel temperature from the sensor Д1 was -15°С. For this case at the pre-heating mode БУ1 simultaneously switches on the fine filter heater ПБ-101 for the estimated time of 5 minutes and the electric fuel standpipe nozzle heater НТП-101 for 3,5 minutes. Then in the propulsion heating mode depending on the current fuel temperature below or above the maximum heating temperature, the flow-type heater ПП-101 automatically switches on and off.

Example 4. When you run the diesel engine with the СПА configuration presented in the Example 2 («Usability guideline» section) the fuel temperature from the sensor Д1 was -30°С. Because of the total electric power consumption for the pre-heating (390 W) is above admissible energy consumption standards equal to 350 W, БУ1 primarily switches on fine filter heating with two sequentially established ПБ-101 24В (240 W) for the estimated time of 7,5 min, and then after ПБ-101 disabling it switches on the electric fuel standpipe heater ТП-301/520 24В (150 W) for 4 min. In the propulsion heating mode at a fuel temperature below the maximum heating temperature БУ1 switches on the flow-type heater ПП-102 and simultaneously puts off КР1 from the position 0 to the position 1 of hot coolant supply from the cab heater to the liquid fuel standpipe heater.

Combined electric and liquid heating continues until the fuel heating temperature limit excess. Then БУ1 turns off electric heating and controls liquid heating according to the upper and lower control fuel temperature. The upper control temperature is +(24±3)°С and is the upper permissible fuel temperature for the optimum performance of the fuel backup and fuel injection pumps. The lower control temperature in this case equals to the maximum heating temperature.

When the temperature exceeds the upper pilot level БУ1 turns off the liquid heating by switching КР1 to the original position 0. If in time the fuel temperature drops again below the heating temperature limit the БУ1 switches on both electric and liquid heating and propulsion heating cycle.