



PRODUCT CATALOG



Contents

About the company.....	2
Quality Management System.....	3
Equipment.....	5
Anti-lock braking system ABS	7
Wheel speed sensor DCHVK.....	8
Electropneumatic trailer modulator EPM-P.....	10
Modulator electropneumatic tractor EPM	11
Electronic cabin control unit EBK	13
Electronic control unit EBP	16
Anti-lock-traction control ABS/ASR system	18
Electronic cabin control unit EBK	19
ASR valve	22
Proportional valve PK-1.....	23
Pneumatic cylinder PC	25
Electronic air suspension control system ECAS	26
Solenoid valve block BEC	27
Electronic control unit for air suspension BEUP	29
Pressure sensors electronic DDE.....	31
DP displacement sensor	33
Remote Control Remote Control	35
ABS for trailers with anti-rollover function	36
Trailer brake control module MUT-P	37
ABS/ASR with EDB function.....	38
Longitudinal stability control system ESP.....	39
Electronic control unit EBK-ESP	40
Pressure sensor electronic intelligent DDEI.....	42
Electropneumatic tractor modulators EPM	44
Steering wheel sensor DPR-1	46
Electronic acceleration sensor DUE	47
Wheel speed sensor DCHVK.....	48
ASR valve	50
Infomodule IM-2	51
Electronic pneumatic brake actuator system EBS	52
Control unit of electronic-pneumatic brake actuator system CU EBS	53
Axial modulators: single-channel MO-1K and dual-channel MO-2K	54
On-board information and analytical system BIAS.....	56
System remote control for electromechanisms SDUE	57
Integrated information and management system KIUS	58
MIU Information Management Module	59
Switching unit	60
Diagnostic complexes DK	62
Pressure sensor DDI	65
Combined pressure sensor DKD	68
Pneumatic brake signal switch VPST	70
Emergency air pressure sensor DADV	71
DADM oil emergency pressure sensor	73
DSDM oil pressure detector sensor	75
DSF air filter clogging detector sensor.....	77
DUTZH Liquid temperature sensors	79
Liquid emergency temperature sensor DATZH.....	81
Fuel level gauge sensor DUMP	83
Glass washers SEAT	86
Accumulator battery switch 1212.3737	89
Electronic direction indicator breakers PEUP	92
Alarm emergency devices SA	94
Electromagnetic solenoid valves	96
Air pressure sensor programmable two-channel DDVPD	99
Pressure sensor electronic programmable DDEP	100
Universal diagnostic complex UDC	101
Electronic brake drive control system unit EB SUPT	102
Services.....	103
Contacts.....	104

About the company

The history of JSC "Ekran" began on May 16, 1974 when the Ministry of Aviation Industry of the USSR signed Order No. 87 «On the creation of the BPZ under construction». The new plant was to master the production of aircraft instruments in the shortest possible time.

On January 7, 1976, the Ministry of Aviation Industry signed Order No. 3 "On The Introduction of Existing BPZ". This date we celebrate as the birthday of the plant.



OJSC "Ekran" is one of the leading manufacturers in the CIS countries of elements of automotive and tractor electrical equipment (sensors, devices) and automotive electronics (anti-lock braking systems, anti-locking / traction control systems and electronic air suspension control systems).

On September 25, 2020, the State Committee for Science and Technology of the Republic of Belarus issued conclusion No. 268 on the accreditation of OJSC "Ekran" as a scientific organization.

Consumers of OJSC "Ekran" products are both Belarusian enterprises (Minsk Automobile Plant OJSC, Minsk Tractor Plant OJSC, Gomselmash OJSC, BELKOMMUNMASH Holding Management Company OJSC, Amkodor OJSC – the holding management company, Minsk Motor Plant Holding Management Company OJSC), and enterprises from the Russian Federation (Ural Automobile Plant JSC, KAMAZ PJSC, Pavlovsk Bus Plant LLC, Petersburg Tractor Plant JSC), Uzbekistan, Azerbaijan.

Since January 2001, the company has implemented a quality management system in accordance with the requirements of STB ISO 9001 - 1996 in the National System of Conformity Assessment of the Republic of Belarus and received a certificate for the design, development, production and maintenance of automotive and tractor products.

In 2009 The company carried out a set of works on the introduction of a new version of STB ISO 9001-2009. Management System Certification Body BelGISS as part of the re-certification in 2009, the quality management system for the



Quality Management System

design, development, production and maintenance of electronic anti-lock braking systems, devices and sensors for motor vehicles and tractors.

The quality management system of OJSC "Ekran" was certified for compliance with the requirements of STB ISO 9001-2009 in the National Conformity Assessment System of the Republic of Belarus. Certificate of Conformity BY/112 05.01.002.0065.

The quality management system of OJSC "Ekran" is certified for compliance with the requirements of STB ISO 9001-2015 in the National Conformity Assessment System of the Republic of Belarus.

The certificate of conformity is registered in the register under No BY/112 05.01. 002.01 00132 dated 8/22/2021 Valid until 8/21/2024



In 2012, JSC "Ekran" carried out a set of works on certification of the quality management system for compliance with the requirements of ISO/TS 16949:2009.

In December 2015, after conducting a certification audit, the certification body IATF issued a certificate of compliance of the quality management system of OJSC "Ekran" with the requirements of ISO/TS 16949:2009. Certificate No54744/A/0001/SM/Ru dated 03.12.2015. Valid until 14.09.2018.

In September 2018, after conducting a certification audit, the certification body IATF was issued a certificate of compliance of the quality management system of OJSC "Ekran" with the requirements of IATF 1 949:2016.

Certificate No. 54744/B/0001/SM/ENG dated 23.08.2021. Valid until 22.08.2024.



ISO 9001-2015



These standards are aimed at applying the process approach in the development, implementation and improvement of the effectiveness and efficiency of the quality management system in order to increase customer satisfaction and is the most popular among world car manufacturers.

Machining of parts



Injection molding of plastic products



Pressing of thermoplastics and vulcanization of rubber parts



Injection molding of non-ferrous metals



Electroplating production



Assembly production



Heat treatment (vacuum furnaces, salt baths)



Test



Anti-lock braking system ABS

The anti-lock braking system is designed to prevent locking and maintain wheel slip at a level that provides optimal grip on the road surface in all road conditions.

The anti-lock braking system is installed on cars and buses with pneumatic brakes and has two modifications:

- ABS-T – for a tractor-trailer;
- ABS-P – for trailer train.



When driving motor vehicles (ATC), the electronic control unit (ECU) constantly measures the speeds of all wheels connected to it, as well as their acceleration, and when some threshold values are exceeded, it activates anti-lock control algorithms. During the adjustment, by purposefully changing the air pressure in the brake chambers, the unit attempts to prevent wheel locking and to maintain wheel slippage at a level that ensures optimal grip on the road surface in given road conditions.

Regulation is made up to a speed of less than 10 km / h, or until the moment when the driver himself stops braking. In addition, the ABS-T system allows limiting the maximum speed of the vehicle with an accuracy of $V_{max} + 1.5$ km / h.

Non-volatile RAM is used to store information about the last 40 seconds of emergency braking.

ABS-T (4S/4K)
wheel speed sensor DCHVK (3) - 4 pcs.
electropneumatic module EPM-1 (2) - 4 pcs
electronic control unit EBK (1) - 1 pc
Harness of sensors and modulators (4) - 1 pc
1 EBK (5) power cable

ABS-P (4S/4K)
Wheel speed sensor DCHVK (3) - 4 pcs
electropneumatic module EPM-P (6) - 4 pcs
electronic control unit EBP (7) - 1 pc
speed sensor cable - 4 pcs
modulator cable - 4 pcs
semitrailer system power cable or trailer system power cable (8) - 1 pc.
spiral cable (9) - 1 pc.

Wheel speed sensor DCHVK

The frequency sensor of the DCHVK wheel **is designed** to obtain information about the rotational speed, the beating of the toothed rotor and transmit this information to the electronic control unit.

Sensor type – generator, inductive.

Output type - two-wire, antiphase, isolated from the "mass" and "plus" of the board network.

The type of output signal is an alternating voltage, the frequency of which is proportional to the speed of rotation of the wheels.

Type of climatic performance: U2 according to GOST 15150, but at the same time the lower operating value of the ambient temperature during operation is minus 45 ° C, the upper value is plus 160 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

Sensors of two main types are developed and produced: straight with a glass length of 57.5 mm and angular - with a length of 40 mm. There are modifications with a connector and without it, wire length from 0.4 m to 2.2 m, at the request of the customer can be manufactured any length.

The weight of the sensor is not more than 200 g.



Modifications of the produced DHVK

Designation of DHVK	Design features
ADUI.407111.003 ADUI.407111.003-01 ADUI.407111.003-02 ADUI.407111.003-03 ADUI.407111.003-04 ADUI.407111.003-05	sensor with right angle wire output and output connector
ADUI.407111.004 ADUI.407111.004-01 ADUI.407111.004-02 ADUI.407111.004-03 ADUI.407111.004-04 ADUI.407111.004-05	sensor with right angle wire output and no output connector
ADUI.407111.005 ADUI.407111.005-01	sensor with right angle wire output and straight wire output
ADUI.407111.007 ADUI.407111.007-01 ADUI.407111.007-02	sensor with extended housing, direct wire output and output connector
ADUI.407111.008 ADUI.407111.008-01 ADUI.407111.008-02 ADUI.407111.008-03 ADUI.407111.008-04	sensor with extended housing, direct wire output and no output connector

An example of an entry in other documents and (or) when ordering:

"Wheel speed sensor DCHVK ADUI.407111.003 TU RB 07513211.023-99"

The electrical resistance of the sensor (1.3 ± 0.1) k Ω , at an ambient temperature of + 20 ° C.

The insulation resistance of the sensor is not less than 100 M Ω , and in conditions of high humidity at less than 5 M Ω .

The insulation of the sensor withstands without damage the impact of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

The sensor remains operational at an increased operating temperature of plus 160 ° C, at a reduced operating temperature of minus 45 ° C.

The sensor remains operational after exposure at a temperature of plus 180 ° C.

The sensor withstands the effects of vibration and shock loads according to GOST 3940 for products installed on the car engine. The sensor is designed for installation in the wheel units of the car.

The maximum working clearance between the end of the sensor and the rotor tooth should be 1.2 mm. The span of the output signal at an angular velocity of 0.43 rpm is not more than 0.1 V;

90% of the sensor operating time to failure is 16 thousand motor hours of vehicle operation or 800 thousand km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the sensor is 10 years.

Electropneumatic trailer modulator EPM-P

Electropneumatic trailer modulator EPM-P is designed to regulate the pressure in the brake chambers according to the electrical control commands from the electronic unit. The modulator provides pressure control in the actuator pneumatic cylinders according to a three-phase algorithm (lifting, holding and resetting). The modulator is made on the basis of an accelerator valve and has an additional input for connecting the receiver, which allows it to function as a standard accelerator valve in normal braking mode.



Type of climatic performance: U2 according to GOST 15150.

Operating mode: re-short-term S3 according to GOST 3940

Modifications of modulators with a bayonet connector and with a connector with a metric thread have been developed and are being produced.

Nominal voltage $U_n=24\text{ V}$.

An example of recording a block in other documents and (or) when ordering:

"Electropneumatic modulator EPM-P ADUI 453643.003 TU RB 07513211.022-99 with a connector with metric thread".

"Electropneumatic modulator EPM-P ADUI 453643.006 TU RB 07513211.022-99 with a bayonet connector".

Modulator weight – $1.1 \pm 0.5\text{ kg}$.

Rated current consumption 1.65A.

The insulation resistance of the modulator is not less than $20\text{ M}\Omega$, and in conditions of high humidity at less than $5\text{ M}\Omega$.

The insulation of the modulator withstands without damage the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 minute.

Electrical resistance of modulator electromagnet windings $(15 \pm 1.0)\text{ Ohms}$, at ambient temperature $(20 \pm 2)^\circ\text{C}$.

The modulator provides the time of filling the brake chamber with air with a volume $(1 \pm 0.1)\text{ l}$ through a pipeline with a diameter of at least 9 mm and a length of not more than 400 mm, not more than 200 ms, the time of release of air from the brake chamber - not more than 210 ms, the delay time of operation is not more than 80 ms.

The modulator remains operational at an increased operating temperature of plus 70°C , at a reduced operating temperature of minus 45°C ;

The modulator is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

The modulator complies with the requirements of UNECE Regulation No. 10.

The modulator's 90% MTBF is 10 thou. motor hours of operation of the vehicle or 1.5 million tons of motor hours. firing cycles for the second category of operating conditions according to GOST 15150.

The average service life of the modulator is 10 years or 800 thousand km of vehicle mileage.

Modulator electropneumatic tractor EPM

Modulators are available in the following types: EPM-1, EPM-2.

The modulators are designed to regulate the pressure in the brake chambers according to the electrical control commands from the electronic unit. Modulators provide pressure control in actuating pneumatic cylinders according to a three-phase algorithm (lifting, holding and resetting pressure of a given value).

Modifications of modulators for a supply voltage of 12V and 24V, with a bayonet connector and with a connector with a metric thread, have been developed and are being produced.



Type of climatic performance: U2 according to GOST 15150.

Operating mode: re-short-term S3 according to GOST 3940

Rated supply voltage (24 ± 0.5) V or (12 ± 0.5) V.

Modifications of EPM produced

Designation	Supply voltage	Design features
EPM-1 ADUI.453643.002	24V	with metric thread connector and optional reset connector
EPM-1 ADUI.453643.002-01	24V	with metric thread connector and no additional reset connection
EPM-1 ADUI.453643.002-02	12V	with metric thread connector and no additional reset connection
EPM-1 ADUI.453643.004	24V	with bayonet connector and optional reset connection
EPM-1 ADUI.453643.004-01	24V	with bayonet connector and no additional reset connection
EPM-1 ADUI.453643.004-02	12V	with bayonet connector and no additional reset connection
EPM-2 ADUI.453643.008	24V	with reduced overall dimensions, with a bayonet connector and without additional reset connection
EPM-2 ADUI.453643.008-01	12V	with reduced overall dimensions, with a bayonet connector and without additional reset connection
EPM-2 ADUI.453643.008-02	24V	for vehicles equipped with a stability control system, with reduced overall dimensions, with a bayonet connector and without an additional reset connection

An example of recording a block in other documents and (or) when ordering:

"Electropneumatic tractor modulator EPM-1 ADUI 453643.002 TU RB 07513211.033-99".

The mass of modulators is not more than 800 g (EPM-1) and 600 g (EPM-2).

The rated current consumption is 1.65 A for a modulator with a nominal supply voltage of 24 V and 2.2 A for a modulator with a nominal supply voltage of 12 V.

The insulation resistance of the modulator is at least 20 MΩ, and in conditions of high humidity at less than 5 MΩ.

The insulation of the modulator can withstand the impact of an alternating voltage of 550 V at a frequency of 50 Hz for 1 minute without damage.

Electrical resistance of modulator electromagnet windings (15 ± 1.0) Ohms, at ambient temperature (20 ± 2) °C for a modulator with a nominal supply voltage of 24 V and (5.5 ± 0.5) Ohm, at ambient temperature (20 ± 2) °C for a modulator with a nominal supply voltage of 12 V.

The modulator provides the time of filling the brake chamber with air with a volume of (1 ± 0.1) l not more than 200 ms, the time of release of air from the brake chamber - no more than 240 ms, the delay time of operation is not more than 30 ms.

The modulator remains operational at an increased operating temperature of plus 90 °C, at a reduced operating temperature of minus 45 °C.

The modulator is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

The modulator complies with the requirements of UNECE Regulation No. 10.

90% operating time to failure of the EPM-1 modulator is 10 thousand hours of operation of the vehicle or 2.5 million cycles of actuations, the EPM-2 modulator - 10 thousand hours of operation of the vehicle or 10 million cycles of actuation.

The average service life of EPM-1 modulators should be 10 years or 800 thousand km of TS mileage, EPM-2 modulators - 10 years or 1 million km of TS run.

Electronic cabin control unit EBK

The electronic control unit EBK is designed to receive information from the wheel speed sensors, process this information and issue control signals to the modulators of the system. The unit provides storage of information about the failures of the system elements, braking efficiency and the transmission of this information to the diagnostic complex or in the form of a flashing light code of the control lamp. The units operate in ABS systems of 4S/4M or 4S/3M configuration, where *xS* is the number of sensors, *xM* is the number of modulators.



Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Rated supply voltage: (24 ± 0.5) V or (12 ± 0.5) V.

Modifications of EBK produced

EBK-DM ADUI.453633.014	for ABS/ PBS cars with MMZ Euro-1, Euro-2 engine (injection pump control through pneumatic cylinder PC-3) with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-DM ADUI.453633.014-01	for ABS / PBS cars with the Engine YAMZ Euro-1, Euro-2 (control of injection pumps through the cylinder pneumatic PC-4) and with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-DM ADJUI.453633.014-02	for ABS/PBS vehicles with KAMAZ Euro-1, Euro-2 engine (injection pump control through pneumatic cylinder PC-5) with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-DM ADUI.453633.014-03	for ABS/PBS cars with Euro-3, Euro-4 engine (communication with the engine via CAN interface) and with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK ADUI.453633.016	for ABS vehicles KAMAZ and MAZ with connector 894 070 850 2 f. AMR
EBK ADUI.453633.016-01	for ABS cars with pneumohydraulic brake drive type Ural
EBK ADUI.453633.016-02	for ABS heavy-duty tractors of Volot type (MZKT)
EBK ADUI.453633.016-03	for ABS cars of MAZ type category N ₂ with connector 894 670 850 2 f. AMR
EBK ADUI.453633.016-04	for ABS/PBS cars with Euro-3 engine, Euro-4 with connector 894 670 850 2 f. AMR, communication with the engine via CAN interface
EBK ADUI.453633.016-05	for ABS/PBS system with electronic brake force regulator ERTS, communication with the engine via CAN interface
EBK ADUI.453633.016-06	for PAZ buses with ABS/PBS function, communication with the engine via CAN interface
EBK ADUI.453633.016-07	for PAZ buses with ABS function, communication with the engine via CAN interface
EBK 12 V ADUI.453633.016-08	for PAZ buses with ABS function, communication with the engine via CAN interface
EBK ADUI.453633.016-09	for cars with pneumatic drive type Ural with ABS function, communication with the engine via CAN interface
EBK-A 12 IN ADUI.453633.018	for ABS buses with a rated voltage of 12 V on board and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1

EBK-A 12 IN ADJUI.453633.018-01	for ABS cars of GAZ-33104 type with a nominal voltage of the board network 12 V and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-A ADJUI.453633.019	for ABS buses with a rated voltage of 24 V on board and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-A ADJUI.453633.019-01	for ABS cars with pneumohydraulic brake drive type Ural
EBK-A ADJUI.453633.019-02	for ABS trolleybuses of MAZ type
EBK-A ADJUI.453633.019-03	for ABS/PBS cars and buses and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1

An example of recording a block in other documents and (or) when ordering:

"Electronic cockpit control unit EBK ADJUI.453633.016 TU RB 07513211.024-99".

The mass of the block is not more than 2 кг

The power consumption of the unit in working condition along the power circuit (excluding actuators) is not more than 20 W (current consumption is not more than 650 mA).

The maximum switched power is 350 W.

The readiness time of the unit after power on is no more than 2 seconds.

The insulation resistance of the unit is not less than 20 MΩ, and in conditions of high humidity - less than 5 MΩ.

The insulation of the unit withstands without damage the impact of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

The unit provides:

- reception and processing of input signals from wheel speed sensors (4 inputs);
- issuance of control actions in the form of rectangular pulses on pressure modulators;
- control of the operation of signal lights that light up in the "AVS" and "INF" modes;
- diagnostics of the elements of the ABS system in continuous monitoring mode.

The unit has a special memory device for storing current modes, system operating parameters and information about failures with a built-in interface such as ISO/DIS 9141 for exchanging diagnostic equipment. The unit stores information about failures, configuration braking performance, serial number and release date of the unit. All information is saved when the power is turned off.

The unit is resistant to polarity reversals in power, short circuit on any of the inputs or outputs.

The unit is operable when exposed to elevated ambient temperature plus 55 ° C and when exposed to a reduced ambient temperature of minus 45 ° C.

The unit is operable under the influence of vibration with the following parameters:

- frequency – 50 Hz;
- Acceleration – 50 m/s².

The unit is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

Production

The unit is resistant to interference from control and signal on-board circuits according to STB ISO 7637-3 or GOST 29157.

The unit is resistant to interference from electrostatic discharge according to GOST 30378 or GOST R 50607.

The unit is resistant to electromagnetic radiation and its own electromagnetic interference in accordance with the requirements of UNECE Regulation No. 10.

90% operating time to the unit failure is 10 thousand motor hours of vehicle operation or 800 thousand km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the unit is 10 years.

Electronic control unit EBP

The electronic control unit of the EBP is designed to receive information from the wheel speed sensors, process this information and issue control signals to the modulators of the system. The unit provides storage of information about the failures of the system elements, braking efficiency and the transmission of this information to the diagnostic complex or in the form of a flashing light code of the control lamp. The units operate in ABS-P systems of the following configurations: 2S/1M, 2S/2M, 4S/2M, 4S/3M, where xS is the number of sensors, xM is the number of modulators.



The EBP-B unit additionally operates in the ABS-P system of configuration 4S/4M.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Rated supply voltage (24 ± 0.5) V.

An example of recording a block in other documents and (or) when ordering:

"Control unit electronic trailer EBP ADUI.453633.005 TU RB 07513211.032-99".

"Control unit electronic trailer EBP-V ADUI.453633.024TU RB 07513211.032-99".

The mass of the block is not more than 3 kg.

The power consumption of the unit in working condition along the power circuit (excluding actuators) is not more than 25 W (current consumption is not more than 650 mA).

The maximum switched power is 250 W.

The readiness time of the unit after power on is no more than 2 seconds.

The insulation resistance of the unit is not less than 20 MΩ, and in conditions of high humidity - less than 5 MΩ.

The insulation of the unit withstands without damage the impact of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

The unit provides:

- reception and processing of input signals from wheel speed sensors (4 inputs);

- issuance of control actions in the form of rectangular pulses on pressure modulators;

- issuing a signal to the electromechanical mileage meter;

- control of the operation of signal lights that light up in the modes of the "AVS-trailer";

- diagnostics of the elements of the ABS system in continuous monitoring mode.

The unit has a special memory device for remembering current modes, system operating parameters and information about failures with Built-in interface for sharing with diagnostic equipment. All information is saved when the power is turned off.

The unit is resistant to polarity reversals in power, short circuit on any of the inputs or outputs.

The unit is operable when exposed to elevated ambient temperature plus 65 ° C and when exposed to a reduced ambient temperature of minus 40 ° C.

The unit is operable under the influence of vibration with the following parameters:

- frequency – 50 Hz;
- Acceleration amplitude – 50 m/s² (5g).

The unit is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

The unit is resistant to interference from control and signal on-board circuits according to STB ISO 7637-3 or GOST 29157.

The unit is resistant to interference from electrostatic discharge according to GOST 30378 or GOST R 50607.

The unit is resistant to electromagnetic radiation and its own electromagnetic interference in accordance with the requirements of UNECE Regulation No. 10.

90% operating time to the unit failure is 10 thousand motor hours of vehicle operation or 800 thousand km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the unit is 10 years.

Anti-lock-traction control ABS/ASR system

The anti-lock and traction control system is designed to prevent blocking and maintain wheel slippage at a level that provides optimal adhesion to the road surface in any road conditions with the implementation of the wheel traction control function.

The ABS/ASR system is the second generation of ABS systems and provides a wide range of applications. The control unit has four software versions and a universal circuitry solution. The system can work with motors with mechanical drive Euro-2, of any type, and with engines Euro-3, Euro-4, including imported.

The ABS/PBS system implements UNECE Regulations 13, UNECE 89 (for Euro 2 engines), 10 UNECE.

Elements of the ABS/ASR system:

- Electropneumatic modulator EPM-1 (from the ABS system);
- Wheel speed sensor DHVK (from the ABS system);
- Modulator cable (from the ABS system);
- Sensor cable (from the ABS system);
- Proportional valve PK-1;
- ASR valve;
- Pneumatic cylinder PC;
- Control unit electronic cabin EBK.



Electronic cabin control unit EBK

The electronic control unit EBK is designed to receive information from the wheel speed sensors, process this information and issue control signals to the modulators of the system. The unit provides storage of information about the failures of the system elements, braking efficiency and the transmission of this information to the diagnostic complex or in the form of a flashing light code of the control lamp. The units operate in ABS systems of 4S/4M or 4S/3M configuration, where xS is the number of sensors, xM is the number of modulators.



Type of climatic performance: U2 according to GOST 15150.

Operating mode: continuous nominal S1 according to GOST 3940.

Rated supply voltage (24 ± 0.5) V or (12 ± 0.5) V.

Modifications of EBK produced

EBK-DM ADUI.453633.014	for ABS/ PBS cars with MMZ Euro-1, Euro-2 engine (injection pump control through pneumatic cylinder PC-3) with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-DM ADUI.453633.014-01	for ABS / PBS cars with the Engine YAMZ Euro-1, Euro-2 (control of injection pumps through the cylinder pneumatic PC-4) and with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-DM ADJUI.453633.014-02	for ABS/PBS vehicles with KAMAZ Euro-1, Euro-2 engine (injection pump control through pneumatic cylinder PC-5) with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-DM ADUI.453633.014-03	for ABS/PBS cars with Euro-3, Euro-4 engine (communication with the engine via CAN interface) and with connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK ADUI.453633.016	for ABS vehicles KAMAZ and MAZ with connector 894 070 850 2 f. AMR
EBK ADUI.453633.016-01	for ABS cars with pneumohydraulic brake drive type Ural
EBK ADUI.453633.016-02	for ABS heavy-duty tractors of Volot type (MZKT)
EBK ADUI.453633.016-03	for ABS cars of MAZ type category N ₂ with connector 894 670 850 2 f. AMR
EBK ADUI.453633.016-04	for ABS/PBS cars with Euro-3 engine, Euro-4 with connector 894 670 850 2 f. AMR, communication with the engine via CAN interface
EBK ADUI.453633.016-05	for ABS/PBS system with electronic brake force regulator ERTS, communication with the engine via CAN interface
EBK ADUI.453633.016-06	for PAZ buses with ABS/PBS function, communication with the engine via CAN interface
EBK ADUI.453633.016-07	for PAZ buses with ABS function, communication with the engine via CAN interface
EBK 12 V ADUI.453633.016-08	for PAZ buses with ABS function, communication with the engine via CAN interface
EBK ADUI.453633.016-09	for cars with pneumatic drive type Ural with ABS function, communication with the engine via CAN interface
EBK-A 12 V ADUI.453633.018	for ABS buses with a rated voltage of 12 V on board and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-A 12 V ADUI.453633.018-01	for ABS cars of GAZ-33104 type with a nominal voltage of the board network 12 V and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1

EBK-A ADJUI.453633.019	for ABS buses with a rated voltage of 24 V on board and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1
EBK-A ADJUI.453633.019-01	for ABS cars with pneumohydraulic brake drive type Ural
EBK-A ADJUI.453633.019-02	for ABS trolleybuses of MAZ type
EBK-A ADJUI.453633.019-03	for ABS/PBS cars and buses and connectors f. AMR 9-966140-5, 9-966140-4, 9-966140-2, 1-967366-1

An example of recording a block in other documents and (or) when ordering:

"Electronic cockpit control unit EBK ADUI.453633.016 TU RB 07513211.024-99".

The mass of the block is not more than 2 кг

The power consumption of the unit in working condition along the power circuit (excluding actuators) is not more than 20 W (current consumption is not more than 650 mA).

The maximum switched power is 350 W.

The readiness time of the unit after power on is no more than 2 seconds.

The insulation resistance of the unit is not less than 20 MΩ, and in conditions of high humidity - less than 5 MΩ.

The insulation of the unit withstands without damage the impact of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

The unit provides:

- reception and processing of input signals from wheel speed sensors (4 inputs);

- issuance of control actions in the form of rectangular pulses on pressure modulators;

- control of the operation of signal lights that light up in the "AVS" and "INF" modes;

- diagnostics of the elements of the ABS system in continuous monitoring mode.

The unit has a special memory device for storing current modes, system operating parameters and information about failures with a built-in interface such as ISO/DIS 9141 for exchanging diagnostic equipment. The unit stores information about failures, configuration braking performance, serial number and release date of the unit. All information is saved when the power is turned off;

The unit is resistant to polarity reversals in power, short circuit on any of the inputs or outputs.

The unit is operable when exposed to elevated ambient temperature plus 55 ° C and when exposed to a reduced ambient temperature of minus 45 ° C.

The unit is operable under the influence of vibration with the following parameters:

- frequency – 50 Hz;

- Acceleration – 50 m/s².

The unit is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

The unit is resistant to interference from control and signal side circuits according to STB ISO 7637-3 or GOST 29157.

The unit is resistant to interference from electrostatic discharge according to GOST 30378 or GOST R 50607.

The unit is resistant to electromagnetic radiation and its own electromagnetic interference in accordance with the requirements of UNECE Regulation No. 10;

90% operating time to the unit failure is 10 thousand motor hours of vehicle operation or 800 thousand km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the unit is 10 years.

ASR valve

The ASR valve is designed to supply pressure from the receivers to the brake chambers of the drive wheels through modulators according to the electrical control commands from the electronic unit. The valve provides a change in pressure according to a two-phase algorithm (lifting and lowering the pressure of a given value). In the initial position (in the de-energized state), the valve cuts off the receiver from the brake line.



Type of climatic performance: U, accommodation category 2 according to GOST 15150, the lower operating value of the air temperature during operation is minus 45 °C, the upper limiting operating value of the air temperature during operation is 65 °C.

Mode of operation: re--short-term S3 according to GOST 3940.

An example of an entry in other documents and (or) when ordering:

"Valve ASR ADUI.453644.004 TU BY 600417525.043-2006".

«Valve ASR ADUI 453644.004-01 TU BY 600417525.043-2006»

The mass of the valve is not more than 400 grams.

Rated supply voltage (24 ± 0.5) V.

Nominal valve consumption current 0.4 A.

The active resistance of the valve electromagnet winding (60 ± 2.5) ohms at a temperature of plus (20 ± 2) ° C.

The supply voltage range of the valve electromagnet is from 21.6 to 30.5 V.

The maximum operating pressure at the inlet is 1.0 MPa.

The valve remains operational after being exposed to pressure on the valve inlet 1.32 MPa for 5 minutes.

The valve provides the time of filling the brake chamber with air with a volume (1 ± 0.1) l of not more than 1.8 seconds, the time of release of air from the brake chamber - no more than 3.8 seconds, the delay time of operation is not more than 30 ms.

The valve actuation current at a nominal voltage of 24 V is not more than 0.5 A.

The valve shall be operated on compressed air in the pneumatic systems of vehicles fitted with a moisture separator and filter, allowing some moisture and oils to enter the pneumatic system.

The valve remains operational when exposed to an elevated temperature of plus 70 ° C, and a low temperature of minus 40 ° C.

The valve withstands the effects of vibration loads according to the IV degree of rigidity according to GOST 28988 and shock loads for group M1 according to GOST 30631 for products installed outside the engine.

Insulation resistance of at least 20 MΩ in normal climatic conditions and not less than 5 MΩ in high humidity.

The valve insulation withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

90% of the operating time to valve failure is 18 thousand engine hours of operation of the vehicle or 1 million. km. vehicle mileage or 2 million. trigger cycles.

The average service life of an ASR valve is 10 years.

Proportional valve PK-1

Proportional valve PK-1 is designed to regulate the pressure in the pneumatic cylinder of control of the mechanical regulator of fuel supply of a diesel engine of Euro-2 type, according to the control commands received by the electromagnet of the proportional valve from the electronic unit in the form of a pulse width modulation signal.

Type of climatic performance: U according to GOST 15150;

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal supply voltage 24 V or 12 V.

Modifications of the valve for a supply voltage of 12 V and 24 V, with a bayonet connector and with a connector with a metric thread have been developed and are being produced.



Modifications of the produced PK-1

Designation	Design features
PK-1 ADUI.453644.001	metric thread connector, nominal voltage 24 V
PK-1 ADUI.453644.001-01	metric thread connector, nominal voltage 12 V
PK-1 ADUI.453644.002	bayonet connector, rated voltage 24 V
PK-1 ADUI.453644.002-01	bayonet connector, rated voltage 12 V

An example of an entry in other documents and (or) when ordering:

"Proportional electropneumatic valve PK-1 ADUI.453644.001 TU RB 600417525.021-2001".

The mass of the PK-1 valve is not more than 950 g.

Maximum current consumption at a maximum supply voltage of 1.6 A for a valve with a nominal supply voltage of 24 V and 3 A for a valve with a nominal supply voltage of 12 V.

Insulation resistance of at least 20 MΩ in normal climatic conditions and not less than 5 MΩ in high humidity.

The valve insulation withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

The active resistance of the valve electromagnet winding at a temperature of plus $(20 \pm 2)^\circ \text{C}$ for a valve with a nominal supply voltage of 24 V - (21 ± 1.0) Ohms, for a valve with a nominal supply voltage of 12 V - (5.1 ± 0.2) Ohms.

Working medium - air (possible ingress of moisture and oils).

Operating pressure – from 0.7 to 0.82 MPa.

Time of filling the chamber with a volume of 1 liter with air up to a pressure of 0.7 MPa at a pressure at the valve inlet of 0.8 MPa, nominal supply voltage and PWM value 60% – not more than 2.5 s, the time of air discharge from the chamber to a pressure of 0.1 MPa – 3,5 sec.

The valve remains operational when exposed to an elevated temperature of plus 60°C , and a low temperature of minus 40°C .

The valve withstands the effects of vibration and shock loads according to GOST 3940 for products installed outside the engine.

Production

90% operating time to failure of the PK-1 is 10 thousand motor hours of vehicle operation or 800 thousand km of mileage for the second category of operating conditions according to GOST 15150.

The average service life of PK-1 is 10 years.

Pneumatic cylinder PC

The pneumatic cylinder PC is designed to control the rail lever of the high-pressure fuel pump of the injection pump drive and is installed in the anti-lock and traction control systems (ABS / ASR) of vehicles of category M and N according to GOST 31286 with pneumatic brake drive and an engine with a mechanical regulator of the fuel supply drive of euro-2 type.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 80 °C.

Pneumatic cylinders are available in the following versions:

- pneumatic cylinder PC-3 with a change in the protrusion of the rod stroke from 0 to 45 mm for engines of the Minsk Motor Plant MMZ;
- pneumatic cylinder PC-4 with a change in the protrusion of the rod stroke from 0 to 70 mm for engines of the Yaroslavl Motor Plant YAMZ;
- PNEUMATIC cylinder PC-5 with a change in the protrusion of the rod stroke from 0 to 40 mm for KAMAZ engines.

Pneumatic cylinders are available in the following versions:

pneumatic cylinder PC-3	ADUI.3043012.003	with a change in the protrusion of the rod stroke from 0 to 45 MM
pneumatic cylinder PC-4	ADUI.3043012.004	with a change in the protrusion of the rod stroke from 0 to 70 MM
pneumatic cylinder PC-5	ADUI.3043012.005	with a change in the protrusion of the rod stroke from 0 to 32 MM

An example of an entry in the technical documentation and when ordering:

"Pneumatic cylinder PC-3 ADUI.304312.003 TU BY 600417525.041-2006".

The weight of the pneumatic cylinders of the PC-3 is not more than 650 grams, the PC-4 is no more than 850 grams, the PC-5 is no more than 650 grams.

The working environment of pneumatic cylinders is air (possible ingress of moisture, oils and diesel fuel)..

Operating pressure – from 0.03 to 0.82 MPa.

The pneumatic cylinder must remain operational when exposed to an increased operating temperature of plus 80 ° C, when exposed to a reduced operating temperature of minus 45 ° C.

The pneumatic cylinder must withstand vibration resistance tests according to the IV degree of rigidity according to GOST 28988 and shock loads for the M37 group according to GOST 30631 for products installed on the engine.

90% time between failures of the pneumatic cylinder for the 2nd category of operating conditions according to GOST 15150 is set at least 18 thousand motor hours or 1 million km of vehicle mileage, or 50,000 actuation cycles.

The average service life of pneumatic cylinder is 10 years.



Electronic air suspension control system ECAS

The ECAS system is an electronically controlled air suspension system for vehicles, which includes many functions:

- increased ride comfort due to low suspension stiffness;
- maintaining a constant height of the PBX regardless of the load;
- changes in the pressure in the pneumatic cylinders of the suspension as a control pressure of the brake force regulator;
- manual selection of the height of the vehicle using the control panel;
- storage in the non-volatile memory of the electronic unit of pre-set levels of the chassis of the vehicle and their restoration at any time using the control panel;
- reducing the center of gravity of the PBX while driving and, consequently, increasing the stability of the vehicle;
- constant diagnostics of all components of the system.

Elements (ECAS):

- Remote control TU BY 600417525.053-2006;
- Electronic air suspension control unit (BEUP) TU BY 600417525/052-2006;
- Block of solenoid valves (BEK) TU BY 600417525.049-2006;
- Displacement sensor (DP-01) TU BY 600417525.051-2006;
- Electronic pressure sensor (DDE).



Solenoid valve block BEK

The solenoid valve unit is designed to regulate the volume of air in the air suspension cylinders (pneumatic cylinders) according to the electrical control commands from the electronic unit entering the contacts of the solenoid valves. BEC provides the process of pressure control in pneumatic cylinders according to a three-phase algorithm (raising, lowering and maintaining at the same level). The BEK in the initial position (in the de-energized state) cuts off the pressure accumulator (receiver) from the line to the pneumatic cylinders. The valve block operates on compressed air of pneumatic systems of motor vehicles equipped with air preparation devices, while allowing the ingress of a certain amount of moisture and oils into the pneumatic system.



Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the ambient temperature during operation is 55 °C, the lower operating value of the ambient temperature during operation is minus 45 °C, the upper limiting operating value of the ambient temperature during operation is 65 °C.

Mode of operation: re--short-term S3 according to GOST 3940-84.

Nominal supply voltage $U_p = 24 \text{ V}$.

An example of an entry in the technical documentation and when ordering:

"Block of solenoid valves BEK ADUI.453648.001 TU BY 600417525.049-2006".

SOLENOID VALVE BLOCK BEK	ADUI.453648.001 TU BY 600417525.049-2006	with three-pin bayonet connector and combined pneumatic outputs 22, 23 for simultaneous adjustment of suspension pneumatic cylinders
Solenoid valve block BEK-2	ADUI.453648.006 TU BY 600417525.049-2006	with four pin bayonet connector and separate outputs 22, 23 for separate adjustment of suspension pneumatic cylinders (front and rear axle)
Solenoid valve block BEK-2M	ADUI.453648.007 TU BY 600417525.049-2006	with four pin bayonet connector and separate outputs 22, 23 for separate control of suspension pneumatic cylinders (front and rear axle), increased thermostat in continuous operation mode and additional moisture resistance when immersed in water to a depth of 1 m

The mass of the valve block is not more than 2,5 kg

Rated current consumption of the valve block is 0.32 A.

The unit is operating in the supply voltage range from 18 V to 30.5 V DC.

The operating pressure at the inlet of the valve block is from 0.5 to 0.8 MPa.

The maximum operating pressure at the inlet is 1.0 MPa.

The valve block remains operational after the pressure on the inlet of the valve block of 1.35 MPa for 5 minutes.

The insulation resistance of the valve block is not less than 20 MΩ in normal climatic conditions and at least 5 MΩ in high humidity.

Production

The insulation of the valve block withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

Active resistance of the windings of the electromagnet of the valve block (75 1.0) Ohms at a temperature of (20 ± 2) °C with a nominal supply voltage of 24 V. $\pm\pm^\circ$

The leakage of the valve block design at an inlet air pressure of 0.8 MPa in the disconnected and on state shall not exceed 5 cm³/min.

The actuation currents of the solenoid valves of the valve block are not more than 0.25 A.

The unit is operable under the influence of:

- increased ambient temperature plus 80 °C and short-term exposure to temperature plus 100 °C for 1 hour;

- reduced ambient temperature minus 40 °C and short-term exposure to a temperature of minus 50 °C for 1 hour;

The valve block must withstand the effects of vibration and shock loads according to GOST 3940 for products installed outside the engine.

The block complies with the requirements of UNECE Regulation No. 10.

The unit is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

95% operating time to the unit failure is 18 thousand motor hours of vehicle operation or 1 million km of vehicle mileage for the second category of operating conditions according to GOST 15150 or 1 million response cycles.

The average service life of the unit is 10 years.

Electronic control unit for air suspension BEUP

The electronic air suspension control unit (BEUP) provides:

- reception and processing of information from resistive motion sensors (4 inputs) with a resistance of $2.5\text{--}5\text{ k}\Omega \pm 20\%$;
- reception and processing of information from analog pressure sensors with a signal level from 0.25V to 3.8V ;
- issuing control signals in the form of rectangular pulses to solenoid valves with an active resistance of at least $15\text{ }\Omega$. Pulse duration from 0.5 s to 5 s ;
- reception and processing of the speed signal from the terminal of the tachograph B7.



The unit controls the operation of signal lights of type A24-2 (GOST 2023.1-88), which light up when errors appear and the blink codes are displayed.

The unit diagnoses the elements of the ESUP system in the continuous monitoring mode. To diagnose the unit with special equipment, the CAN interface J1949 is used.

The unit has a special memory device for remembering current modes, system operating parameters and information about failures. The block memory device stores information about the failures, configuration, serial number, and release date of the unit. All information is saved when the power is turned off.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the ambient temperature plus $55\text{ }^{\circ}\text{C}$, the lower operating value of the ambient temperature minus $40\text{ }^{\circ}\text{C}$, the upper limit value of the ambient temperature plus $65\text{ }^{\circ}\text{C}$.

Operating mode: continuous rated S1 according to GOST 3940-84.

Nominal supply voltage $U_p = 24\text{ V}$.

An example of an entry in the technical documentation and when ordering:

Electronic control unit for air suspension BEUP	ADUI.452925.002 TU BY 600417525.052-2006	1S/1K Configuration Unit
	ADUI.452925.002-01 TU BY 600417525.052-2006	configuration unit 1S/1K c CAN
	ADUI.452925.002-02 TU BY 600417525.052-2006	configuration unit 2S/1K c CAN

The mass of the block is not more than 300 grams.

The unit is operating in the supply voltage range from 18 V to 30.5 V DC .

Readiness time after power on - no more than 2 seconds.

The power consumption of the unit in working condition along the power circuit (excluding actuators) is not more than 20 W (current consumption is not more than 650 mA). The maximum switched power is 250 W .

The unit is resistant to power polarity reversals, to short circuits on any of the inputs or outputs. Exposure time is not limited.

The unit complies with the requirements of UNECE Regulation No. 10;

The unit is stable:

Production

- to conductive interference on power circuits according to STB ISO 7637-2 or according to GOST 28751;
- to interference with control and signal on-board circuits according to STB ISO 7637-3 or according to GOST 29157;
- to interference from electrostatic discharge according to GOST 30378.
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;

The unit is operable under the influence of:

- vibration with a frequency of 50Hz, acceleration of 50m/ s²;
- ambient temperature plus 55 ° C;
- ambient temperature minus 40 ° C;

95% operating time to the unit failure is 18 thousand motor hours of vehicle operation or 1 million km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the unit is 10 years.

Pressure sensors electronic DDE

The electronic pressure sensor is designed to obtain information about the pressure in pneumatic cylinders or the pneumatic network of the ATC and transmit it to the electronic control unit of the system.

Type of climatic performance: U1 according to GOST 15150, but at the same time the upper operating value of the ambient temperature during operation is 80 °C, the lower operating value of the ambient temperature minus 40 °C, the upper limit operating value of the ambient temperature is 100 °C.

Mode of operation of the sensor: continuous nominal S1 according to GOST 3940.

Nominal supply voltage $U_p = 24 \text{ V}$.

The sensor remains operational in the supply voltage range from 18 V to 32 V.

An example of an entry in the technical documentation and when ordering:



Electronic pressure sensor DDE-08-01	ADUI.406222.003 TU BY 600417525.050-2006	maximum diameter of the sensor – 42 mm; height – 80 mm; connecting external thread M16x1,5; air supply hole diameter 4 mm
Electronic pressure sensor DDE-08-02	ADUI.406222.005 TU BY 600417525.050-2006	maximum diameter of the sensor – 42 mm; height – 65 mm; connecting external thread M16x1,5; air supply hole diameter 4 mm
Electronic pressure sensor DDE-08-02	ADUI.406222.005-01 TU Y 600417525.050-2006	maximum diameter of the sensor – 42 mm; height – 65 mm; connecting external thread M16x1,5; hole for air supply with internal thread M10x1
Electronic pressure sensor DDE-08-03	ADUI.406222.008 TU BY 600417525.050-2006	maximum diameter of the sensor – 42 mm; height – 80 mm; connecting external thread M16x1,5; air supply hole diameter 4 mm
Electronic pressure sensor DDE-08-04	ADUI.406222.016 TU BY 600417525.050-2006	maximum diameter of the sensor – 42 mm; height – 82 mm; connecting external thread M12x1,5; air supply hole diameter 4 mm
Electronic pressure sensor DDE-10-01	ADUI.406222.017 TU BY 600417525.050-2006	maximum diameter of the sensor – 42 mm; height – 80 mm; connecting external thread M16x1,5; air supply hole diameter 4 mm
Electronic pressure sensor DDE-10-02	ADUI.406222.018	

Electrical parameters of the sensor at rated voltage

Rated supply voltage, V	Pressure value at sensor input, KPa	Sensor output voltage, V (DDE-08-01, DDE-08-02)	Sensor output voltage, V (DDE-10-01, DDE-10-02)	Sensor output voltage, V (DDE-08-03)
24±0,5	0	0,2	0,5	0,4
	100	0,6505*	0,9*	1,301 *
	200	1,101	1,3	2,202
	300	1,5515*	1,7*	3,103*
	400	2,002	2,1	4,004
	500	2,4525*	2,5*	4,905*
	600	2,903	2,9	5,806
	700	3,3535*	3,3*	6,707*
	800	3,804	3,7	7,608
	900	4,2545	4,1	8,509
	1000	4,705	4,5	9,41
*- for acceptance tests				

The mass of the sensors is not more than 150 g.

The sensor is resistant to short circuits on any of the pins to the on-board or to the body network, and is also protected from pairwise entanglement.

The sensor is stable:

- to conductive interference on power circuits according to STB ISO 7637-2;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to interference from electrostatic discharge according to GOST 30378;
- to the effect of changes in ambient temperature from minus 40 ° C to plus 80 ° C;
- to the effect of vibration with an acceleration of 50 m / s² and a frequency of 10 to 50 Hz (DDE-08-03: from 30 to 80 Hz) at least 8 h.
- to the effects of shock loads with an acceleration of 100 m/s² and a frequency of 100 beats per minute.

The insulation resistance of the sensor contacts relative to the housing is not less than 1 MΩ in normal climatic conditions.

The isolation of the sensor contacts relative to the housing withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 minute.

95% of the sensor operating time to failure is 18 thousand motor hours of vehicle operation or 1 million km of vehicle mileage for the second category of operating conditions according to GOST 15150. The average service life of the sensor is 10 years.

DP displacement sensor

The displacement sensor is designed to obtain information about the change in the distance between the body and the axle of the vehicle and transmit it to the electronic control unit.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the ambient temperature during operation is 80 °C, the lower operating value of the ambient temperature minus 40 °C, the upper limiting operating value of the ambient temperature is 100 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal supply voltage $U_p = 24 \text{ V}$.

An example of an entry in the technical documentation and when ordering:



Displacement sensor DP-01	ADUI.301269.025 TU BY 600417525.051-2006
Displacement sensor DP-02	ADUI.301269.030 TU BY 600417525.063-2013
Displacement sensor DP-03	ADUI.301269.032 TU BY 600417525.071-2017

The mass of the sensor is not more than 300 grams.

Sensor output voltage at reference points as a function of lever rotation angle

Lever rotation angle	Sensor output voltage DP-01, V	Lever rotation angle	Sensor digital output values DP-02, D(α)	Lever rotation angle	Sensor output voltage DP-03, V
0	1,5	10°	410	0	1
10	1,75	30°	819	20	2
20	2,0	50°	1229	40	3
30	2,25	70°	1638	60	4
40	2,5	90°	2048	80	5
50	2,75	110°	2457	100	6
60	3,0	130°	2867	120	7
70	3,25	150°	3276	140	8
80	3,5	170°	3686	160	9

NOTE – The value of the digital output signal at an arbitrary position of the sensor lever can be determined by the formula

$$D(\alpha) = (20,475 \alpha + 2047,5) \cdot 66, \text{ at } \alpha [-90; 90], \times \pm \epsilon$$

where D(α) is the value of the output digital signal,

α is the angle of rotation of the sensor lever, expressed in degrees.

The result of the calculations is rounded towards a larger whole.

The sensor is operable in the supply voltage range from 8 V to 32 V.

The insulation resistance of the sensor contacts relative to the housing is not less than 1 M Ω in normal climatic conditions.

The isolation of the sensor contacts relative to the housing withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 minute.

The sensor is stable:

- to conductive interference on power circuits according to STB ISO 7637-2 or according to GOST 28751;

Production

- to interference with control and signal on-board circuits according to STB ISO 7637-3 or according to GOST 29157;
- to interference from electrostatic discharge according to GOST 30378;
- to the effect of changes in ambient temperature from minus 40 ° C to plus 80 ° C;
- to the effect of vibration with acceleration of 50 m / s² and a frequency from 10 to 50 Hz at least 8 h.
- to the effects of shock loads with an acceleration of 100 m/s² and a frequency of 100 beats per minute.

The sensor complies with the requirements of UNECE Regulation No. 10.

95% of the sensor operating time to failure is 18 thousand hours of sensor operation on the stand or 1 million km of vehicle mileage or 175 thousand cycles of full movement of the lever.

The average service life of the unit is 10 years.

Remote Control Remote Control

The remote control is designed to enable the driver to influence the height level of the car by giving the appropriate control commands via a wired communication line to the electronic control unit of the air suspension.

Remote control provides:

- signal processing from the keyboard.
- issuance of control actions according to the I2C protocol on the BEUP.
- control of the operation of signal LEDs.

The remote control has a memory for remembering the current modes, system operating parameters, serial number and release date of the remote. All information is stored when the power is turned off.

Type of climatic performance: U2 according to GOST 15150.

Operating mode: continuous rated S1 according to GOST 3940-84.

Nominal supply voltage $U_p = 24 \text{ V}$.

An example of an entry in the technical documentation and when ordering:

«Remote control remote control TU BY 600417525.053-2006».

The weight of the remote control is not more than 300 g.

The remote control is operable in the supply voltage range from 18V to 30.5VDC.

The readiness time after turning on the power is no more than 2 seconds.

The power consumption of the remote control in working condition on the power supply circuit is not more than 6 W (current consumption is not more than 250 mA).

The remote control is resistant to power polarity reversals, to short circuits on any of the inputs or outputs. Exposure time is not limited.

The console complies with the requirements of UNECE Regulation No. 10.

The remote control is stable:

- to conductive interference on power circuits according to STB ISO 7637-2 or according to GOST 28751;
- to interference with control and signal on-board circuits according to STB ISO 7637-3 or according to GOST 29157;
- to interference from electrostatic discharge according to GOST 30378.
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;

The remote control is operable when exposed to:

- vibration with a frequency of 50Hz, acceleration of 50 m / s²;
- ambient temperature plus 55 ° C;
- ambient temperature minus 45 ° C;

95% of the operating time to failure of the remote control is 10 thousand motor hours of vehicle operation or 1 million km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the console is 10 years.



ABS for trailers with anti-rollover function

The system is designed to improve the active safety of vehicles by improving braking properties, improving handling and stability during braking, cornering and maneuvering on roads with low and variable coefficient of adhesion.

The system can be used on trailer trains (trailers and semi-trailers) of new generation MAZ and KAMAZ long-haul heavy-duty road trains, as well as on other trailer vehicles with pneumatic brake drive.

MUT-P trailer brake control module is designed to control the braking of the trailer, when receiving a signal about the beginning of braking from the electronic brake control unit of the tractor or from the pressure sensor in the control pneumatic main.

DDEI pressure sensor electronic intelligent is designed to obtain information about the pressure in the pneumatic cylinders or pneumatic network of the vehicle and transmit it to the receiver of the digital signal via the CAN network in accordance with the communication standard J1939.

DP-02 motion sensor (with output to the CAN bus) is designed to obtain information about the change in the distance between the body and the axle of the vehicle and transmit it to the electronic control unit.

DFVK wheel speed sensors are installed one at a time on the wheels of the front and rear axles. These sensors produce speed signals, on the basis of which the ECU sends control signals to the actuators in accordance with the speed of the PBX and the road condition. The sensor works with a rotor (inductor) installed on the wheel hub.

EPM-P electropneumatic modulator is designed to regulate the pressure in the brake chambers according to the control electrical commands coming from the electronic control unit.



Trailer brake control module MUT-P

Designed to work as part of anti-lock braking systems (ABS) brakes with anti-rollover function on trailers with pneumatic brake actuation.

The trailer module shall provide:

- anti-lock braking;
- anti-rollover regulation;
- adjustment of braking forces depending

on the load.

The trailer module shall carry out self-monitoring and control of the serviceability and quality of operation of the elements of the ABS system connected to it with the anti-rollover function, save information about failures and pre-emergency modes of operation, including when the power is turned off.



Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is 55 °C, the lower operating value of the air temperature during operation is minus 40 °C, the upper limiting operating value of the air temperature during operation is 65 °C.

Operating mode: continuous nominal mode S1 according to GOST 3940.

The nominal supply voltage of the trailer module is 24 V.

An example of recording a trailer module in other documents or when ordering:

"Control module for trailer brakes MUT-P ADUI.453648.005 TU BY 600417525.060-2013".

The mass of the trailer module is not more than 5 kg.

The power consumption of the trailer module at rest on the supply circuit (in the absence of regulation) should be no more than 20 W (current consumption not more than 650 mA).

The maximum power consumption during the regulation is 450 W (current consumption is not more than 15 A).

The trailer module is stable:

- to the polarity of nutrition;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to interference from electrostatic discharge according to GOST 30378.
- to conductive interference on power circuits according to GOST ISO 7637-2;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;
- to the effects of shock loads with acceleration of 100 m/s².

95% operating time to failure of the trailer module is 1 million km of trailer mileage.

The average service life of the unit is 10 years.

ABS/ASR with EDB function

The system is designed to prevent locking and maintain wheel slip at a level that provides optimal grip on the road surface in all road conditions with the implementation of the function traction control wheels and electronic control of braking forces.

EBK-016-05 electronic cabin control unit (with EDB function) of cars with pneumatic brakes receives information from wheel speed sensors, processes this information and issues control signals to the actuators (solenoid valves) of the system. Provides storage of information about failures of system elements, braking efficiency, brake force regulation and transmission of this information to the diagnostic complex.



EPM-2 electropneumatic modulator is designed to regulate the pressure in the brake chambers according to the electrical control commands from the electronic unit. Provides pressure control in the actuator pneumatic cylinders according to a three-phase algorithm (lifting, holding and resetting).

DDE-08-01 electronic pressure sensor is designed to obtain information about the pressure in the pneumatic cylinders or pneumatic network of the vehicle and transmit it to the receiver of the digital signal.

The ASR valve is designed to supply pressure from the receivers to the brake chambers of the drive wheels through modulators (one-way actuator pneumatic cylinders) according to the electrical control commands from the electronic unit entering the contacts of the solenoid valve.

ABS sensor with cable sensors are installed one at a time on the wheels of the front and rear axles. These sensors produce speed signals, on the basis of which the ECU sends control signals to the actuators in accordance with the speed of the PBX and the condition of the road.

Longitudinal stability control system ESP

The longitudinal (directional) stability control system is designed to be installed on cars (tractors) of heavy-duty MAZ and KAMAZ road trains in order to increase the active safety of the vehicle.

The system for monitoring the longitudinal (directional) stability of the heavy-duty truck tractor allows you to avoid an emergency situation, ensuring the functioning of the braking system, the implementation of the functions of the anti-lock and traction control system, load control and the trajectory of movement, thereby ensuring accurate regulation of the braking force, improving the compatibility of the braking properties of the tractor and trailer, reducing the wear of the brake pads and reducing the overall operating costs of road transport means.



The set of the system for monitoring the longitudinal (directional) stability of the tractor of a heavy-duty road train includes:

- electronic cabin control unit EBK-ESP;
- steering wheel rotation sensor DPR-1;
- electronic acceleration sensor DUE-01 (or DUE-02);
- pressure sensor electronic intelligent DDEI;
- ASR valve;
- wheel speed sensor DCHVK – 4 pcs.;
- electropneumatic modulator (EPM-1, EPM-2, EPM-P) – 4-6 pcs.;
- infomodule;
- a set of cables.

To diagnose the operability of the longitudinal (directional) stability control system, a diagnostic complex DK / SAN has been developed.

Electronic control unit EBK-ESP

EBK-ESP electronic cabin control unit receives information from wheel speed sensors, acceleration sensors, pressure sensors and steering wheel rotation sensor, processes this information and issues control signals to the actuators (solenoid valves) of the system. Synchronizes the operation of the system on the tractor with the ABS system installed on the trailer / semi-trailer (for ABS-P with anti-rollover or electronic drive function). Provides storage of information on failures of system elements, braking efficiency, configuration and transmission of this information to the diagnostic complex tu RB 600417525.042 or in the form of a flashing light code of the control lamp.



The unit operates in the stability control system of the 4S/4M or 6S/6M configurations, where xS is the number of sensors, xM is the number of modulators.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal supply voltage of the unit $U_n = 24 \text{ V}$.

An example of recording a block in other documents and (or) when ordering:

"Electronic cabin control unit EBK-ESP ADUI.453633.025 TU BY 600417525.069 – 2017".

The mass of the block is not more than 1 kg.

The degree of protection provided by the shell against penetration into foreign bodies and water for the block according to GOST 14254 should be IP34.

Electrical parameters of the unit at the nominal supply voltage.

The power consumption of the unit in working condition along the power circuit (excluding actuators) should be no more than 25 W. The maximum switched power is 350 W.

The standby time of the unit after turning on the power should be no more than 2 seconds.

The unit shall provide:

a) Reception and processing of input signals from wheel speed sensors: inductive sensors (coil windings with resistance $(1.3 \pm 0.1) \text{ k}\Omega$), the frequency of received signals from 10 to 1400 Hz, the signal amplitude at a frequency of 10 Hz is not less than 0.05 V, at a frequency of 1400 Hz $\pm$ not more than 40 V.

b) Issuance of control actions in the form of rectangular pulses on pressure modulators (solenoid valves "discharge" and "cut-offs" with active resistance under normal conditions $(15 \pm 1.0) \text{ }\Omega$. Pulse duration from 10 to 500 ms. $\pm$

c) Issuance of control actions in the form of rectangular pulses to the modulator on the accelerator valve with active resistance under normal conditions $(15 \pm 1.0) \text{ }\Omega$. Pulse duration from 10 to 500 msec.

d) Control of the brake-retarder shutdown relay with active resistance $(24 \pm 1.0) \text{ }\Omega$. $\pm$

e) Control of the operation of signal lights of type A24-2 (GOST 2023.1), which light up in the modes "AVS" (ABS) and "INF" (information) (when errors appear and the blink codes are displayed, respectively).

(e) The unit provides CAN bus communication to the engine to ensure the function of PBS and speed limitation.

g) The unit provides communication via the CAN bus with the electronic control unit of the trailer to synchronize the operation.

h) The unit receives information via the CAN bus from the steering wheel rotation sensor and the acceleration sensor.

i) Diagnostics of system elements in continuous monitoring mode:

- checking the status of the sensors for a break and a short circuit on the plus or minus of the car's onboard network when the power is turned on and the driving mode;

- checking the state of the electromagnets of the actuators for a break and a short circuit when the power is turned on and then with a period of 1c;

- checking the state of the unit (controller), with automatic shutdown of the faulty element of the circuit (axis) or the system as a whole;

90% of the unit's operating time to failure is 800 thousand km of car mileage.

The average service life of the unit is 10 years.

Pressure sensor electronic intelligent DDEI

The electronic intelligent pressure sensor is designed to obtain information about the pressure in the pneumatic blocks or pneumatic network of the vehicle and transmit it to the receiver of the digital signal via the CAN network in accordance with the communication standard J1939.

Type of climatic performance: U1 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

An example of recording a sensor in other documents and /or when ordering:

"Electronic intelligent pressure sensor DDEI ADUI.406222.006 TU VY 600417525.061-2013".



Electrical parameters of the sensor at rated voltage

Rated supply voltage, V	Sensor inlet pressure, kPa	Digital output values, Du (P)
24±0,5	0	164
	100	533*
	200	902
	300	1271*
	400	1640
	500	2009*
	600	2378
	700	2747*
	800	3115

* - For acceptance tests

The mass of the sensor is not more than 250 g.

The sensor is resistant to short circuit on any of the pins to the on-board network or to the body, and is also protected from polarity over power.

The sensor is stable:

- to conductive interference on power circuits according to STB ISO 7637-2;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to interference from electrostatic discharge according to GOST 30378;
- to the effect of changes in ambient temperature from minus 40 ° C to plus 65 ° C;
- to the effect of vibration with an acceleration of 50 m / s² and a frequency from 10 to 50 Hz for at least 8 hours.
- to the effects of shock loads with an acceleration of 100 m/s² and a frequency of 100 beats per minute.

The insulation resistance of the sensor contacts relative to the housing is not less than 1 MΩ in normal climatic conditions.

The isolation of the sensor contacts relative to the housing withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 minute.

Production

95% of the sensor operating time to failure is 18 thousand engine hours of the vehicle or 1 million km of the vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the sensor is 10 years.

Electropneumatic tractor modulators EPM

Modulators are available in the following types: EPM-1, EPM-2.

The modulators are designed to regulate the pressure in the brake chambers according to the electrical control commands from the electronic unit. Modulators provide pressure control in actuating pneumatic cylinders according to a three-phase algorithm (lifting, holding and resetting pressure of a given value).

Modifications of modulators for a supply voltage of 12V and 24V, with a bayonet connector and with a connector with a metric thread have been developed and are being produced.



Type of climatic performance: U2 according to GOST 15150.

Operating mode: re-short-term S3 according to GOST 3940

Rated supply voltage (24 ± 0.5) V or (12 ± 0.5) V.

Modifications of epm produced

Designation	Supply voltage	Design features
EPM-1 ADUI.453643.002	24V	with metric thread connector and optional reset connector
EPM-1 ADUI.453643.002-01	24V	with metric thread connector and no additional reset connection
EPM-1 ADUI.453643.002-02	12V	with metric thread connector and no additional reset connection
EPM-1 ADUI.453643.004	24V	with bayonet connector and optional reset connection
EPM-1 ADUI.453643.004-01	24V	with bayonet connector and no additional reset connection
EPM-1 ADUI.453643.004-02	12V	with bayonet connector and no additional reset connection
EPM-2 ADUI.453643.008	24V	with reduced overall dimensions, with a bayonet connector and without additional reset connection
EPM-2 ADUI.453643.008-01	12V	with reduced overall dimensions, with a bayonet connector and without additional reset connection
EPM-2 ADUI.453643.008-02	24V	for vehicles equipped with a stability control system, with reduced overall dimensions, with a bayonet connector and without an additional reset connection

An example of recording a block in other documents and (or) when ordering:

"Electropneumatic tractor modulator EPM-1 ADUI 453643.002 TU RB 07513211.033-99".

The mass of modulators is not more than 800 g (EPM-1) and 600 g (EPM-2).

Rated consumption current of 1.65 A for a modulator with a nominal supply voltage of 24 V and 2.2 A for a modulator with a nominal supply voltage of 12 V.

The insulation resistance of the modulator should be at least 20 MΩ, and in conditions of high humidity at less than 5 MΩ.

Production

The insulation of the modulator must withstand without damage the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

Electrical resistance of modulator electromagnet windings (15 ± 1.0) Ohms, at ambient temperature (20 ± 2) ° C for a modulator with a nominal supply voltage of 24 V and (5.5 ± 0.5) Ohm, at ambient temperature (20 ± 2) ° C for a modulator with a nominal supply voltage of 12 V.

The modulator provides the time of filling the brake chamber with air with a volume of (1 ± 0.1) l not more than 200 ms, the time of release of air from the brake chamber - no more than 240 ms, the delay time of operation is not more than 30 ms.

The modulator remains operational at an increased operating temperature of plus 90 ° C, at a reduced operating temperature of minus 45 ° C.

The modulator is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

The modulator complies with the requirements of UNECE Regulation No. 10.

90% operating time to failure of the EPM-1 modulator is 10 thousand hours of operation of the vehicle or 2.5 million cycles of actuations, the EPM-2 modulator - 10 thousand hours of operation of the vehicle or 10 million cycles of actuation.

The average service life of EPM-1 modulators should be 10 years or 800 thousand km of TS mileage, EPM-2 modulators - 10 years or 1 million km of TS run.

Steering wheel sensor DPR-1

Designed to obtain information about the angular position of the steering wheel of the vehicle and transmit its digital signal to the receiver via the CAN network in accordance with the communication standard SAE J1939.

Type of climatic performance: U2 according to GOST 15150.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal supply voltage of the sensor $U_n=24$ V.

An example of recording a sensor in other documents and /or when ordering:

"Steering wheel rotation sensor DPR-1 ADYUI.402142.001 TU BY 600417525.064-2014".

The mass of the sensor is not more than 55 g.

The sensor is operable in the supply voltage range from 18 to 32 V.

The insulation of the contacts relative to the housing withstands without damage for 1 minute the impact of a practically sinusoidal alternating current with a frequency of 50 Hz, the effective voltage of which is 550 V.

The sensor is stable:

- to conductive interference on power circuits according to GOST ISO 7637-2;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to interference from electrostatic discharge according to GOST 30378;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;
- to the effect of vibration at an acceleration of 50 m / s² and a frequency from 10 to 50 Hz for at least 8 hours;
- to the effects of shock loads with a maximum acceleration of up to 100 m/s² and a frequency of 100 beats per minute.

95% operating time to failure is 18 thousand hours of operation of the sensor on the stand or 1 million km of truck mileage, or 280 thousand full revolutions of the steering wheel of the truck.

The average service life of the sensor is 10 years.



Electronic acceleration sensor DUE

The electronic acceleration sensor is designed to obtain information about the accelerations and angular velocities of the vehicle in X-Y-Z coordinates and transmit a digital signal to the receiver via the CAN network in accordance with the communication standard J 1939.

Type of climatic performance: U1 according to GOST 15150.

Operating mode: continuous nominal S1 according to GOST 3940.

The nominal supply voltage of the sensor is $U_n=24$ V.

Examples of recording the sensor in other documents and /or when ordering:

"Electronic acceleration sensor DUE-01 ADUI.402139.001 TU BY 600417525.065-2014".

"Electronic acceleration sensor DUE-02 ADUI.402139.002 TU BY 600417525.076-2018".

The mass of the sensor is not more than 300 grams. (DUE-01), 100 gr. (DUE-02).

The sensor is resistant to short circuit on any of the pins to the on-board network or to the body, and is also protected from polarity over power.

The sensor is stable:

- to conductive interference on power circuits according to STB ISO 7637-2;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to interference from electrostatic discharge according to GOST 30378;
- to the effects of changes in ambient temperature from minus 50 ° C to plus 65 ° C (DUE-01), from minus 50 ° C to plus 80 ° C (DUE-02);
- to the effect of vibration with an acceleration of 50 m / s² and a frequency from 10 to 50 Hz for at least 8 hours.
- to the effects of shock loads with an acceleration of 100 m/s² and a frequency of 100 beats per minute.

The insulation resistance of the sensor contacts relative to the housing is not less than 1 MΩ in normal climatic conditions.

The isolation of the sensor contacts relative to the housing withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 minute.

95% operating time to the unit failure is 10 thousand motor hours (DUE-01), 18 thousand. (DUE-02) vehicle operating hours or 0.8 million km (DAI-01), 1 million. km (DUE-02) of vehicle mileage for the second category of operating conditions as per GOST 15150.

The average service life of the sensor is 10 years.



Wheel speed sensor DCHVK

The frequency sensor of the DCHVK wheel is designed to obtain information about the rotational speed, the beating of the toothed rotor and transmit this information to the electronic control unit.

Sensor type – generator, inductive.

Output type - two-wire, antiphase, isolated from the "mass" and "plus" of the board network.

The type of output signal is an alternating voltage, the frequency of which is proportional to the speed of rotation of the wheels.

Type of climatic performance: U2 according to GOST 15150, but at the same time the lower operating value of the ambient temperature during operation is minus 45 ° C, the upper value is plus 160 ° C.



Operating mode: continuous nominal S1 according to GOST 3940.

Sensors of two main types are developed and produced: straight with a glass length of 57.5 m and angular - with a length of 40 mm. There are modifications with a connector and without it, wire length from 0.4 m to 2.2 m, at the request of the customer can be manufactured any length.

The mass of the sensor is not more than 200 grams.

Modifications of the produced DCHVK

Designation of DCHVK	Design features
ADUI.407111.003 ADUI.407111.003-01 ADUI.407111.003-02 ADUI.407111.003-03 ADUI.407111.003-04 ADUI.407111.003-05	sensor with right angle wire output and output connector
ADUI.407111.004 ADUI.407111.004-01 ADUI.407111.004-02 ADUI.407111.004-03 ADUI.407111.004-04 ADUI.407111.004-05	sensor with right angle wire output and no output connector
ADUI.407111.005 ADUI.407111.005-01	sensor with right angle wire output and straight wire output
ADUI.407111.007 ADUI.407111.007-01 ADUI.407111.007-02	sensor with extended housing, direct wire output and output connector
ADUI.407111.008 ADUI.407111.008-01 ADUI.407111.008-02 ADUI.407111.008-03 ADUI.407111.008-04	sensor with extended housing, direct wire output and no output connector

Example of an entry in other documents and/or when ordering:

Production

"Wheel speed sensor DCHVK ADUI.407111.003 TU RB 07513211.023-99"

The electrical resistance of the sensor (1.3 ± 0.1) k Ω , at an ambient temperature of + 20 ° C.

The insulation resistance of the sensor is not less than 100 M Ω , and in conditions of high humidity at less than 5 M Ω .

The insulation of the sensor withstands without damage the impact of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

The sensor remains operational at an increased operating temperature of plus 160 ° C, at a reduced operating temperature of minus 45 ° C.

The sensor remains operational after exposure at a temperature of plus 180 ° C.

The sensor withstands the effects of vibration and shock loads according to GOST 3940 for products installed on the car engine. The sensor is designed for installation in the wheel units of the car.

The maximum operating clearance between the end of the sensor and the rotor tooth shall be 1.2 mm. The span of the output signal at an angular velocity of 0.43 rpm is not more than 0.1 V.

90% of the sensor operating time to failure is 16 thousand motor hours of vehicle operation or 800 thousand km of vehicle mileage for the second category of operating conditions according to GOST 15150.

The average service life of the sensor is 10 years.

ASR valve

The ASR valve is designed to supply pressure from the receivers to the brake chambers of the drive wheels through modulators according to the electrical control commands from the electronic unit. The valve provides a change in pressure according to a two-phase algorithm (lifting and lowering the pressure of a given value). In the initial position (in the de-energized state), the valve cuts off the receiver from the brake line.

Type of climatic performance: Y, placement category 2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is 55 °C, the lower operating value of the air temperature during operation is minus 45 °C, the upper limiting operating value of the air temperature during operation is 65 °C.



Mode of operation: re--short-term S3 according to GOST 3940.

An example of an entry in other documents and (or) when ordering:
"Valve ASR ADUI.453644.004 TU BY 600417525.043-2006".

«Valve ASR ADUI 453644.004-01 TU BY 600417525.043-2006»

The mass of the valve is not more than 400 grams.

Rated supply voltage (24 ± 0.5) V.

Nominal valve consumption current 0.4 A.

The active resistance of the valve electromagnet winding is (60 ± 2.5) Ohms at a temperature of plus (20 ± 2) °C.

The supply voltage range of the valve electromagnet is from 21.6 to 30.5 V.

The maximum operating pressure at the inlet is 1.0 MPa.

The valve remains operational after being exposed to pressure on the valve inlet 1.32 MPa for 5 minutes.

The valve provides the time of filling the brake chamber with air with a volume (1 ± 0.1) l of not more than 1.8 seconds, the time of release of air from the brake chamber - no more than 3.8 seconds, the delay time of operation is not more than 30 ms.

The valve actuation current at a nominal voltage of 24 V is not more than 0.5 A.

The valve shall be operated on compressed air in the pneumatic systems of vehicles fitted with a moisture separator and filter, allowing some moisture and oils to enter the pneumatic system.

The valve remains operational when exposed to an elevated temperature of plus 70 °C, and a low temperature of minus 40 °C.

The valve withstands the effects of vibration loads according to the IV degree of rigidity according to GOST 28988 and shock loads for group M1 according to GOST 30631 for products installed outside the engine.

Insulation resistance of at least 20 MΩ in normal climatic conditions and not less than 5 MΩ in high humidity.

The valve insulation withstands the effects of an alternating voltage of 550 V with a frequency of 50 Hz for 1 min.

90% of the operating time to valve failure is 18 thousand engine hours of operation of the vehicle or 1 million. km. vehicle mileage or 2 million. trigger cycles.

The average service life of an ASR valve is 10 years.

Infomodule IM-2

Designed for installation in the anti-lock braking system (ABS) of the car. The infomodule provides control of the connection of the trailer and the control unit of the EBP ABS of the trailer.

Type of climatic performance: U according to GOST 15150, but at the same time the lower value of the operating temperature is minus 40 ° C.

Mode of operation of the infomodule: continuous nominal S1 according to GOST 3940.

The nominal supply voltage of the infomodule is 24 V.

An example of recording an infomodule in other documents and when ordering:

"Infomodule IM-2 TU RB 600417525.026 –2000".

The mass of the infomodule should be no more than .35 r

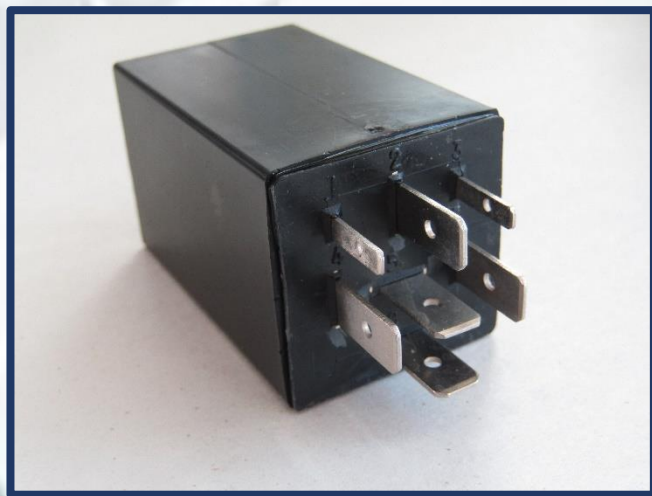
The infomoduleretains its parameters at the maximum reduced supply voltage of the on-board network $U_{n \min} = 18 \text{ V}$ and increased supply voltage of the on-board network $U_{n \max} = 33.2 \text{ V}$.

The infomodule is stable:

- to the polarity of nutrition;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;
- to the effects of shock loads with acceleration of 100 m/s².

90% of the operating time to failure of the information module is 800 thousand km of truck mileage.

The average service life of the unit is 10 years.



Electronic pneumatic brake actuator system EBS

The system of electronic-pneumatic brake actuator is designed to improve the braking properties of motor vehicles (ATS), increase stability when driving and maneuvering and, as a result, active safety of the ATS.

The system provides:

- reduced stopping distance;
- braking distribution and compatibility of the vehicle – tractor and trailer;
- increasing resistance to rollover and maintaining a given trajectory of movement;
- the presence of traction control and the function of assistance when starting to climb.



The **DCHVK** is designed to obtain information about the rotational speed, the beating of the toothed rotor and transmit this information to the electronic control unit.

EPM-1 is designed to regulate the pressure in the brake chambers according to the electrical control commands from the electronic unit.

DUE-02 accelerated electronic sensor is designed to obtain information about the accelerations and angular velocities of the vehicle in X-Y-Z coordinates and transmit it to the receiver of a digital signal via the CAN network in accordance with the communication standard J 1939.

CU EBS receives information from the wheel speed sensors, the acceleration sensor of the electronic DUE-02, the steering wheel rotation sensor DPR-1 and the brake crane, processes this information and issues control signals to the single-channel and two-channel modulator, as well as to the brake control valve of the trailer.

Axial **single-channel modulator MO-1k** is designed to control the braking of the front axle of the car (a tractor as part of a road train) when: receiving a signal about the beginning of braking from the electronic control unit or a pneumatic signal from the brake tap (in case of malfunction of the electronic system.)

Axial **two-channel modulator MO-2k** is designed to control the supply of air to the brake chambers of the rear axle of the tractor when receiving a signal about the beginning of braking from the electronic control unit or a pneumatic signal from the brake tap (in case of malfunction of the electronic system).

Foot brake faucet (purchased).

Trailer brake control valve (purchased).

The modulator cable is designed to connect the modulator.

The sensor cable is designed to connect the sensor.

Control unit of electronic-pneumatic brake actuator system CU EBS

The unit receives information and processes signals from the angular acceleration sensor, steering sensor, brake faucet, brake lining wear and control signals to the axial single-channel and two-channel modulators, as well as to the trailer brake control valve.

The unit operates in an ABS system of configurations of 4 S/4M or 4S/3M 4S/4M, where x S is the number of sensors, xM is the number of modulators.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.



Operating mode: continuous nominal S1 according to GOST 3940.

Nominal voltage $U_n = 24 \text{ V}$.

An example of recording a block in other documents and (or) when ordering:

"Control unit of electronic-pneumatic brake drive ADUI.453633.027 TU BY 600417525.083-2020".

The mass of the block is not more than .2 кг

The sensor retains its parameters at the maximum reduced supply voltage of the on-board network $U_{n \min} = 18.5 \text{ V}$ and increased supply voltage of the on-board network $U_{n \max} = 30.5 \text{ V}$.

The power consumption of the unit in working condition along the power circuit (excluding actuators) is not more than 20 W (current consumption is not more than 650 mA).

The maximum switched power is 350 W.

The sensor is stable:

- to the polarity of nutrition;
- to interference from electrostatic discharge according to GOST 30378.;
- to conductive interference on power circuits according to GOST ISO 7637-2;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;
- to the vibration load at acceleration 50 m / s² and frequency from 10 to 50 Hz;
- to the effects of shock loads with acceleration of 100 m/s².

90% of the unit's operating time to failure is 800 thousand km of truck mileage.

The average service life of the unit is 10 years.

Axial modulators: single-channel MO-1K and dual-channel MO-2K

The axial modulator is designed to control the braking of the front (MO-1k) or rear (MO-2k) axis of the vehicle when receiving a signal about the beginning of braking from the electronic control unit or a pneumatic signal from the brake valve (if the electronic system malfunctions).

The axial modulator has two inputs for connecting inductive speed sensors of the front (MO-1k) and rear (MO-2k) wheels, an input-output for connecting a communication channel with an electronic control unit, an input for connecting power, two inputs for connecting brake pad wear sensors. Communication with the pneumatic system of the vehicle is carried out by the axial modulator by entering from the air battery, the input from the brake control line and two (MO-1k) or four (MO-2k) exits to the brake chambers of the front (MO-1k) or rear (MO-2k) wheels of the vehicle.



Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is 55 °C, the lower operating value of the air temperature during operation is minus 40 °C, the upper limit operating value of the air temperature during operation is 65 °C, the lower limit operating value of the air temperature during operation is minus 50 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal voltage $U_n=24$ V.

An example of recording a block in other documents and (or) when ordering:

"Axial single-channel modulator MO-1k ADUI.453648.009 TU BY 600417525.084-2020".

"Axial two-channel modulator MO-2k ADUI.453648.010 TU BY 600417525.084-2020".

The mass of the modulator axial MO-1k is not more than 3.5 kg, MO-2k - 7 kg.

The power consumption of the axial modulator at rest on the power circuit (in the absence of regulation) is not more than 20 W (current consumption not more than 650 mA). Maximum power consumption during regulation is 350 W (current consumption not more than 15 A).

The modulator is stable:

- to conductive interference on power circuits according to GOST ISO 7637-2;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to interference from electrostatic discharge according to GOST 30378;
- to polarity reversal nutrition;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;

Production

- to the vibration load at acceleration $50 \text{ m} / \text{s}^2$ and frequency from 5 to 250 Hz;
 - to the effects of shock loads with acceleration of 100 m/s^2 .
- 95% operating time to the unit failure is 1 million km of vehicle mileage.
The average service life of the unit is 10 years.

On-board information and analytical system BIAS

The system provides:

- determination of the location of the PBX (coordinates, speed, direction of movement) from the signals of global navigation satellite systems (GNSS): GLONASS (GPS, Galileo, Beidou);
- informing emergency operational services in case of a traffic accident (accident), accompanied by a strong blow, the formation and transmission of related information;
- providing two-way voice communication with the operator of the call center of emergency operational services and / or the dispatcher;
- informing emergency operational services and / or the dispatcher in case of inability of the driver to drive the vehicle;
- support for additional interfaces, sensors and devices, information interaction with other on-board systems, driver assistance systems, support for additional services using the functionality of intelligent transport systems.



Composition of the system:

- On-board information module ADUI.453639.012 – 1 pc.
- Remote speaker ADUI.453686.002 - 1 pc.
- Terminal remote ADUI.453689.001 - 1 pc.
- Harnesses of the on-board network, speaker and interfaces, antennas.

System remote control for electromechanisms

SDUE

Designed for the organization, controlled by a wired remote control, intermittent operation, as well as reversing of DC actuator electromechanisms with an operating voltage of 24 V, as part of medical and household products.

- The system consists of a control unit for electromechanisms, one or two remote controls and several actuators.

- The system is powered autonomously from the built-in battery of 24 V batteries with a capacity of 1.3 A / h, as well as an alternating current network of $230 \pm 23V$, 50Hz. The battery is charged automatically by the built-in charger when connected to AC power. Battery operating modes can be controlled using the LED indicator. When the battery is low, pressing the buttons on the control panel(s) is accompanied by an intermittent light and sound indication.

- AC power consumption, not more than, 30 VA.
- The degree of protection of blocks and control panels from penetration into foreign bodies is not lower than IP54 according to GOST 14254.



Integrated information and management system KIUS

The on-board integrated information and control system KIUS is designed for use on MAZ buses. The use of the system increases the manufacturability of the assembly of MAZ buses by reducing the number of assembly units and harnesses from electrical equipment, reducing the number of inspection and debugging units, increases the reliability of electrical equipment due to constant diagnostics of the state of electrical circuits, increases the competitiveness of MAZ buses of the new generation.



The first samples of the system included **three blocks**: BUNSU - control unit for outdoor lighting devices; BUPD - door drive control unit; BUPP - instrument panel control unit.

Subsequent versions of the system are equipped with universal blocks of miU (information control module).

The integrated information and management system KIUS provides:

- control of the electrical equipment units of the bus connected to it;
- automatic recognition of its location in the system when the power is turned on;
- receiving control commands from the multiplex instrument panel via the CAN channel to turn on/ off the electrical equipment units;
- decryption of commands and on/off of actuators;
- transmission of reverse messages about the status of actuators;
- transmission of messages on the status of signals at the inputs of the CIUS;
- performing the functions of door actuator control units;
- diagnosing and storing information about failures of system elements;
- output of diagnostic and service information to the display of the multiplex instrument panel as well as using the interface module connected to the CAN-network on the monitor of a portable computer.

The system and its elements are placed either in the cabin of the bus or in special buildings. The conditions of climatic and mechanical influences comply with GOST 3940-2004 for operating conditions "U", while the upper and lower value of the operating temperature during operation are set respectively minus 40 °C and plus 60 °C.

The module must be powered from the on-board network of the bus with a nominal voltage of 27 V and a minus on the body.

Assembly units and elements are operable under: voltage change in the on-board network from 18 to 32 V; relative humidity up to 98 % at a temperature of $(40 \pm 2) ^\circ\text{C}$;

Operating mode: continuous nominal S1 according to GOST 3940.

The system provides automatic monitoring of the serviceability of all components and the output of information about failures to external devices.

MIU Information Management Module

Designed for use as part of on-board integrated information and control systems (CIUS) of vehicles (TC).

MIU is used on buses MAZ-203, MAZ-215, MAZ-206, MAZ-207, MAZ-231, MAZ-251, MAZ-226, MAZ-232 produced by the AMAZ branch of the Minsk Automobile Plant, and trolleybuses MAZ-203T, MAZ215T, MAZ-207T, as well as other similar vehicles.

MIU is an intelligent multifunctional device and can be used to read sensor readings and control actuators depending on the place of installation of miu in the vehicle.

Type of climatic performance: U2 according to GOST 15150.

Operating mode: continuous nominal S1 according to GOST 3940.

The nominal supply voltage of the MIU shall be $U_n = 24 \text{ V}$.

An example of recording MIU in other documents and (or) when ordering: "Information-control module MIU ADUI.453638.003 TU BY 600417525.062 -2013".

The mass of the MIU should be no more than 400 grams.

The MIU shall be operable at the maximum reduced supply voltage of the on-board network $U_{n \min} = 16 \text{ V}$ and increased supply voltage of the on-board network $U_{n \max} = 33.75 \text{ V}$.

MIU is stable:

- to the polarity of nutrition;
- interference with control and signal side circuits according to STB ISO 7637-3;
- to the effect of changes in ambient temperature from minus 50°C to plus 65°C ;
- to the effects of shock loads with acceleration of 100 m/s^2 .

90% of the MTBF of the MIU is 10 thousand engine hours of the car or 800 thousand km of the car's mileage.

The average service life of the unit is 10 years.



Switching unit

The switching unit is designed for use in new generation MAZ vehicles equipped with a multiplex control system for electrical equipment.

The product allows you to increase:

- manufacturability of the assembly by reducing the number of debugging units, integrating the functions of polling switches and routing data;

- consumer qualities of MAZ vehicles of a new generation due to the possibility of using devices that allow to implement additional

- comfort functions during the operation of the car;

- prompt maintenance due to the self-diagnostic function

- competitiveness of MAZ vehicles of new generation.

Type of climatic performance: U1 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 80 °C.

Operating mode of the unit: continuously rated S1 according to GOST 3940.

The nominal supply voltage of the unit $U_n=24$ V.

An example of writing a switching block in other documents and /or when ordering:

"Switching unit ADUI.453619.001 TU BY 600417525.080-2020".

The mass of the block should be no more than 1.5 kg.

The switching unit provides:

- distribution of power to consumers and electronic devices of electrical equipment of the car, polling the status of the switches of the instrument panel, routing of data received through the LIN channels and from the switches to the CAN channel of the central control unit - the instrument panel

- switching and control of devices, appliances, elements of electrical equipment, electronic systems that make up the car (listed below)

- protection of power circuits from short circuits, as well as visualization of the integrity of the most important power circuits (terminals 15, 30, 30') and fuse burnout on the part of the relay and fuse installation

- receiving signals from the instrument panel switches connected to the product and transmitting in the form of messages the states of the switches via the CAN and LIN channels

- Illumination of switches connected to the switching unit in the dark

- configuration of any of the LIN channels using messages from the central control unit - the instrument panel via the CAN channel, saving the current configuration and verifying it during operation.

Main technical characteristics:

The total number of circuits protected by fuses with an individual indication of burnout is 69.

Including:

- terminal 30 (disconnectable battery terminal) - 40 pcs.



- 30' terminal (non-detachable battery terminal) – 5 pcs.
- terminal 15-1 (ignition lock) – 8 pcs.
- terminal 15-2 (ignition lock) – 16 pcs.

Number of built-in relays – 5.

Including:

- Ignition switching relays – 2 pcs. (terminals 15_1 and 15_2) with a common control of one external signal, each with a switched current of up to 50 A.
- Relay with closing of the external output to the common (terminal 31) with external signal control (switched current up to 25 A).
- Relay with jumping of two external pins and with control by two external pins (switched current up to 25 A).
- Relay with closing of the external output to the terminal 30 through the fuse and with external signal control (switched current up to 25 A).
- Relay with closing of the external output to the terminal 30 through the fuse, with control from the processor of the switching unit (switched current up to 40 A).

Number of individually configurable LIN channels – 8 pcs.

Number of CAN channels – 2 pcs.

List of electronic systems and devices that can be connected to the inputs/outputs of the switching unit: Tachograph, Navigation module, Windshield wiper, Windshield washer, Steering wheel switches, Main switch light, Steering angle sensor, Rain and light sensors, Door switch blocks, Battery charge sensor, EFU, Engine block, ADAS systems, Heated mirrors, Central locking, Seat blocks, Refrigerator, Radio, Climate control unit, Heater fan, Heater liquid, Air Suspension Unit, Transmission Control Unit, Retarder Control Unit, Neutralizer Control Unit, Electronic Instrument Panel, ABS / EBS Systems (Screen, Wabco, Knorr), Tire Pressure Monitoring System. It is possible to connect other systems and devices, in agreement with JSC "Ekran".

90% of the operating time of the unit is 30 thousand hours of operation.

The average service life of the unit is 10 years.

Diagnostic complexes DK

Diagnostic complexes are designed to check the connection and performance of anti-lock braking systems (ABS), anti-lock braking systems ABS /ASR, electronic air suspension control systems (ECAS), braking control systems. The complexes are means of technical diagnostics of cars, buses and trailer trains.

By functional purpose, the complexes belong to groups of means for diagnosing brake systems and air suspension. According to metrological means, complexes are not means of measurement and do not have accurate characteristics.

The complexes provide display on the screen of a personal electronic computer (PC) data of failures of systems located in a reprogrammable read-only memory (ROM):

- a list of active malfunctions of systems (malfunctions present at the moment);
- a list of passive malfunctions of systems (malfunctions that occurred earlier);
- manufacturer's data - date of manufacture, serial number;
- system configuration.

When identifying malfunctions in the connection of systems and eliminating these malfunctions, the complex ensures the erasure of information about system malfunctions.

Performance groups C3, R1, N1 for third-order products according to GOST 12997.

Operating mode of the complex: continuous nominal S1 according to gost 3940.

Nominal operating voltage of supply of complexes UP=24 V.

Modifications of the complexes, their designation, completeness and application are indicated in the table:



Diagnostic complex	Designation	Composition of the complex	Applicability
Diagnostic complex DK ABS-T	ADUI.453613.005		
	ADUI.453613.005-01		
	ADUI.453613.005-02		
	ADUI.453613.005-03		
Diagnostic complex DK ABS-P	ADUI.453613.007		
	ADUI.453613.007-01		
DC/USB ABS-T (complex diagnostic ABS tractor with USB interface)	ADUI.453613.010	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.013	For diagnostics of ECB blocks ADUI.453633.016 ADUI.453633.016-01 ADUI.453633.016-03 MAZ trucks with Euro-2 engine
	ADUI.453613.010-02	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.025	For diagnostics of ECB blocks ADUI.453633.019 Buses LiAZ Neman

	ADU I.453613.010-03	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.010	For diagnostics of ECB blocks ADUI.453633.016 ADUI.453633.016-01 Avtomobili Ural, KamAZ
	ADUI.453613.010-04	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.021	For diagnostics of blocks of EBK ADUI.453633.019 MAZ buses with Euro-2 engine
DC/USB ABS-P (complex diagnostic ABS trailer) with USB interface)	ADUI.453613.010-05	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.011	Trailers with diagnostic connector
Complex diagnostic DK SUT&SD	ADUI.453613.011		
DC ABS/ASR (complex of diagnostic anti- lock/traction control system with USB interface)	ADUI.453613.011-01	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.013	For diagnostics of blocks of EBK ADUI.453633.016-04 MAZ cars with Euro-3 engine
	ADUI.453613.011-02	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.021	For diagnostics of blocks of EBK ADUI.453633.019-03 MAZ buses with Euro-3 engine
DC/USB ECAS (complex diagnostic electronic system air suspension control with USB interface)	ADUI.453613.010-01	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.013	MAZ cars
DC/CAN ESP (diagnostic complex)	ADUI.453613.012	Adapter Computer connection cable ADUI.685624.014 Connection cable to the ADUI unit.453766.013 Adapter connection cable to OBD-II ADUI connector.453766.029	
DC/CAN ABS-P (diagnostic complex)	ADUI.453613.012-01	Adapter Computer connection cable ADUI.685624.014 Trailer connection cable ADUI.453766.011	
DC/CAN (diagnostic complex)	ADUI.453613.012-02	Adapter Computer connection cable ADUI.685624.014 Adapter connection cable to EBK ADUI.453766.010 Trailer connection cable ADUI.453766.011 Connection cable to the ADUI unit.453766.013 Adapter connection cable to EBK-A ADUI.453766.021 Adapter connection cable to MIU ADUI.453766.031 Adapter connection cable to OBD-II ADUI connector.453766.029	

Weight of the complex Is not more than 4 kg.
Main parameters and characteristics.

The power consumption of the complexes on the power supply chain is not more than 10 W.

The complexes retain their parameters at the maximum reduced operating voltage $U_{p \min} = 21.6 \text{ V}$. and the maximum increased operating voltage up to $U_{p \max} = 30 \text{ V}$.

The complexes must be resistant to power polarity reversals and short circuits along the ISO-K line.

The complexes must be operable under the influence of vibration with the following parameters:

- frequency – (10-70) Hz;
- acceleration – 50 m/s^2 .

Complexes must be resistant to sinusoidal vibration for the performance group N1 according to GOST 12997.

The complexes are operable when exposed to ambient temperatures from plus 50°C to minus 10°C .

Norms of radio interference at telecommunication ports and radiated radio interference for complexes correspond to class A according to STB EN 55022.

The complexes ensure the quality of operation according to STB EN 55024 when exposed to interference on the input port and the power supply port.

95% operating time to failure should be 3 thousand hours.

The average service life of the complex is 5 years.

Pressure sensor DD

Pressure sensors (DD) are designed for installation in the oil and pneumatic systems of cars and tractors and are used to issue an electrical signal to the logometric pressure indicator.

Type of climatic performance: O1 according to GOST 15150, but at the same time the maximum lower operating value of the air temperature is set at minus 50 ° C, and for operation in a non-working state - minus 60 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

Pressure sensors are used in a single-wire system of electrical equipment of a vehicle with a nominal voltage of 12 V or 24 V DC, complete with a corresponding logometric indicator.

Technical characteristics of the sensor versions are indicated in the table:



Technical characteristics of the sensor versions are indicated in the table:			
Abbreviated designation of sensors	Designation of the main design document	Type of electrical contact	Carving on the housing
DD-6EI	ADUI.406222.010-07	Pin 01-6,3-00	Conical K1/4"
DD-6MI	ADUI.406222.010-01	Pin 501202 pad	
DD-6MI1	ADUI.406222.010-18		
DD-6-01I	ADUI.406222.010-04	Pin 01-6,3-00	
DD-6-02I	ADUI.406222.010-14	Screw V.M4-6gx6	
DD-6-03I	ADUI.406222.010-16		
DD-6-04I	ADUI.406222.010-17		
DD-10I	ADUI.406222.010	Pin 01-6,3-00	Metric M14x1,5-6g
DD-10-01EI	ADUI.406222.010-09	Pin 501202 pad	
DD-10-01MI	ADUI.406222.010-0 3		
DD-10-01MI1	ADUI.406222.010-19		
DD-10-02I	ADUI.406222.010-05	Screw V.M4-6gx6	Conical K1/4"
DD-10-03I	ADUI.406222.010-10		
DD-10-04I	ADUI.406222.010-11	Pin 01-6,3-00	Metric M14x1,5-6g
DD-10-05I	ADUI.406222.010-12		Conical K1/4"
DD-10-07MI	ADUI.406222.010-13	Pin 501202 pad	
DD-20I	ADUI.406222.010-0 6	Screw V.M4-6gx6	
DD-20EI	ADUI.406222.010-0 8	Pin 01-6,3-00	

DD-20MI	ADUI.406222.010-0 2	Pin 501202 pad	
DD-20MI1	ADUI.406222.010-20		
DD-20-01MI	ADUI.406222.010-15		
C41R11.3829010	ADUI.406222.007		
S41C23.3829010	ADUI.406222.011	Analogue of bayonet connector DIN 72585-1	

The resistance values of the rheostats of sensors with a normalized basic error when specifying the controlled pressure values shall correspond to the values indicated in the table:

Short designation Sensors	Range Readings sensors, MPa	Controlled pressure values, MPa	Nominal resistance of sensor rheostat, Ohm	Main error, Ohm
DD-6EI	0-0,6	0,1	44	±5
		0,5	157	±5
DD-6MI DD-6MI1	0-0,6	0 ¹⁾	10	+10 -2,5
		0,1	44	±5
		0,5	157	±5
DD-6-01I DD-6-03I	0-0,6	0	166	±7
		0,4	60	±6
DD-6-02I DD-6-04I	0-0,6	0	310	±20
		0,15	185	+15 -14
		0,45	65	±14
DD-10I DD-10-02I DD-10-07MI	0-1,0	0	166	±7
		0,6	68	±6
DD-10-01EI	0-1,0	0,5	104	±5
		0,8	152	±5
DD-10-01MI DD-10-01MI1	0-1,0	0 ¹⁾	10	+10 -2,5
		0,5	104	±5
		0,8	152	±5
DD-10-03I DD-10-05 DD-10-05I C41C23.3829010 C41R11.3829010	0-1,0	0	310	±20
		0,5	115	+10 -6
		1,0	12	+14 -3,5
DD-10-04I	0-1,0	0	166	±7
		0,7	52	±6
DD-20I	0-2,0	0	166	±7
		1,5	53	±6
DD-20EI	0-2,0	0,9	96	±5
		1,5	145	±5
DD-20MI DD-20MI1	0-2,0	0 ¹⁾	10	+10 -2,5
		0,8	86	±5
		1,5	145	±5
DD-20-01MI	0-2,0	0	10	±5
		1,0 ²⁾	90	+3
		1,5 ³⁾	145	±5

Note - variants of DD-I sensors have increased vibration resistance and wear resistance of the resistive board. The signal from the sensor must be continuous. Sensors can be used with on-board information systems.

- 1) Check during periodic tests.
- 2) Check on the reverse course
- 3) Check on the go.

The sensors remain operational when the ambient temperature changes from minus 50 ° C to plus 110 ° C.

An example of recording a sensor in other documents and when ordering:

"Pressure sensor DD-10-01MI TU RB 600417525.009-2000".

"Pressure sensor C41C23.3829010 TU RB 600417525.009-2000".

The mass of the sensors is not more than .150 r

The sensors remain operational after exposure to the maximum minimum ambient temperature minus 60 ° C and the maximum maximum ambient temperature limit plus 115 ° C.

The sensors withstand overloads with pressures that exceed the upper limit of the reading range by 50%.

The sensors withstand vibration loads on two axes at an acceleration of 100 m/s² and a frequency of 50 Hz to 250 Hz, as well as on the X-axis at an acceleration of 130 m/s² at a frequency of 500 Hz and on the Y axis at an acceleration of 180 m/s² at a frequency of 2000 Hz under pressure.

The sensors withstand shock loads with a maximum acceleration of up to 150 m/s² and a frequency (80 – 120) of shocks per minute.

The plugs of the sensors withstand a tear load applied along the axis of fastening of at least 117.6 N.

The insulation resistance between the contacts of the sensor in the pad and the casing is not less than 5 MΩ.

95% time between failures of sensors for the first category of operating conditions is set at least 600 thousand km of vehicle mileage or 12 thousand motor hours of tractor operation.

The average service life of the sensor is 10 years.

Combined pressure sensor DKD

Combined pressure sensors (DKD) are available in the following versions:

- sensors DKD-1K, DKD-5K, designed to work in the pneumatic braking system of cars, signal the working pressure of the air in the brake circuits to the corresponding pressure indicators and the pressure drop to the emergency - corresponding to the control lamps;
- DKD-2K sensors, designed to work in the engine lubrication system, signal the operating pressure of the oil to the corresponding pressure indicators and the pressure drop to the emergency - the corresponding control lamps.



Type of climatic performance: O1 according to GOST 15150. At the same time, the operating range of ambient temperature from minus 50 ° C to plus 110 ° C. In addition, the sensors must remain operational after being in an inoperative state at a temperature of minus 60 ° C and at plus 115 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

The sensors have a thick-film resistor on the ceramic board.

The sensors are used in a single-wire system of electrical equipment with a **nominal voltage** of 24 V DC complete with a corresponding logometric pointer.

Example of sensor recording when ordering:

"Combined pressure sensor DKD-1 TU RB 600417525.040-2004".

The weight of the sensors is not more than 160 g.

Technical characteristics of the sensor versions are indicated in the table:

Abbreviated designation of sensors	Designation of the main design document	Carving on the housing	Resistor	Type of electrical contact
DKD-1K	ADUI.406222.004	Metric	Thick film resistor on ceramic board	Analogue of bayonet connector DIN-72585-1
DKD-1KM	ADUI.406222.004-06	M14x1,5-6g		
DKD-2K	ADUI.406222.004-01	Conical K1/4"		
DKD-2KM	ADUI.406222.004-07	GOST 6111		
DKD-3K	ADUI.406222.004-03	Metric		
DKD-3KM	ADUI.406222.004-04	M16x1,5-6g		
DKD-4KM	ADUI.406222.004-08	Metric		
DKD-5K	ADUI.406222.004-02	M14x1,5-6g		
DKD-5KM	ADUI.406222.004-05	Metric M12x1,5-6g		
DKD-6KM	ADUI.406222.004-09			

The values of the sensor alarm pressures at a connected load of 0.5 A are shown in the table:

Sensor Type	Alarm pressure sensors, MPa	
	direct stroke	Reverse
DKD-1K, DKD-1KM, DKD-3K, DKD-3KM, DKD-4KM, DKD-5K, DKD-5KM, DKD-6KM	0,55±0,05	0,55-0,1
DKD-2K, DKD-2KM	0,08±0,02	0,05±0,02

Production

The resistance values of sensors with a normalized basic error of the resistance of the sensor rheostat when setting the controlled pressure values correspond to the values indicated in the table:

Abbreviated designation of sensors	Sensor operating pressure range, MPa	Controlled pressure values, MPa	Nominal resistance Sensor Rheostat, Ohm
DKD-1K, DKD-2K, DKD-3K, DKD-5K	0-1,0	0	166±5
		0,6	68±5
DKD-1KM		0	166±5
		0,8	42±5
DKD-2KM		0	166±5
DKD-3KM, DKD-4KM, DKD-5KM		0,4	98±5
		0,6	68±5
		0,8	42±5
		0	166±5
DKD-6KM		0,4	98±5 reverse

Reference and calculated nominal values of the resistances of sensors at other pressures are given in the table:

Abbreviation Sensors	Controlled pressure values, MPa	Change in the resistance of the sensor rheostat, Ohm
DKD-1K, DKD-2K, DKD-3K, DKD-5K	0 and 0.6	±10
DKD-2KM, DKD-3KM, DKD-4KM, DKD-5KM	0; 0,4; 0.6 and 0.8	
DKD-1KM	0 and 0.8	
DKD-6KM	0 and 0.4	

DKD sensors are operable when the ambient temperature changes in the range from minus 50 ° C to plus 110 ° C;

DKD sensors remain operational after exposure to the maximum minimum ambient temperature minus 50 ° C and the maximum maximum ambient temperature limit plus 115 ° C.

DKD sensors withstand overloads with pressures exceeding by 100% the upper limit of the reading range.

The sensors withstand the effects of vibration loads in three axes at an acceleration of 100 m / s² and a frequency of 50 to 250 Hz and the impact of shock loads with a maximum acceleration of up to 150 m / s². And a frequency (80-120) of shocks per minute.

Sensors are non-repairable products.

90% of the operating time of the sensors to failure is 800 thousand km. mileage.

The average service life of the sensor is 10 years.

Pneumatic brake signal switch VPST

Pneumatic brake signal switches (VPST) are designed to turn on (off) signal lamps or load when the air (oil) pressure changes in the systems of cars and tractors.

The circuit breakers are designed to work in a single-wire DC circuit:

- voltage 12 V, current 0.4 A;
- voltage 24 V, current 0.25 A.

Type of climatic performance: O1 according to GOST 15150. At the same time, the lower operating value of the ambient temperature during operation is minus 50 ° C, the upper operating value of the ambient temperature during operation is plus 80 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

The technical characteristics of the circuit breaker of the VPST decree are in the table:

Sensor designation	Carving on the housing	Type of electrical contact	Weight, not more than, g	State of sensor contacts in the absence of pressure (P= 0)	Sensor actuation pressure, MPa	
					Disjunction	Closing
VPST ADUI.407529.003	Metric M12x1,5-6g	Analog pin 101600-10	50	Open	from 0,05 to 0,01	from 0,01 to 0,05
VPST-B ADUI.407529.014		Analogue Connectors DIN 72585	44			

An example of recording a switch in other documents and when ordering:

"Pneumatic brake signal switch TU RB 07513211.004-94".

VPST circuit breakers withstand pressure overloads up to 2.5 ± 0.5 MPa (25 ± 5 kgf/cm²).

VPST switches are operable when the ambient temperature changes in the range from minus 50 ° C to plus 80 ° C.

The switches withstand vibration loads in three axes at an acceleration of 100 m/s² and a frequency of 50 to 250 Hz and the impact of shock loads with a maximum acceleration of up to 150 m/s² and a frequency (80-120) of beats per minute.

The insulation resistance of the switches between the terminal or plug and the housing shall be at least 10 MΩ.

The insulation of the current-carrying parts of the circuit breakers relative to the housing must withstand the effects of alternating current at a frequency of 50 Hz with a voltage of 550 V for 1 min.

95% time between failures of BFAS switches, 12 thousand motor hours or 100 thousand actuation cycles are set.

The average service life of the circuit breaker is 10 years.



Emergency air pressure sensor DADV

Emergency air pressure sensors (DADV) are designed to turn on (off) signal lamps or load when the air (oil) pressure changes in the systems of cars and tractors. The sensors are designed to operate in a single-wire DC circuit:

- voltage 12 V, current 0.4 A;
- voltage 24 V, current 0.25 A.

Type of climatic performance: 01 according to GOST 15150. At the same time, the lower operating value of the ambient temperature during operation is minus 50 ° C, the upper operating value of the ambient temperature during operation is plus 80 ° C.



Operating mode: continuous nominal S1 according to GOST 3940.

Technical characteristics of the variants of THEDV sensors:

Sensor designation	Carving on the housing	Type of electrical contact	Weight, not more than, g	State of sensor contacts in the absence of pressure (P= 0)	Sensor actuation pressure, MPa	
					Disjunction	Closing
DADV ADUI.407529.002	Metric M12x1,5-6g	Analog pin 101600-10	40	Closed	from 0,45 to 0,60	from 0,60 to 0,45
DADV-01 ADUI.407529.002-01	Conic1/4" GOST 6111				from 0,20 to 0,30	from 0,30 to 0,20
DADV-02 ADJUI.407529.002-02					from 0,45 to 0,55	from 0,55 to 0,45
DADV-03 ADUI.407529.002-03					0,7 max	from 0,66
DADV-B ADUI.407529.011	Metric M12x1,5-6g	Analogue Connectors DIN 72585	52		from 0,01 up to 0,05	from 0,05 up to 0,01
DADV-1B ADUI.407529.011-01					from 0,025 up to 0,085	from 0,085 up to 0,025
DADV-2B ADUI.407529.011-02					from0,54 up to0,66	from 0,66 up to 0,54
DADV-3B ADUI.407529.011-03					0,6 max	from 0,47 up to 0,53
DADV-4B ADUI.407529.011-04						

An example of recording a sensor in other documents and when ordering:

"Emergency air pressure sensor DADV-01 TU RB 07513211.004-94".

DADV sensors withstand pressure overloads up to 2.5 ± 0.5 MPa (25 ± 5 kgf/cm²).

DADV sensors are operable when the ambient temperature changes in the range from minus 50 ° C to plus 80 ° C.

The sensors withstand vibration loads in three axes at an acceleration of 100 m/s² and a frequency of 50 to 250 Hz and the impact of shock loads with a maximum acceleration of up to 150 m/s² and a frequency (80-120) of shocks per minute.

The insulation resistance of the sensors between the terminal or plug and the housing must be at least 10 MΩ.

Production

The insulation of the current-carrying parts of the sensor relative to the housing must withstand the effects of alternating current with a frequency of 50 Hz with a voltage of 550 V for 1 min.

90% time between failures of DADV sensors, 12 thousand motor hours or 100 thousand response cycles are set.

The average service life of the sensor is 10 years.

DADM oil emergency pressure sensor

Emergency oil pressure sensors (DADM) are designed to turn on (off) signal lamps or load when the air (oil) pressure changes in vehicle and tractor systems.

The sensors are designed to operate in a single-wire DC circuit:

- voltage 12 V, current 0.4 A;
- voltage 24 V, current 0.25 A.

Type of climatic performance: O1 according to GOST 15150. At the same time, the lower operating value of the ambient temperature during operation is minus 40 ° C, the upper operating value of the ambient temperature during operation is plus 120 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

Technical characteristics of the variants of the DADM sensors are indicated in the table:



Sensor designation	Carving on the housing	Type of electrical contact	Weight, not more than, g	State of sensor contacts in the absence of pressure (P= 0)	Sensor actuation pressure, MPa	
					Disjunction	Closing
DADM ADUI.407529.001	ConicheskayaK1/4" GOST 6111	Analog pin 101600-10	45	Closed	from 0,04 to 0,08	from 0,08 to 0,04
DADM-01 ADUI.407529.001-01	Metric M10x1-6g					
DADM-02 ADUI.407529.001-02	ConicheskayaK1/4" GOST 6111	Screw V.M5- 6g GOST 17473				
DADM-03 ADUI.407529.001-03	Conic1/8" GOST 6111	Analog pin 101600-10				
DADM-03-M ADUI.407529.001-06						
DADM-04 ADUI.407529.012	ConicheskayaK1/4" GOST 6111	Analog pin 101600-10			from 0,64 to 0,82	from 0,82 to 0,64
DADM-05 ADUI.407529.012-01	Metric M10x1-6g	Analog pin 101600-10			from 0,9 to 1,1	from 1,1 to 0,9
DADM-06 ADUI.407529.001-04	ConicheskayaK1/4" GOST 6111	Screw V.M5- 6g GOST 17473			from 0,07 to 0,13	from 0,13 to 0,07
DADM-07 ADUI.407529.012-02		Analog pin 101600-10			from 0,13 to 0,19	from 0,19 to 0,13
DADM-08 ADUI.407529.001-05		Screw V.M4- 6g GOST 17473			from 0,04 to 0,08	from 0,08 to 0,04
DADM-09 ADUI.407529.001-07		Conic1/8" GOST 6111			Analog pin 101600-10	
DADM-B ADUI.407529.021	Metric M10x1,5-6g	Analogue DIN 72585 connector	55			—

An example of recording a sensor in other documents and when ordering:

"Emergency oil pressure sensor DADM-01 TU RB 07513211.004-94"

DADM sensors withstand pressure overloads up to 2.5 ± 0.5 MPa (25 ± 5 kgf/cm²).

Production

DADM sensors are operable when the ambient temperature changes in the range from minus 40 °C up to plus 120 °C.

The sensors withstand vibration loads in three axes at an acceleration of 100 m/s² and a frequency of 50 to 250 Hz and the impact of shock loads with a maximum acceleration of up to 150 m/s² and a frequency (80-120) of shocks per minute.

The insulation resistance of the sensors between the terminal or plug and the housing must be at least 10 MΩ.

The insulation of the current-carrying parts of the sensor relative to the housing must withstand the effects of alternating current with a frequency of 50 Hz with a voltage of 550 V for 1 minute.

90% time between failures of DADM sensors is set to 12 thousand motor hours or 100 thousand response cycles.

The average service life of the sensor is 10 years.

DSDM oil pressure detector sensor

Oil or brake fluid pressure detector (DSDM) sensors are designed to turn on (off) signal lamps or load when the air (oil) pressure changes in car and tractor systems.

The sensors are designed to operate in a single-wire DC circuit:

- voltage 12 V, current 0.4 A;
- voltage 24 V, current 0.25 A.

Type of climatic performance: 01 according to GOST 15150. At the same time, the lower operating value of the ambient temperature during operation is minus 40 ° C, the upper operating value of the ambient temperature during operation is plus 120 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

Technical characteristics of the variants of the DSDM sensors are indicated in the table:



Sensor designation	Carving on the housing	Type of electrical contact	Weight, not more than, g	State of sensor contacts in the absence of pressure (P= 0)	Sensor actuation pressure, MPa	
					Disjunction	Closing
DSDM ADUI.407529.005	Metric M12x1,5-6g	Analog pin 101600-10	55	Open	from 0,8 to 0,6	from 0,6 to 0,8
DSDM-M ADUI.407529.008		Analogue of the pin 501203 pad	60			
DSDM-MS ADUI.407529.017						
DSDM-01-MS ADUI.407529.017-05					from 0,9 to 0,7	from 0,7 to 0,9
DSDM-02-MS ADUI.407529.017-06					from 1,0 to 0,8	from 0,8 to 1,0
DSDM-03-MS ADUI.407529.017-07					from 1,3 to 1,1	from 1,1 to 1,3
DSDM-04-MS ADUI.407529.017-08					from 0,9 to 0,7	from 0,7 to 0,9
DSDM-07-MS ADUI.407529.017-01					from 1,0 to 0,8	from 0,8 to 1,0
DSDM-10-MS ADUI.407529.017-02		from 1,3 to 1,1	from 1,1 to 1,3			
DSDM-12-MS ADUI.407529.017-03		Metric M10x1-6g				from 0,8 to 0,6
DSDM-08-MS ADUI.407528.017-04						
DSDM-05-MS ADUI.407529.017-09						

An example of recording a sensor in other documents and when ordering:

"Sensor oil pressure detector DSDM-M TU RB 07513211.004-94".

DSDM sensors withstand pressure overloads up to 4.0 ± 0.5 MPa (40 ± 5 kg/cm²).

DSDM sensors are operable when the ambient temperature changes in the range from minus 40 ° C to plus 120 ° C.

Production

The sensors withstand vibration loads in three axes at an acceleration of 100 m/s^2 and frequencies from 50 to 250 Hz and impact shock loads with maximum acceleration up to 150 m/s^2 and a frequency of (80-120) beats per minute.

The insulation resistance of the sensors between the terminal or plug and the housing must be at least $10 \text{ M}\Omega$.

The insulation of the current-carrying parts of the sensor relative to the housing must withstand the effects of alternating current with a frequency of 50 Hz with a voltage of 550 V for 1 minute.

90% MTBF of DSDM sensors, 12 thousand engine hours or 100 thousand cycles of operation are installed.

The average service life of the sensor is 10 years.

DSF air filter clogging detector sensor

Air Filter Clogged Detector (DSF) sensors are designed to turn on the warning light when the air filter is clogged above the permissible limit. Closing the circuit of the signal lamp is made due to the movement of the membrane that perceives the maximum vacuum of pressure in the air filter.

Type of climatic performance: O2 according to GOST 15150, but the lower value of the ambient temperature during operation is set at minus 50 ° C, the upper value of the ambient temperature during operation is set to plus 90 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.



The contacts of the sensors shall be closed at the parameters specified in the table at the ambient air temperature (25 10) $\pm$ °C. The power of the signal lamp is not more than 2.5 W.

Technical characteristics of the variants of the DSF sensors are indicated in the table:

Abbreviated sensor designation	Designation of the main design document	Pressure, hPa (mm water station)
DSF-35-B	ADUI.406422.004	35 $\pm$ 5 (350 $\pm$ 50)
DSF-45	ADUI.406422.001	45 $\pm$ 5 (450 $\pm$ 50)
DSF-50	ADUI.406422.001-06	50 $\pm$ 5 (500 $\pm$ 50)
DSF-50-B	ADUI.406422.004-01	50 $\pm$ 5 (500 $\pm$ 50)
DSF-55	ADUI.406422.001-03	55 $\pm$ 5 (550 $\pm$ 50)
DSF-55-B	ADUI.406422.004-03	55 $\pm$ 5 (550 $\pm$ 50)
DSF-65	ADUI.406422.001-01	65 $\pm$ 5 (650 $\pm$ 50)
DSF-65-B	ADUI.406422.004-02	65 $\pm$ 5 (650 $\pm$ 50)
DSF-65-01	ADUI.406422.001-02	65 $\pm$ 5 (650 $\pm$ 50)
DSF-65-02	ADUI.406422.001-07	65 $\pm$ 5 (650 $\pm$ 50)
DSF-70	ADUI.406422.001-05	70 $\pm$ 5 (700 $\pm$ 50)
DSF-130	ADUI.406422.001-04	130 $\pm$ 5 (1300 $\pm$ 50)

An example of recording a sensor in other documents and when ordering:

"Sensor of the air filter cloggedness detector DSF-65-01 TU RB 07513211.003-94".

The mass of the sensor is not more than 100 g.

The sensors are operable in the range of operating ambient temperatures from minus 50 ° C to plus 90 ° C.

Sensors have a degree of protection IP55 according to GOST 14254.

Metal coatings of DSF parts are resistant to salt (sea) fog for groups of operating conditions 5.6 according to GOST 3940.

The sensors withstand vibration loads in three axes at an acceleration of 100 m/s² and a frequency of (50-250) Hz.

The sensors withstand shock loads at a frequency of (80-120) beats per minute and an acceleration of 150 m/ s².

The sensors withstand for 1 min. the effect of vacuum by 30% exceeding the actuation pressure and short-term exposure to rarefaction up to 150 hPa within 5 s.

Sensors resistant to the effects of operating values of air humidity for O2 version according to GOST 15150.

The insulation resistance between the sensor pins shall be at least 5 MΩ.

The insulation of the current-carrying parts relative to the housing must withstand without damage for 1 min the effects of practically sinusoidal alternating current with a frequency of 50 Hz, a voltage of 550 V.

95% of the MTBF is 12 thousand engine hours or 600 thousand km of car mileage.

DUTZH Liquid temperature sensors

Liquid temperature indicator sensors (DUTZH) are designed to work in the electrical circuit of the temperature indicator, are installed on water-cooled engines of cars, tractors and special equipment.

The sensors are used in a single-wire system of electrical equipment with a nominal voltage of 12 or 24 V DC complete with a corresponding magnetoelectric type indicator.

Type of climatic performance: O1 according to GOST 15150, but at the same time the maximum lower operating value of the air temperature is set to minus 50 ° C, and for operation in a non-working state - minus 60 ° C.

Operating mode: continuous nominal S1 according to GOST 3940.

Sensor type: thermistor.

The sensors are protected from penetration into foreign bodies and water in accordance with the degree of protection IPX7 GOST 14254.

An example of a switch record in other documents and when ordering: "Liquid temperature sensor DUTZH 02M TU RB 07513211.001-95".

The mass of the sensors is not more than 50 grams.

Technical characteristics of the VARIANTS of DUTZH are indicated in the table:



Liquid temperature sensor	Carving on the housing	Method of joining	Sensor reading range, °C/ (Rated voltage, V)	Sensor resistance, Ohm	Sensing temperature, °C / return, °C	
			Current – 0,1 A			
DUTZH ADUI.405213.001	Conical K 3/8" GOST 6111-58	Analog pin 101600	40-120 / (12 or 24)	600-42		
DUTZH-01 ADUI.405213.001-01		Screw V.M4-6gx8.58.016 GOST 17473-80				
DUTZH-02 ADUI.405213.001-02		Analog pin 101600	40-120 / (12)	315-20		
DUTZH-05 ADUI.405213.001-03		Screw M4-6gx8.58.016 GOST 17473-80	40-120 / (24)			
DUTZH-M ADUI.405213.001-04	Metric M14×1,5-6g	Analog pin 101600	40-120 / (12 or 24)	660-50		
DUTZH-02M ADUI.453842.003	Conical K 3/8" GOST 6111-58	Analogue of the pad Pin 501202		315-20		
DUTZH-06M ADUI.453842.003-01	Metric M16x1,5-6g					
DUTZH-01M1 ADUI.453842.003-02	Conical K 3/8 " GOST 6111			600-42		
DUTZH-03 ADUI.453842.001	Conical K 3/8" GOST 6111-58	Bayonet connector (connector analogue DIN-72585-1)	40-120 / (12 or 24)	600-42		+105+4 -3 / 92 min
DUTZH-04 ADUI.453842.001-01						+96+4 -3 / 83 min

Milestones Temperature liquids, °C	Sensor resistance, Ohm			
	with electrical load			without electrical load
	DUTZH, DUTZH-M, DUTZH-01, DUTZH-01M1	DUTZH-02, DUTZH-06M	DUTZH-02M	DUTZH, DUTZH-M, DUTZH-01, DUTZH-01M1
40	400-600	222-315	222-315	530-660
80	120-157	63-78	63-78	150-190
100	68-95	36-42	36-42	90-110
105*	—	—	30-40*	—
120	42-63	20-26	20-26	50-65
* Parameters for references				

Short designation Sensor	Temperature Surrounding medium, °C	Sensor resistance, Ohm	
		when changing Voltage from 12 to 16 V	when changing Voltage from 24 to 30 V
DUTZH, DUTZH-M, DUTZH-01, DUTZH-01M1	100±0,3	63-102	63-102
DUTZH-02, DUTZH-02M, DUTZH-06M		33-44	—

Sensors DUTZH-03 and DUTZH-04 are combined and give a signal to both the temperature indicator and the control lamp in case of an emergency increase in temperature.

The temperature of operation and return of the sensor alarm contact shall correspond to the values indicated in the table:

Sensor Type	Sensing temperature (with increasing temperature), °C		Return temperature (when the temperature drops), °C
	Bottom value	Top value	Bottom value
DUTZH-03	102	109	92
DUTZH-04	93	100	83

The sensors withstand the effects of vibration loads with a frequency of 50÷250 Hz, acceleration of 100 m / s² according to GOST 3940.

The sensors withstand the impact of shock loads with a frequency of 80÷120 shocks per minute at a maximum acceleration of 150 m / s² according to GOST 3940.

Sensors without electrical load are resistant to cyclic temperature effects from minus 50 to plus 125 ° C.

The sensors remain operational after exposure to an elevated temperature (125 ± 5) ° C for 3 hours without an electrical load.

The sensors are operable when under an electrical load of not more than 0.1 A at a temperature of (125 ± 5) ° C for 3 hours.

The insulation resistance of the alarm contact relative to the housing at ambient temperature (25±5) ° C and relative humidity (45-80) % should be at least 1 MΩ.

The insulation of the alarm contact relative to the housing must withstand the effects of an alternating voltage of 550 V at a frequency of 50 Hz without damage for 1 min.

Sensors are non-repairable, non-recoverable products.

90% MTBF of 10 thousand engine hours or 1 million km of vehicle mileage.

The average service life of the sensor is 10 years.

Liquid emergency temperature sensor DATZH

Liquid Emergency Temperature Sensors (DATS) are designed to turn on the warning light when the maximum liquid temperature is reached in the cooling systems of automotive and tractor engines.

The type of sensors is thermobimetallic. Supply voltages from the on-board network are 12. 24 V, current strength is not more than 120 mA.

Type of climatic performance: O2 according to GOST 15150. The lower operating value of the ambient temperature during operation is minus 50 ° C, the upper operating value of the ambient temperature during operation is plus 125 ° C.

Operating mode: S2 according to GOST 3940.

The sensors are protected from penetration into foreign bodies and water in accordance with the degree of protection IPX7 GOST 14254.

The sensors meet the requirements of TR CU 018.

The designations of the variants and the connection dimensions of the DATZH sensors are indicated in the table:



Short designation Sensor	Designation of the main Design Document	View Electric Output	Weight not more than, gr	Carving on the housing
DATZH	ADUIS. 407529.004	Pin	40	K3/8" GOST 6111
DATZH-01	ADUIS. 407529.004-01	Screw M4-6g GOST 17473		K3/8" GOST 6111
DATZH-02	ADUIS. 407529.004-02			K3/8" GOST 6111
DATZH-03	ADUIS. 407529.004-03			K3/8" GOST 6111
DATZH-04	ADUIS. 407529.004-04			K3/8" GOST 6111
DATZH-05	ADUIS. 407529.004-05	Pin		K3/8" GOST 6111
DATZH-06	ADUIS. 407529.004-06	Screw M4-6g GOST 17473		K3/8" GOST 6111
DATZH-07	ADUIS. 407529.004-07			K3/8" GOST 6111
DATZH-08	ADUI.407529.004-08	Pin	55	K3/8" GOST 6111
DATZH-09	ADUI.407529.004-09			K3/8" GOST 6111
DATZH-08M	ADUI.407529.004-10			K3/8" GOST 6111

The actuation and return temperature shall correspond to the table:

Sensor designation	Temperature, °C		
	Actuation (when the temperature rises)		Return (when the temperature drops)
	Bottom value, T1	Top value, T2	Bottom value, T3
DATZH, DATZH-01	102	109	92
DATZH-02	98	104	86
DATZH-03	74	80	64
DATZH-04	80	86	70
DATZH-05	98	104	86
DATZH-06	110	118	100
DATZH-07	91	98	81

DATZH-08, DATZH-08M	106	113	96
DATZH-09	85	91	75

Example of recording a sensor in other documents and when ordering: "Sensor emergency temperature of liquid DATZH-01 ADUI. 407529.004 TU RB 07513211.011-97".

The sensors are operable in the range of operating ambient temperatures from minus 50 ° C to plus 125 ° C.

The sensors remain operational after being inoperative at ambient temperatures from minus 60 ° C to plus 125 ° C.

The sensors withstand vibration loads in three axes at an acceleration of 100 m/s² and a frequency of 50-250 Hz and the impact of shock loads at a frequency of 80-120 shocks per minute and an acceleration of 150 m/s².

The insulation resistance of the DATJ output relative to the housing is not less than 1 MΩ. Insulation of current-carrying parts relative to the housing withstands without damage for 1 min the impact of almost sinusoidal alternating current with a frequency of 50 Hz with a voltage of 550 V.

Sensors are non-repairable non-recoverable products.

90% of the MTBF of DATZH is 6 thousand engine hours of engine operation or 350 thousand km of vehicle mileage.

The average service life of the sensor is 10 years.

Fuel level gauge sensor DUMP

The fuel level gauge sensor of the rheostat type, electromechanical, is designed to monitor the fuel level using the fuel level indicator connected to it and turn on the warning lamp of the backup fuel level in the tank.

Operating mode: S1 according to GOST 3940.

Type of climatic performance: O2 according to GOST 15150, but at the same time the lower operating value of the air temperature during operation is minus 40 ° C, the upper operating value of the air temperature during operation is plus 60 ° C.

The resistive element of the sensor is made using thick-film technology.

Sensor DUMP-71MI, DUMP-80MI, DUMP-82MI can be used in conjunction with an electronic pointer or electronic indicator with the following characteristics:

- minimum EMF of the measurement scheme, U, 2 B;
- the minimum operating measuring current flowing through the sensor (with an R sensor of 800 Ohms) 2 mA;
- the maximum operating measuring current flowing through the sensor (with R of the sensor 182 Ohms) 5 mA;
- minimum internal inductance of the measurement circuit, L, not more than 30 nH;
- maximum internal resistance of the measurement circuit R, 202 ohms.



Examples of recording the sensor in other documents and /or when ordering:

"Sensor DUMP-21M1I ADYUI.400720.001 TU, sensor DUMP-29NI ADYUI.400720.001 TU".

"M" - the presence of an angular sealed pad;

"1" - the presence of an 18-degree angular hermetic pad or the possibility of connecting a signal lamp;

"And" - the presence in the sensor of a resistive element with increased wear resistance;

"H" - the presence of additional design improvements.

The sensors are manufactured at . of 12 V and 24 V DC.

Sensors are manufactured of several types, differing in rheostat resistance, voltage and the ability to connect a warning lamp of the reserve fuel level, have different levels of displacement of the float depending on the shape and volume of the tank in accordance with the table:

Short designation Sensor	Designation of the main design Document	Nominal resistance Rheostat, Ohm	Nominal voltage, V	Possibility to connect a signal lamp	Nominal operating range of the float movement, (H1-H3), mm	Sensor weight, g, not more than
DUMP-I	ADUI.407511.060	90	12; 24	–	226	125
DUMP-01I	ADUI.407511.060-01				294	128
DUMP-02I	ADUI.407511.059			+	412	160
DUMP-02MI	ADUI.407511.068					165
DUMP-03I	ADUI.407511.059-01				567	175
DUMP-03MI	ADUI.407511.063-01					185
DUMP-04I	ADUI.407511.060-02				226	125

Production

DUMP-05I	ADUI.407511.060-03				294	128
DUMP-05MI	ADUI.407511.060-24					140
DUMP-06I	ADUI.407511.060-04			-	182	125
DUMP-07I	ADUI.407511.059-02				529	175
DUMP-07MI	ADUI.407511.063					180
DUMP-08I	ADUI.407511.059-03			+	374	130
DUMP-08MI	ADUI.407511.063-02					185
DUMP-10I	ADUI.407511.059-04				265	
DUMP-11I	ADUI.407511.059-05	330			294	155
DUMP-12I	ADUI.407511.060-05				391	
DUMP-15I	ADUI.407511.060-06	90			182	125
DUMP-17I	ADUI.407511.064			-	99	130
DUMP-19I	ADUI.407511.060-07				226	125
DUMP-19MI	ADUI.407511.060-15	330	12			135
DUMP-20I	ADUI.407511.060-08		12; 24			128
DUMP-20MI	ADUI.407511.060-16		12	-	294	140
DUMP-21I	ADUI.407511.060-09		12; 24			125
DUMP-21MI	ADUI.407511.060-17		12		226	
DUMP-21MI	ADUI.407511.069			+		135
DUMP-22I	ADUI.407511.060-10		12; 24		294	128
DUMP-22MI	ADUI.407511.060-18		12			140
DUMP-23I	ADUI.407511.060-11		12; 24	-		125
DUMP-23MI	ADUI.407511.060-19		12	+	182	135
DUMP-24I	ADUI.407511.060-12	330	12; 24			130
DUMP-24MI	ADUI.407511.060-20		12	-	391	140
DUMP-25I	ADUI.407511.060-13		12; 24			125
DUMP-25MI	ADUI.407511.060-21		12		182	135
DUMP-26I	ADUI.407511.060-14		12; 24	-		130
DUMP-26MI	ADUI.407511.060-22		12		99	140
DUMP-26MI	ADUI.407511.060-23		12; 24			145
DUMP-28I	ADUI.407511.061		12		505	180
DUMP-28MI	ADUI.407511.079					190
DUMP-29I	ADUI.407511.062		24			175
DUMP-29BI	ADUI.407511.062-02	800			567	
DUMP-29MI	ADUI.407511.068-02		12; 24	+		185
DUMP-29NI	ADUI.407511.062-01		12			175
DUMP-30I	ADUI.407511.070	90	12; 24		450	180
DUMP-32I	ADUI.407511.071		24			175
DUMP-32MI	ADUI.407511.068-01	800	12; 24		294	
DUMP-35I	ADUI.407511.072					180
DUMP-35MI	ADUI.407511.080	330			514	190
DUMP-36I	ADUI.407511.073			-		128
DUMP-36MI	ADUI.407511.081	117	12		294	138
DUMP-37I	ADUI.407511.074					180
DUMP-37MI	ADUI.407511.082	213		+	514	190
DUMP-38I	ADUI.407511.075	330			150	125
DUMP-39I	ADUI.407511.076		24			160
DUMP-39MI	ADUI.407511.068-03		12; 24		412	165
DUMP-39NI	ADUI.407511.076-01	800				160
DUMP-40I	ADUI.407511.077		24		238	150
DUMP-44I	ADUI.407511.065			+	298	185
DUMP-46MI	ADUI.407511.083	330			412	180
DUMP-48I	ADUI.407511.087	180	12; 24		299	160
DUMP-52I	ADUI.407511.066	800	24			155
DUMP-53I	ADUI.407511.066-01	310	12		374	
DUMP-54I	ADUI.407511.066-02	800			450	180
DUMP-55I	ADUI.407511.084				150	125
DUMP-57I	ADUI.407511.059-06	90		-	567	180
DUMP-70I	ADUI.407511.086				512	170
DUMP-71MI	ADUI.407511.067	800			697	
DUMP-76I	ADUI.407511.078		12; 24			250
DUMP-78I	ADUI.407511.059-08	90		+	695	
DUMP-80MI	ADUI.407511.055-02	800			797	330
DUMP-81MI	ADUI.407511.088	330		-	591	250
DUMP-82MI	ADUI.407511.055-03	800		+	255	140
				-	524	250

Note: the sign "+" indicates the presence of a design requirement, the sign "-" does not indicate the presence of this requirement.

The minimum allowable current in the sensor circuit should be at least 0.010 A, the maximum allowable current in the sensor circuit should be no more than 0.075 A.

The insulation resistance between the contacts and the sensor frame should be at least 5 MΩ.

The insulation of the current-carrying parts relative to the sensor frame withstands the effects of alternating current with a frequency of 50 Hz and a voltage of 550 V without damage.

The sensors are resistant to the following effects:

- fuel and lubricants;
- vibration loads in three axes at acceleration 50 m/s^2 and frequency from 50 to 100 Hz;
- shock loads at acceleration 100 m/s^2 and frequency from 80 to 120 beats per minute.

The sensors are operable in the operating temperature range from minus 40 °C to plus 60 °C.

90% of the sensor operating time to failure is 10 thousand engine hours of engine operation and with a probability of 95% should be at least 400 thousand km of vehicle mileage.

The average service life is 12 years.

Glass washers SEAT

Electric windshield washer (SEAT) is designed to supply liquid to the windshield and headlights of vehicles.

SEAT with a tank volume of 1.5 and 2 liters is attached to the bracket of the "dovetail" type: external, internal. SEAT with a tank volume of 10 liters is installed in a special bracket.

Climatic performance: O2 according to GOST 15150, but at the same time the lower working value of the ambient temperature during operation is set to minus 20 ° C, the upper operating value of the ambient temperature during operation is set to plus 70 ° C.

Mode of operation: repeated-short-term S3 according to GOST 183 with the duration of switching on the PV - 15%.

Pump type – centrifugal.

Windshield washers are manufactured at a nominal voltage of 12 V and 24 V DC. The current consumption at a voltage of 13.5 V is not more than 3 A, at a voltage of 24 V not more than 2.5 A.

The execution options of SEAT are indicated in the table:



Windshield washer designation	Overall dimensions of the tank, mm (tank volume, l)	Number of distributors	Number of gicleers, Pcs.	Total length of pipe-wire, mm	Weight, g, not more than	Nominal voltage of the electrical equipment system, V	Applicability
SEAT-00 ADUI.062841.001	140×142×147 (1,5)	-	3	950	360	12	MTZ tractors
SEAT-01 ADUI.062841.001-01		1	5	2000	400		Cars
SEAT-02 ADUI.062841.001-02		-	2	-	340		
SEAT-03 ADUI.062841.001-03		1	2	5500	485	24	Forklifts
SEAT-04 ADUI.062841.001-04		1	2				Forklifts
SEAT-05 ADUI.062841.001-05		-	1	1900	410		JSC "Amkador"
SEAT-10 ADUI.062841.002	168×100×200 (2)	1	3	2960	455		MAZ, "Neman", "Udarnik"
SEAT-11 ADUI.062841.002-01	392×290×145 (10)	2	5	7400	1339		MAZ
SEAT-12 ADUI.062841.002-02	168×100×200 (2)	1	2	2000	398	12	Cars
SEAT-13 ADUI.062841.002-03		1	2	6130	532	24	Farming
SEAT-14 ADUI.062841.002-04		1	2	5500	515	12	Forklifts
SEAT-15 ADUI.062841.002-05		1	2			24	Forklifts
SEAAT-16 ADUI.062841.002-06		1	2	4140	419	12	
SEAT-17 ADUI.062841.002-07		1	2	2440	470	24	BELAZ
SEAAT-18 ADUI.062841.002-08		1	2	6130	532		Gomselmash
SEAAT-19 ADUI.062841.002-09		1	2	2810	450		MoAZ

Production

SEAT-20 ADUI.062841.002-10		1	2	2100	432		URALAZ
SEAT-21 ADUI.062841.002-11		1	3		435	12	
SEAT-22 ADUI.062841.002-12	392×290× 145 (10)	1	3	2960	1128	24	MAZ
SEAT-23 ADUI.062841.002-13		1	3	3760	1148		MAZ
SEAT-24 ADUI.062841.002-14	168×100× 200 (2)	1	2	6000	590	12	MTZ
SEAT-25 ADUI.062841.002-15	392×290× 145 (10)	1	3	4380	2100	24	MAZ
SEAT-26 ADUI.062841.002-16		1	3	4260	1180		MAZ
SEAT-27 ADUI.062841.002-17		-	1	4000	470	12	Gomselmash
SEAT-28 ADUI.062841.002-18	168×100× 200 (2)	-	1	-	410		MAZ
SEAT-29 ADUI.062841.002-19		1	-	2070	435	24	MAZ
SEAT-30 ADUI.062841.002-20	392×290× 145 (10)	1	-	4560	1195		MAZ
SEAT-31 ADUI.062841.002-21	168×100× 200 (2)	1	-	3060	445		MAZ
SEAT-32 ADUI.062841.002-22		1	-	4750	480		MAZ
SEAT-33 ADUI.062841.003	160×100× 176 (2)				372	12	
SEAT-33M ADUI.062841.002-30	168×100× 200 (2)			-	340		
SEAT-33M1 ADUI.062841.003-02							
SEAT-34 ADUI.062841.002-23	168×100× 200 (2)	-	4	-		24	
SEAT-35 ADUI.062841.002-24		1	2	1560	370	12	
SEAT-36 ADUI.062841.003-01	160×100× 176 (2)	1		-	372	24	
SEAT-37 ADUI.062841.002-25	168×100× 200 (2)		3	4260	540		
SEAT-39 ADUI.062841.002-27				2700	455		
SEAT-38 ADUI.062841.002-26		1		6130	500	24	
SEAT-41 ADUI.062841.002-28	168×100× 200 (2)	1	2				
SEAT-42 ADUI.062841.002-29		1	3	5100			
SEAT-43 ADUI.062841.002-31	392×290× 145 (10)		-	6400	1500		
SEAT-44 ADUI.062841.002-32			-				
SEAT-46 ADUI.062841.002-34	168×100× 200(2)			3100	530		
SEAT-47 ADUI.062841.002-33	392×290× 145(10)			4560	1200		
SEAT-48 ADUI.062841.002-35	168×100× 200(2)			5500	530		

An example of recording a SEAT windshield washer in other documents and (or) when ordering:

"Glass washer SEAT-01 ADUI.060280.001 TU"

The duration of one cycle is 30 s. Continuous operation of the windshield washer is allowed for 10 s. The pressure of the washer fluid in the system is not less than 60 kPa (0.6 kg / cm²).

Windshield washers must withstand:

- vibration loads with acceleration of 50 m/s² and frequency (50-120) Hz;

- shock loads with an acceleration of $100 \text{ m} / \text{s}^2$ and a frequency of 80-120 beats per minute;
- increased speed of rotation at idle for 20 seconds;
- ambient temperature from minus 20°C to plus 70°C (when using a non-freezing liquid).

The insulation of the windings and current-carrying parts of the windshield washers relative to the housing must withstand an alternating current of 50 Hz, an effective value of 550 V.

95% of the MTBF is equal to 400 thousand km of the car or 10 thousand engine hours of the vehicle.

The average service life is 10 years.

Accumulator battery switch 1212.3737

Accumulator battery switch (hereinafter referred to as switches) designed for use on cars and tractors for general and special purposes, as well as on self-propelled agricultural, construction and road machines (hereinafter referred to as vehicles (CU)), including those exported to countries with a temperate and tropical climate, as well as in spare parts for them.

Type of climatic performance: O1 according to GOST 15150.

Mode of operation of the switches: continuous nominal S1 according to GOST 3940.

Mode of operation of the mechanism for switching on the electromagnet of switches with electromagnetic control drive (type EM, EMM, EMF): short-term nominal S2 according to GOST 3940. Duration of short-term operation for switches with electromagnetic control drive (type EM, EMM, EMF, except for ultrasound) - no more than 2 s.



Switches by control method and control signal are manufactured of the following types:

- with an electromagnetic control drive, the control signal "plus" or "minus" of the battery (EM);
- with an electromagnetic control drive, the control signal "minus" of the battery (EMM);
- with electromagnetic control drive, the control signal "plus" of the battery (EMF);
- with manual control drive (P).

Switches at the place of installation on the vehicle are made of two types:

- installed on the engine (DV);
- installed outside the engine (NDV).

Switches according to the switching schemes are made of two types:

- two-contact (2K);
- three-pin (3K).

Switches with a protection device (SC).

Explosion-proof circuit breaker (VZ) (example: 1212.3737-14M).

Modifications 1212.3737-10; 1212.3737-15 1212.3737-16 have a red power button, the rest are black.

At the request of the consumer, it is possible to manufacture a modification with covers of black or red color.

Technical characteristics of the variants:

Abbreviated circuit breaker designation	Designation of the main design document	Nomina l voltage , V	Maximu m continuo us current of the electrom agnet A, not more than	Nomiina l continuo us current switch, A	Typica l versio n	Maximum short- term current of the circuit breaker, A, not more than; exposure time, c, not more than	Degree of protectio n against the penetrati on of foreign bodies and water	Cover color and type (on/off buttons)														
1212.3737	ADUI.453779.001	24	9,8	50	EM, NDV, 2K	800 A; 30 s	IPX5	Black (pressed)														
1212.3737-01	ADUI.453779.001-01	12	17,5		EMF, NDV, 2K			Black														
1212.3737-1M	ADUI.453779.001-08								Black (with seal)													
1212.3737-02	ADUI.453779.001-02	24	9,8							R, DV, 2K	Black											
1212.3737-03	ADUI.453779.001-03	12	17,5			R, DV, 3K			—													
1212.3737-04	ADUI.453779.002	12; 24	—		EM, DV, 3K			Black (pressed)														
1212.3737-05	ADUI.453779.004											12	17,5	950 A; 20 s	Black (with seal)							
1212.3737-06	ADUI.453779.005	24	9,8							EM, NDV, 2K	800 A; 30 s					IP55	Black					
1212.3737-6M	ADUI.453779.005-01					12			17,5			800 A; 30 s	IP55					Black				
1212.3737-07	ADUI.453779.006	24	9,8	800 A; 30 s	IP55		Black															
1212.3737-08	ADUI.453779.007					12		17,5	800 A; 30 s					IP55	Black							
1212.3737-09	ADUI.453779.001-04	24	9,8							50	EMM, NDV, 2K					950 A to 20 s	IPX5		Black (with seal)			
1212.3737 M	ADUI.453779.001-05					24		9,8				50	EM, NDV, 2K					800 A; 30 s		IPX5	Black (with seal)	
1212.3737-10	ADUI.453779.001-06			24	9,8		50															EMM, NDV, 2K, UZ
1212.3737-11	ADUI.453779.001-07								24					9,8	50							
1212.3737-12	ADUI.453779.001-09	24	9,8							50	EMM, NDV, 2K, UZ					950 A; 20 s	IP65/IP67		Black (pressed)			
1212.3737-13	ADUI.453779.001-10					24		9,8				50	EMF, NDV, 2K, UZ					950 A; 20 s		IP65/IP67	Black (pressed)	
1212.3737-14	ADUI.453779.001-11			24	9,8		50															EMM, NDV, 2K, UZ
1212.3737-14M	ADUI.453779.001-14								24					9,8	50							
1212.3737-15	ADUI.453779.006-01	24	9,8							50	EM, NDV, 2K					950 A; 20 s	IP65/IP67		Black (pressed)			
1212.3737-16	ADUI.453779.006-02					24		9,8				50	EM, NDV, 2K					950 A; 20 s		IP65/IP67	Black (pressed)	
1212.3737-17	ADUI.453779.006-03			24	9,8		50															EM, NDV, 2K
1212.3737-19	ADUI.453779.006-04								24					9,8	50							
1212.3737-20	ADUI.453779.001-12	24	9,8							50	EM, NDV, 2K					950 A; 20 s	IP65/IP67		Black (pressed)			
1212.3737-24	ADUI.453779.007-01					24		9,8				50	EM, NDV, 2K					950 A; 20 s		IP65/IP67	Black (pressed)	
1212.3737-25	ADUI.453779.006-05			24	9,8		50															EM, NDV, 2K

An example of a circuit breaker record in other documents and when ordering: "Switch 1212.3737-02 ADUI.453779.001-02 TU RB 07513211.006-97".
"Battery switch 1212.3737-14M TU RB 07513211.006-97".

Weight of switches:

- with electromagnetic drive (type EM, EMM, EMF) – no more than 1600 g;
- with manual drive (type P) – no more than 1000 g.

The voltage drop between contacts 1 and 2 at a current of 50 A is not more than 0.025 V.

Production

The circuit breakers withstand without damage 5 circuit shutdowns at a current of 1,000 A with intervals between shutdowns of 10 seconds and an on time of 1 to 2 seconds.

The minimum actuation voltage of circuit breakers with electromagnetic control drive (type EM, EMM, EMF) with a nominal supply voltage:

- 12 V - no more than 10 V;
- 24 V - no more than 18 V.

Disconnection of circuit breakers with a nominal supply voltage of 24 V - no more than 15 V.

Switches are protected from penetration into foreign bodies and water in accordance with the degree of protection (see table) according to GOST 14254.

The switch is stable:

- to vibration loads with a frequency of 50 Hz along three axes according to GOST 3940 (with maximum acceleration - 50 m / s^2 - when installed outside the engine (type NDV); with maximum acceleration - 100 m / s^2 - when installed on the engine (type DV));

- to the impact of shock loads according to GOST 3940 (with maximum acceleration - 100 m / s^2 - when installed outside the engine (type NDV); with maximum acceleration - 150 m / s^2 - when installed on the engine (type DV)).

- to the change in ambient temperature from minus 50°C to plus 55°C ;

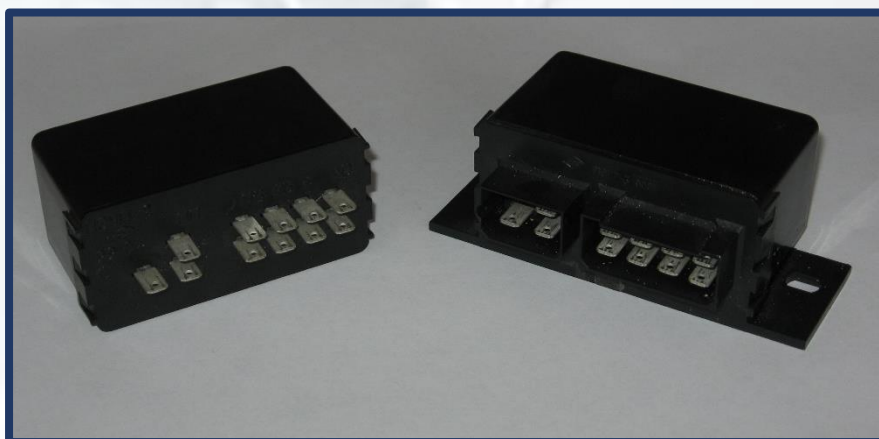
95% MTBF for switches is 600 thousand km of car mileage or 10 thousand engine hours of tractor operation.

The average service life is 12 years.

Electronic direction indicator breakers PEUP

Electronic direction indicator interrupters (IPCs) are designed to provide intermittent operation in the circuits of motor vehicle direction indicators.

Type of climatic performance: U2 according to GOST 15150, but at the same time the lower value of the operating temperature is minus 40 °C, the upper value of the operating temperature is plus 60 °C, the upper limit temperature is plus 65 °C, the value of the relative humidity of the air (95±3) % at (40±2) °C.



Operating mode of the interrupters: continuous nominal S1 according to GOST 3940.

Rated voltage: 24 V.

PEUP interrupters have individual thermal protection against overload when the current is exceeded on one channel, group thermal protection against overload when the total current is exceeded, as well as individual short-circuit protection (SHORT CIRCUIT) for each output channel (PP, LP, PT, LT).

Interrupters are manufactured of several types, differing in electrical circuit and design in accordance with the table:

Abbreviated designation of interrupters	Designation of the main design document	Controlled interrupter load	Control Signal Type	Number of power channels	Availability of protection against short circuits by outputs	Mounting method
PEUP-2	ADUI.453714.002	$2/(2 \times 21W + 5W) + 2/1 \times 21W$	minus on-board network	4	$+ I_{1k} \geq 6.5A$	Block
PEUP-3	ADUI.453714.003		meander with vyv. "P"		$- I_{kZ} = 70A$	On the bracket
PEUP-4	ADUI.453714.004				$+ I_{1k} \geq 6.5A$	
PEUP-5	ADUI.453714.005	$2/3 \times 21W + 2/2 \times 21W$	minus the on-board network or with an exit. "P"		$+ I_{1k} \geq 12.5A$	Block
PEUP-6M	ADUI.453714.006					
PEUP-7M	ADUI.453714.007					
PEUP-8	ADUI.453714.008					
PEUP-9	ADUI.453714.009	$2/2 \times 21W + L + 2/1 \times 21W$				On the bracket
PEUP-10	ADUI.453714.010					

Notes

- Short circuit – short circuit;
- I_{1k} – protection current on one channel;
- $I_{short\ circuit}$ – short-circuit current;
- $2/1 \times 21W$ - 2 channels with a controlled load of one lamp of 21 W;
- $2/2 \times 21W$ - 2 channels with a controlled load of two lamps of 21 W;
- $2/3 \times 21W$ - 2 channels with a controlled load of three lamps of 21 W;
- $2/(2 \times 21W + 5W)$ - 2 channels with a controlled load of two lamps of 21 W plus one lamp of 5 W;
- $2/2 \times 21W + L$ - 2 channels with a controlled load of two incandescent lamps 21 W and 1 LED lamp.

Example of recording an interrupter in other documents and/or when ordering:

"Electronic direction indicator interrupter PEUP-6M TU RB 07513211.020-2000".

The mass of the interrupters is not more than 100 g.

The interrupter shall maintain its parameters at the maximum reduced supply voltage of the on-board network $U_{n \min} = 21.6 \text{ V}$ and increased supply voltage of the on-board network $U_{n \max} = 30 \text{ V}$.

The interrupter is stable:

- to the polarity of nutrition;
- to conductive interference on control and signal on-board circuits according to STB ISO 7637-3 or according to GOST 29157;
- to conductive interference on power circuits according to STB ISO 7637-2 or according to GOST 28751;
- to interference from electrostatic discharge according to GOST 30378;
- to the effect of changes in ambient temperature from minus 50°C to plus 65°C ;
- to the vibration load at acceleration $50 \text{ m} / \text{s}^2$ and frequency from 20 to 50 Hz;
- to the impact of shock loads with an acceleration of $100 \text{ m} / \text{s}^2$, a frequency of 80-120 beats per minute.

Interrupters are non-repairable, non-repairable products.

90% of the MTBF is 1 million km of the car or 10 thousand engine hours of the vehicle.

The average service life of the interrupter is 10 years.

Alarm emergency devices SA

Alarm emergency device SA-1 is designed for sound alarm of the emergency mode of any car system.

The alarm device has two modes of audible alarm: intermittent and continuous beep.

Climatic design of the interrupters: 02 according to GOST 15150, but at the same time the maximum lower operating value of the air temperature is minus 30 ° C, the lower value of the maximum air temperature is minus 50 ° C, the upper value of the operating air temperature is plus 60 °C, the upper value of the maximum air temperature is plus 65 °C.

Operating mode of the alarm device: short-term nominal S2 according to GOST 3940.

Rated voltage: 12 V, 24 V.

An example of recording the alarm device in other documents and when ordering:

"Emergency alarm device SA-1 ADYUI.453686.001 TU RB 07513211.019-2000".

"Emergency alarm device SA-2 ADUI.453686.001-01 TU RB 07513211.019-2000".

The weight of the alarm devices is not more than 50 g.

The sound pressure level of the alarm signal at a distance of 50 cm corresponds to the table:

Abbreviation Switch	Audio Frequency signal, Hz	Sound level Signal pressure, dB
SA-1	3 000 – 5 000	30 – 100
SA-2	2 000 – 3 000	75 – 100

Electrical parameters of the alarm device at the nominal supply voltage $U_P = 12 \div 24$ V:

- the current consumption of the alarm device on the power circuit is not more than 10mA;
- the frequency of interrupts of the signal signal at the pin P - from 0.5 to 3.0 Hz.

The alarm device retains its parameters at the maximum reduced supply voltage of the on-board network $U_p = 10.8$ V and at the maximum increased supply voltage of the on-board network $U_p = 30$ V.

The alarm device is resistant to polarity reversal.

The alarm device is resistant to vibration with the following parameters: frequency – 50 Hz, acceleration 50 m/s²;

The alarm device remains operational after exposure to mechanical shocks of multiple action with the following parameters: peak shock acceleration - 100 m / s², duration of impact acceleration - from 2 to 15 ms.

The alarm device is operable when exposed to ambient temperature from plus 60 C to minus 30 C. The alarm device remains operational after exposure to changes in ambient temperature from minus 50 C to plus 65 C. °°°°

The alarm device is stable:

- to conductive interference on power circuits according to STB ISO 7637-2 or according to GOST 28751;



Production

- to conductive interference on control and signal on-board circuits according to STB ISO 7637-3 or according to GOST 29157;

- to interference from electrostatic discharge according to GOST 30378.

The alarm device refers to non-repairable products.

90% of the MTBF is 12,5 thousand engine hours of the vehicle or 1 million km of the car's mileage.

The average service life of the alarm device is 10 years.

Electromagnetic solenoid valves EMPK

Pneumatic solenoid valve (EMPK) is designed to work as part of the pneumatic system of the vehicle (TS). The valve is designed to supply pressure from the receivers to the pneumatic actuators according to the electrical control commands received by the valve contacts. The valve provides pressure control in the actuators according to a two-phase algorithm (lifting and resetting pressure of a given value). In the initial position (in the de-energized state), the valve cuts off the receiver from the pneumatic mechanisms. Type of climatic performance "U", category of placement 2 according to GOST 15150. The main feature of the valve is the presence of a built-in control and protection circuit, which ensures stable heating of the electromagnet coil with prolonged switching on, the absence of its own interference and protection against conductive interference along the power circuits.



Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is 70 °C, the lower operating value of the air temperature during operation is minus 40 °C.

Operating mode (EMPK-05,05-01,05-02,05-03, EMPK-06,06-01,06-02,06-03, EMPK-07, EMPK-08,08-01,08-02, EMPK-09, EMPK-13, EMPK-15): continuous nominal S1 according to GOST 3940.

Operating mode (EMPK-10, EMPK-10-01, EMPK-10-02, EMPK-10-03, EMPK-10-06, EMPK-10-07, EMPK-10-10, EMPK-11, EMPK-11-01, EMPK-14): continuous nominal S2 according to GOST 3940

Rated supply voltage of the electromagnet of the electropneumatic valve (24 ± 0.5) V.

EMPK versions are shown in the table:

EMPK designation	Input and output connection thread	Design differences
ADUI.453644.005	M10x1	Location of the electrical connector along the input-output axis, normally closed
ADUI.453644.005-01	M10x1	Location of the electrical connector along the axis of the mounting holes, normally closed
ADUI.453644.005-02	M10x1	Location of the electrical connector along the output-in axis, normally closed
ADUI.453644.005-03	M10x1	Location of the electrical connector along the output-in axis, normally closed
ADUI.453644.006	M10x1	Location of the electrical connector on the output-reset axis, open
ADUI.453644.006-01	M10x1	Location of the electrical connector along the axis of the mounting holes, normally open
ADUI.453644.006-02	M10x1	Location of the electrical connector along the reset-output axis, normally open
ADUI.453644.006-03	M12x1,5	location of the electrical connector along the output-reset axis, normally open
ADUI.453644.007	M10x1,5	Swivel, normally closed
ADUI.453644.008	M12x1,5	Location of the electrical connector along the input-output axis, normally closed
ADUI.453644.008-01	M12x1,5	Location of the electrical connector along the axis of the mounting holes, , normally closed
ADUI.453644.008-02	M12x1,5	Location of the electrical connector along the output-in axis, normally closed
ADUI.453644.009	M10x1	Consists of two solenoid valves, has one inlet and two outlets, the valves are normally closed
ADUI.453644.010	M10x1	Location of the electrical connector along the input-output axis, normally closed

ADUI.453644.010-01	M10x1	location of the electrical connector along the axis of the mounting holes, normally closed
ADUI.453644.010-02	M10x1	Location of the electrical connector along the input-output axis, normally closed
ADUI.453644.010-03	M10x1	Location of the electrical connector along the axis of the mounting holes, normally closed
ADUI.453644.010-06	M12x1,5	Location of the electrical connector along the input-output axis
ADUI.453644.010-07	M12x1,5	Location of the electrical connector along the axis of the mounting holes
ADUI.453644.010-10	M10x1	Swivel, normally closed
ADUI.453644.011	M10x1	It consists of two solenoid valves, has one inlet and two outlets.
ADUI.453644.011-01	M12x1,5	It consists of two solenoid valves, has one inlet and two outlets. valves are normally closed
ADUI.453644.013	M12x1,5	Rotary, thread of the output and inlet hole M12x1,5, normally open
ADUI.453644.014	M10x1	Swivel, normally closed, with anti-EMF protection
ADUI.453644.015	M10x1,5	Rotary, thread output and inlet hole M10x1,5, normally closed, nominal voltage 12 V

An example of recording the valve designation in the technical documentation when ordering it:

"Solenoid pneumatic valve EMPK ADUI. 453644.005 TU BY 600417525.056-2008".

The mass of the valve is not more than 0.5 kg. The mass of the ADUI valve.453644.009 is not more than 1 kg.

Power consumption is not more than 4 W.

The mass of the valve ADUI.453644.010, ADUI.453644.014 is not more than 0.5 kg. Mass of the valve ADUI.453644.011 is not more than 1 kg.

The supply voltage range of the valve electromagnet is from 90 to 125% (from 21.6 to 30 V) of the nominal with full preservation of all temporary pneumatic and electrical parameters of operation, while at voltages from 18 to 21.6 V and from 30 to 30.5 V, the valve must be fully operational, where it is allowed to leave pneumatic time parameters that do not affect the operation of the system as a whole.

The retention current at a nominal voltage of 24 V is not more than 0.2 A.

The valve shall be operated on compressed air in the pneumatic systems of vehicles fitted with a moisture separator and a filter, and a certain amount of moisture and oils is allowed in the pneumatic system.

The working pressure at the valve inlet is from 0.03 to 0.82 MPa.

Maximum operating pressure at the inlet 1.0 MPa;

The valve remains operational after being exposed to a modulator inlet pressure of 1.32 MPa for 5 minutes.

Air leakages from the valve at an inlet pressure of 0.8 MPa in the disconnected and on state shall not exceed 5 cm³/min.

The valve provides the time of filling the chamber with air with a volume (1 ± 0.1) l not more than 1.8 s, the time of release of air from the chamber - no more than 1.9 s, the delay time of operation is not more than 30 ms.

Valve insulation resistance of at least 20 MΩ in normal climatic conditions and not less than 5 MΩ in high humidity;

Valve insulation withstands 550 V AC voltage at 50 Hz for 1 min.

The valve must remain operational when exposed to an elevated temperature of plus 70 °C.

The valve remains operational when exposed to a reduced temperature of minus 40 °C.

Production

The valve withstands vibration resistance tests according to IV degree of rigidity according to GOST 28988 and shock loads for group M1 according to GOST 30631 for products installed outside the engine.

The valve is resistant to conductive interference through power circuits according to STB ISO 7637-2 or GOST 28751.

The valve must be resistant to interference from electrostatic discharge according to GOST 30378.

90% MTBF for category 2 operating conditions according to GOST 15150 is not less than 18 thousand hours of operation of the vehicle or 2 million cycles of operation.

The average service life of the valve is 10 years.

Air pressure sensor programmable two-channel DDVPD

The sensor is designed to be installed in the pneumatic line of the truck brake system in order to monitor the air pressure in the system.

Type of climatic performance: UT2 according to GOST 15150.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal voltage $U_n=24$ V.

An example of recording a block in other documents and (or) when ordering:

"Air pressure sensor programmable two-channel DVDPD ADUI.406222.012 TU BY 600417525.082-2020".

"Air pressure sensor programmable two-channel DDVPD ADUI.406222.012-01 TU B Y 600417525.082-2020 (with a resistor for coordination of communication via CAN)".

The mass of the sensor is not more than 150 g.

The sensor shall maintain its parameters at the maximum reduced supply voltage of the on-board network $U_{n \min} = 18$ V and increased supply voltage of the on-board network $U_{n \max} = 30$ V.

The insulation of the contacts relative to the housing must withstand without damage for 1 minute the impact of a practically sinusoidal alternating current with a frequency of 50 Hz, the effective voltage of which is 550 V.

The sensor is stable:

- to the polarity of nutrition;
- to interference from electrostatic discharge according to GOST 30378.;
- to conductive interference on power circuits according to GOST ISO 7637-2;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 95 ° C;
- to the vibration load at acceleration 50 m / s² and frequency from 10 to 50 Hz;
- to the effects of shock loads with acceleration of 100 m/s².

95% of the MTBF of the sensor is 18 thousand engine hours of the car or 1 million km of truck mileage.

The average service life of the unit is 10 years.

Pressure sensor electronic programmable DDEP

The sensor is designed to obtain information about the pressure in the pneumatic cylinders or pneumatic network of the vehicle and transmit it to the receiver of the digital signal via the CAN network.

Type of climatic performance: U1 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal voltage $U_n = 24$ V.

An example of recording a block in other documents and (or) when ordering:

"Electronic programmable pressure sensor DDEP ADUI.406222.009 TU BY 600417525.081-2022".

The mass of the sensor should not exceed 150 g.

The sensor shall maintain its parameters at the maximum reduced supply voltage of the on-board network $U_{n \min} = 18$ V and increased supply voltage of the on-board network $U_{n \max} = 32$ V.

The insulation of the contacts relative to the housing must withstand without damage for 1 minute the impact of a practically sinusoidal alternating current with a frequency of 50 Hz, the effective voltage of which is 550 V.

The sensor is stable:

- to the polarity of nutrition;
- to interference from electrostatic discharge according to GOST 30378.;
- to conductive interference on power circuits according to GOST ISO 7637-2;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;
- to the vibration load at acceleration 50 m / s² and frequency from 10 to 50 Hz;
- to the effects of shock loads with acceleration of 100 m/s².

95% of the MTBF of the sensor is 18 thousand engine hours of the car or 1 million km of the car's mileage.

The average service life of the unit is 10 years.



Universal diagnostic complex UDC

The complex is designed to diagnose all electronically controlled units and assemblies:

- all modifications of anti-lock braking systems for tractors;
- all modifications of anti-lock braking systems for trailers;
- all modifications of anti-lock-anti-slip systems;
- electronic control system for air suspension of the truck;
- electronic acceleration sensor;
- electronic pressure sensor;
- electronic steering wheel rotation

sensor;

- Programmable pressure sensor.

The complex provides:

- reading diagnostic information on the ISO 9141 bus and transmitting this information via usb bus to a computer for display to the user;

- reading diagnostic information on the CAN bus and transmitting this information via the USB bus to the computer for display to the user;

- Reading diagnostic information via the LIN bus and transmitting this information via the USB bus to a computer for display to the user;

- output of active faults;

- output of passive faults;

- removal of passive faults from the diagnosed equipment;

- configuration (parameterization) of the diagnosed equipment;

- convenient display of diagnostic information, output of manufacturer data, output of the date of manufacture and serial number of the diagnosed unit.

Nominal voltage $U_n = 24$ V.

An example of recording the complex in other documents and (or) when ordering:

"Universal diagnostic complex UDC ADUI.453613.014 TU BY 600417525.085-2020".

The mass of the complex should be no more than 1 kg.

The complex must maintain its parameters at the maximum reduced supply voltage of the on-board network $U_{n \min} = 21.5$ V and increased supply voltage of the on-board network $U_{n \max} = 30$ V.

The complex is stable:

- to the effect of changes in ambient temperature from minus 25 ° C to plus 55 ° C;

- to the vibration load at acceleration 50 m / s² and frequency from 10 to 55 Hz;

- to the effects of shock loads with an acceleration of 150 m/s².

95% MTBF Complex Is 3 thousand hours of operation of the vehicle, or or 1 million km of car mileage.

The average service life of the unit is 5 years.



Electronic brake drive control system unit EB SUPT

The unit receives information from the wheel speed sensors, the acceleration sensor, pressure sensors and the steering wheel rotation sensor, processes this information and issues control signals to the actuators of the system.

The unit operates in the stability control system of the GCS configurations of 4 S/4M or configuration 6S/6M, where xS is the number of sensors, xM is the number of modulators.

Type of climatic performance: U2 according to GOST 15150, but at the same time the upper operating value of the air temperature during operation is plus 55 °C.

Operating mode: continuous nominal S1 according to GOST 3940.

Nominal voltage $U_n=24$ V.

An example of recording a block in other documents and (or) when ordering:

"Electronic brake drive control unit EB SUPT ADUI.453633.026 TU BY 600417525.075 2018".-

The mass of the block is not more than 1 kg.

The power consumption of the unit in working condition along the power circuit (excluding actuators) should be no more than 25 W (current consumption not more than 650 mA). The maximum switched power is 350 W.

The unit shall maintain its parameters at the maximum reduced supply voltage of the on-board network $U_{n\ min} = 18.5$ V and increased supply voltage of the on-board network $U_{n\ max} = 30.5$ V.

The unit is stable:

- to the polarity of nutrition;
- to interference from electrostatic discharge according to GOST 30378.;
- to conductive interference on power circuits according to GOST ISO 7637-2;
- to the effect of changes in ambient temperature from minus 50 ° C to plus 65 ° C;
- to the vibration load at acceleration 50 m / s² and frequency from 10 to 50 Hz;
- to the effects of shock loads with acceleration of 100 m/s².

90% of the MTBF of the unit is 800 thousand km of the car's mileage.

The average service life of the unit is 10 years.

1. Warranty workshop

Performs work on warranty service of products manufactured by OJSC "Ekran".

Tel. (+375-177)-74-81-61

2. Test Center

Accreditation certificate BY/112 02.2.0.0424 for compliance with STB ISO/IEC 17025

Conducts tests of products according to GOST 20.57.406 (more)

Tel. (+375-177) 72-39-14

3. Sanitary-industrial laboratory

Accreditation certificate No BY/112 02.2.0.0525. Analyzes wastewater, air of the working area, microclimate in the premises, noise level, light level in the premises.

Tel. (+375-177) 72-30-62

4. Brand store "Krynitsa"

Sale of products of automobile and tractor electrical equipment of OJSC "Ekran" for cash and non-cash payment with registration of bills of lading for shipment;

sale of food and non-food products:

- for cash payment,
- non-cash payment from plastic cards.

22514 Minsk region, Borisov district, Borisov, Normandy – Neman str., 161 A

Tel. (+375-177) 79-77-80

5. Transport shop No 28

Tel. (+375-177) 72-39-47, VEL (+375-44) 72-444-37

6. Hotel

Tel. (+375-177) 95-47-17, 74-81-86, Fax: (+ 375177) 74-81-17

ekran@ekranbel.com

Reservation of a room (places in the room) by accepting a reservation request from the consumer by mail, telephone, electronic and facsimile.

OJSC "Ekran", Republic of Belarus,
Minsk region, Borisov district
222514 Borisov, Normandy-Neman str., 167.
waiting room. Tel./fax: (+375 177) 74-81-17, tel. 73-42-01

E-mail of the reception of OJSC "Ekran": **ekran@ekranbel.com**

E-mail marketing and sales department:

market@ekranbel.com (marketing)

sbyt@ekranbel.com (sales)

Phones:

Marketing and Sales Department: +375 (177) 79-77-70

sales: 8 029 609-74-41 (corporate) 74-80-41

company shop "Krynitsa": +375 (177) 79-77-80,

krynica@ekranbel.com

Supply and Transport Department: + 375 (177) 79-77-64,
fax 79-77-66

special design bureau: + 375 (177) 79-77-65, 79-77-63

