

Railway Solutions



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IRZ-Space

Space-related electronics for on-board and ground segments, microwave products, hybrid assemblies production, mobile robotic system

IRZ-Lokomotiv

Railway automatics and safety systems

IRZ TEK

Oilfield electronic equipment, oil production management system



IZHEVSKIY RADIOZAVOD (IRZ)



IRZ-Svyaz Navigation equipment, radio communication

and data transmission system, avionics, check-out equipment

IRZ-TEST

Procurement and tests of electronic components, testing laboratory

IRZ-Foton

Printed circuit boards, surface mounting

IRZ-Rinkos Mechanical parts production



IRZ-Lokomotiv



IRZ-Lokomotiv is a part of the group of companies of Izhevskiy Radiozavod (IRZ). For over 20 years the company has been the system supplier of Russian Railways, railways of CIS and Baltic States, subways.

In 2010, IRZ became the first Russian railway supplier certified to International Railway Industry Standard (IRIS).

The projects are implemented in collaboration with the Russian leading Research and Design Institute for Information Technology, Signalling and Telecommunication in Railway Transportation (NIIAS). Among large projects is the development and production of the KLUB automatic train protection systems (over 30 thousand systems have been manufactured since 1994). Thanks to the smart interface solutions developed by IRZ, the KLUB-U systems were integrated on trains of 15 world manufacturers: Siemens (Germany), General Electric (USA), Alstom (France), Skoda (Czech Republic), PESA (Poland), Talgo (Spain), Hyundai (South Korea), Stadler (Switzerland), Zhuzhou Electric Locomotive Co., Datong Electric Locomotive Co., Dalian Locomotive Co. (China), Plasser (Austria), etc.

IRZ-Lokomotiv offers innovative solutions aimed at:

- · improvement of safety and intensity of railway traffic;
- · control of railway objects;
- · creating power systems including autonomous systems for various equipment and hardware;
- · improvement of production efficiency and business processes control systems;
- development and production of systems to tackle specific tasks and systematic operations of the customer.

The company utilizes modern production facilities which allow to perform full cycle of work from engineering of products according to customer specification to mass production and after-sale service.





KLUB-U Automatic train protection system

Application: linehaul, shunting, high-speed locomotives and motor car rolling stock operated on railways equipped with automatic locomotive signaling (ALSN / ALS-EN) or radio link



Main functions

- speed control
- automatic braking in case of the speed limit exceeding
- prevention from spontaneous movement
- driver's vigilance monitoring
- reception of signals of automatic locomotive signaling (ALSN / ALS-EN)
- indication of traffic lights
- registration of train traffic parameters and characteristics
- train positioning by GNSS signals (GLONASS/GPS)
- online data transmission by radio link
- routing by electronic map
- self-diagnostics of the system

Key benefits

- certified to Technical Regulation of Customs Union 001/2011
- registered mean of speed and pressure measurement (state register)
- maintenance of eqipment in operation by own service department
- training center for operation and maintenance staff

Parameter	Value
Power consumption	less 300 W
Operating temperature	– 40…+50 °C
Service life	20 years
Warranty period	3 years
Power supply	50, 75, 110 V

TRAFFIC CONTROL & SAFETY SYSTEMS



KLUB-UP Safety system for self-propelled rolling stock

Application: special self-propelled rolling stock of I and II category



Main functions

- speed control
- automatic braking in case of the speed limit exceeding
- prevention from spontaneous movement
- driver's vigilance monitoring
- reception of automatic locomotive signaling (ALSN)
- indication of traffic lights
- registration of train traffic parameters and characteristics
- positioning by GNSS signals (GLONASS/GPS)
- routing by electronic map
- self-diagnostics of the system

Key benefits

- certified to Technical Regulation of Customs Union 001/2011
- registered mean of speed and pressure measurement (state register)
- maintenance of eqipment in operation by own service department
- training center for operation and maintenance staff

Parameter	Value
Power consumption	less 100 W
Operating temperature	– 40…+50 °C
Service life	15 years
Warranty period	3 years
Power supply	20 32 VDC





LOTES Locomotive telemetry system

Application: linehaul, shunting and high-speed locomotives, motor vehicles

LOTES STRUCTURAL DIAGRAM



DIAGNOSTIC & MONITORING SYSTEMS



Main functions

- integration with on-board ATP systems
- monitoring of fuel level in tanks and analysis of refueling and fuel consumption including unauthorized discharge
- real-time monitoring of train parameters, equipment and subsystems (on-board supply voltage, pressure, power consumption, etc.)
- positioning by GNSS (GLONASS/GPS)
- saving history of technical parameters to nonvolatile memory
- indication of traffic and equipment main parameters on driver's display unit
- generating reports on changes of technical parameters
- automated processing and transmission of train traffic and equipment parameters to a server of a locomotive monitoring system in real time mode
- quick access to information on the condition of trains fleet by maintenance personnel

Key benefits

- detecting and informing about pre-failure condition of train equipment and mechanisms
- gathering and storing data on train and traffic parameters on a single server
- remote access to train and traffic parameters data
- maintenance of equipment in operation by own service department
- in-house training center for operators of the system

SPECIFICATIONS	
Parameter	Value
Power consumption	less 100 W
Operating temperature	– 40…+50 °C
Service life	15 years
Warranty period	3 years
Power supply	24, 50, 75, 110 VDC





SKRPD Video monitoring system

Application: motor cars, track machines and other vehicles operated on railways, in metros, industrial zones or protected sites, urban transport

SKRPD STRUCTURAL DIAGRAM



DIAGNOSTIC & MONITORING SYSTEMS



Main functions

- displaying and recording main parameters of a train performance, on-board equipment and mechanisms (engine speed of rotation, engine temperature, engine oil pressure, fuel level, train speed, air pressure in braking line and brake cylinders, on-board power supply, gear engaged, charge/discharge current, battery, digital inputs on/off)
- recording video stream from cameras with a resolution of 1024x768 at a frequency of not less than 18 frames per second for 24 hours (for standard configuration)
- customization of the operating modes of the system

Key benefits

- video and audio recording subsystems can be used autonomously to monitor compliance with traffic safety and health protection requirements
- communication regulations and other actions in a cabin or wagon
- gathering data on train technical parameters and transfering to a server
- maintenance of equipment in operation by own service department
- training center for operation and maintenance staff

SPECIFICATIONS	
Parameter	Value
Power consumption	less 200 W
Operating temperature	– 40…+50 °C
Service life	15 years
Warranty period	3 years
Power supply	24 VDC

Successful projects

Rolling stock of Kambarka Engineering Works (Kambarka), Muromteplovoz (Murom), Moscow Metro and Saint Petersburg Metro





ABTC-M Microprocessor automatic blocking system with tone track circuits, centralized equipment deployment and backup data transmission channels

Application: interval control and safety of trains operated on DC or AC traction railways, autonomous traction railways, sections with centralized power supply of locomotives and rolling stock with pulse regulation of engines, high-speed lines, new and upgraded lines



Main functions

- control of train movement over block sections of a track
- block sections occupancy control
- track integrity control
- generating and transmitting to operator the data on train position through the ALSN and/or ALS-EN automatic locomotive signaling and digital radio link
- control signals of traffic lights with control of lamps integrity
- · control of level crossing automatics
- turn on of the prohibitive traffic lights by station duty officer and level crossing duty officer
- · interaction with electric and dispatcher interlocking
- interaction of the system subsets at neighboring stations with each other
- · control of serviceability of signal cable of track circuits
- diagnostics of system modules with failure registration

INTERVAL CONTROL SYSTEMS



ABTC-M STRUCTURAL DIAGRAM



Key benefits

- easy maintenance and repair due to unified modular design
- no limitation for distance
- system can be integrated with any types of existing electrical interlocking
- several system designs: indoor rack, indoor cabinet, outdoor cabinet
- reduction of capital and operating costs due to centralized installation

Parameter	Value
Power consumption	up to 100 W
Operating temperature: – indoor installation – outdoor installation	+ 1…+50 ℃ - 40…+75 ℃
Service life	15 years
Warranty period	3 years
Power supply	220 VAC 24 VDC





IRCS-T/W Integrated Rail Control System

Application: traffic interval control on public and industrial railways



Main functions

- · railway traffic interval control
- tracks integrity monitoring
- generation and transfer of railway section occupancy status to locomotive
- locomotive or train positioning control
- overspeeding control, automatic braking when exceeding speed limit
- emergency breaking by driver or forced braking by interval control system
- control and transfer to a single server of data on train and locomotive main parameters
- control of level crossing subsystems (warning and protection lights, barriers, fenders, alarm speakers, etc.)
- self-diagnostics of the system

10 • driver's vigilance monitoring

INTERVAL CONTROL SYSTEMS



KTSU-P Level crossing control system

Application area: safety ensurance on level crossings for road and rail transport

Description and main functions

- control of railway objects of level crossing automatics based on the signals of various types of interlocking and axel counters
- control of protection lights and crossing barriers
- control of traffic lights and barriers
- · closing and opening of barriers
- control of crossing signaling lamps and flashing equipment
- control of availability of main and backup power for the signaling system
- · transmitting the status of level crossing to station
- logging and archiving the system self-diagnostic data
- · storage of self-diagnostic data for 30 days
- access to archive of the system performance for the last 30 days



Indication panel (optional)

Control cabinet

SPECIFICATION	
Parameter	Value
Power consumption	less 150 W
Operating temperature	– 40…+60 °C
Service life	15 years
Warranty period	3 years
Power supply	220 VAC (main) 12 VDC (backup)





Countdown panel for level crossings signalling

Application: informing the drivers about the time remaining until the closure of the attended or unattended railway crossings



Control unit

Description and main functions

- indication of time remaining to turning on the level crossing alarm
- easy installation and maintenance
- backup power is provided by level crossing equipment

SPECIFICATION	
Parameter	Value
Power consumption: – indication unit – time-delay unit	less 36 W less 6 W
Operating temperature	– 40…+65 °C
Service life	20 years
Warranty period	3 years
Power supply: – indication unit – time-delay unit	2 V 6 V

INTERVAL CONTROL SYSTEMS



Memory unit (registration cassette)

Application: storing the data from the KLUB, BLOCK safety systems and their modifications



Main functions

- saving rolling stock traffic data
- saving data when power is off
- storing electronic map of safety system (KRE-E only)
- reading time is up to 2 minutes
- saving data from various equipment (KRE-E only)
- powered by USK reader

SPECIFICATION	
Parameter	Value
Weight: – KRE-E – KRE-M	less 39 g less 60 g
Memory size: – KRE-E – KRE-M	256 MB 2 MB
Operating temperature	−30…+40 °C
Service life	15 years
Warranty period	3 years





SUD-U Memory unit reader

Application: reading memory units of ATP systems in service centers, points of reading traffic parameters



Main functions

- reading and processing data from memory units (registration cassette)
- · generating and storing results of a trip
- identification of pre-emergency and emergency situations and their causes during a trip
- generating trip archives and accounting documents
- fast reading of data from KR-M memory units less than 2 minutes
- supports Windows XP/7/10 32/64 bit
- connection to PC via USB
- testing of a memory unit reader with KR-TEST-01
- by operator (self-diagnostics)

14

Parameter	Value
Weight	less 0,71 kg
Power consumption	less 2.5 W
Operating temperature	+1+40 °C
Service life	15 years
Warranty period	3 years
Overall dimensions	125x128x72 mm

SERVICE AND MAINTENANCE EQUIPMENT



BVD-U Unified input and diagnostic portable unit

Application: control and repair sites of locomotive depots, maintenance centers of train safety systems

Main functions

- · recording and storing an electronic map
- simulating signals of locomotive control equipment, speed sensors, driver's vigilance monitoring system, ALSN and ALS-EN signalling:
- speed sensors simulation in two channels at the frequency in the range from 2 to 2,500 Hz with phase shifting between channels (90±10)°
- simulation of driver's vigilance monitoring system signlas at an interval of (840±140) ms
- simulation of ALSN signaling with an amplitude of 3.5 ± 1.0 V and frequencies (25.0 ± 0.5), (50.0 ± 1.0) (75.0 ± 1.5) Hz
- simulation of ALS-EN signaling with an amplitude of 3.5±1.0 V and frequency of 174.5±3.0 Hz
- monitoring of serviceability and diagnostics of locomotive equipment via CAN interface
- supports Windows XP/7/10 32/64 bit
- connection to PC via USB
- Windows user interface for device diagnostics

Available options

- storing multiple electronic maps
- recording an electronic map to the internal memory via CAN interface
- quick recording of several electronic maps via USB-port



Parameter	Value
Weight	less 0.9 kg
Power consumption	less 8 W
Operating temperature	−40…+50 °C
Service life	15 years
Warranty period	3 years
Power supply	20 65 VDC
Overall dimensions	110x220x50 mm





PK-KLUB-U Unified test and control console for train safety systems

Application: maintenance of the KLUB-U and KLUB-UP train safety systems at control and repair sites of locomotive depots and maintenance centers



Main functions

- functionality check of locomotive display unit, memory unit, electronic unit, interface unit that are part of the KLUB-U (KLUB-UP) safety systems via CAN interface
- simulation of analog and digital signals of train control systems
- · simulation and test of speed sensors signals
- formation of ALSN and ALS-EN signals
- simulation and test of EPV control signals
- simulation of signals of automatic braking system and driver's vigilance control system
- indication of relays status of switching unit
- supports Windows XP/7/10 32/64 bit;
- 16 connection to PC via USB

Parameter	Value
Weight	less 14,5 kg
Power consumption	less 60 W
Operating temperature	+1+40 °C
Service life	15 years
Warranty period	3 years
Power supply	20 ± 22 V or 48 ± 2 or 24 ± 2 VDC
Current consumption	less 0.2 A
Overall dimensions	550x280x260 mm

SERVICE AND MAINTENANCE EQUIPMENT



UFK Electronic map generation portable unit

Application: electronic map generation at control and repair sites of locomotive depots, maintenance centers for locomotive safety systems by an operator at station or in driver's cabin



Description and main functions

- generating electronic route model
- generating electronic map according to electronic route model and GNSS
- generating railway objects database for memory reader unit
- used with input and diagnostic unit to upload electronic map into volatile memory of KLUB-U, KLUB-UP systems
- satellite navigation antenna (5 m)
- supports Windows XP/7/10 32/64 bit

Parameter	Value
Weight	less 12 kg
Power consumption	60 W
Operating temperature	+5+40 °C
Service life	15 years
Warranty period	3 years
Power supply	220 ±22 VAC @ 50 Hz
Overall dimensions	542x410x215 mm





MPK Multifunctional control unit

Application: control and repair sites control and repair sites of locomotive depots, maintenance centers for locomotive safety systems



Main functions

- control, diagnostics and firmware update of KLUB-U, KLUB-UP, SSPS-KH, BLOCK-M safety systems modules through a special interface
- interface with a PC via RS-232

Benefits

- memory size for software 2 GB
- supplied with a pad for the AT91, ChipProg-48, for programming individual chips
- portable unit, supplied with convenient bag for transportation

SPECIFICATIONS	
Parameter	Value
Weight	less 0.8 kg
Power consumption	2.4 W (without a connected programmable cell)
Operating temperature	0+40 °C
Service life	15 years
Warranty period	3 years
Power supply	20 65 VDC
Overall dimensions	200x120x40 mm

SERVICE AND MAINTENANCE EQUIPMENT



UBP Portable check-out unit

Application: checking out the ALSN and ALS-EN receiving equipment of the KLUB-U, KLUB-UP, KLUB-P safety system at control and repair sites of locomotive depots or maintenance centers of locomotive safety device



Description and main functions

- checking ALSN and ALS-EN receiving equipment of ALS, KLUB, KLUB-U, KLUB-UP, BLOCK, BLOCK-M, BLOCK-KH, DKSV-M equipment
- simulating ALSN signals with the characteristics of KPT-5 and KPT-7
- simulating ALS-EN code signals
- measurement of induced EMF in receiption coils at rated currents in ALSN and ALS-EN channels (together with IPLK)
- control of receiption coils windings inclusion correctness (together with IPLK)
- control of threshold sensitivity level of ALSN and ALS-EN signal reception channels (together with BVD-M, BVD-U)
- coefficient of nonlinear distortion of the signal in ALSN, ALS-EN channels is not more than 15%
- calibration interval of the built-in amper indicator is 1 year

SPECIFICATIONS	
Parameter	Value
Weight	less 17 kg
Power consumption	less 30 W
Operating temperature	−30…+50 °C
Service life	15 years
Warranty period	3 years
Power supply	180 to 240 VAC @ 50Hz 18 65 VDC
Overall dimensions	less 625x500x220 mm





RADIUS telecommunication system

Application:

coverage of rural areas, roads and railways with LTE, UMTS, GSM mobile networks where construction of conventional base stations is difficult or not economically viable

SPECIFICATION

- capital costs of 4G (LTE), 3G (UMTS), 2G (GSM) network equipment are 2-3 times lower (depending on the system configuration)
- operating costs are reduced: energy consumption of the system is up to 5 times lower than that of a traditional base station (without loss of quality of the cellular network)
- coverage area of one base station is increased by up to 60 km (coverage of long-distant sections)
- system can be used by two operators simultaneously (RAN Sharing)
- weatherproof (-40 .. +55 °C) anti-vandal housing, IP65 protection rating

- turnkey approach: analysis of existing infrastructure, project development, radio planning, development of new infrastructure based on Radius system, system installation, testing, setup, maintenance, and support
- remote monitoring and setup of output power, frequency band, channel frequencies
- compliant to international requirements:
 - TS 125 106 V14.0.0 (2017-04)
 - TS 136 106 V14.0.0 (2017-04)
- ITU-R F.384-11 (03/2012)



Parameter	Value
Supported standards	LTE 1800, UMTS 2100, GSM 900, GSM-R
Power consumption	80-150 W
Operating temperature	– 40 +55 °C
Weight – main module – remote radio module	14 kg 4 kg
Power supply	220/110 VAC or 48 VDC
Output power – UMTS/LTE channel – retransmission link	40 dBm (adjustable) 23 dBm (adjustable)

TELECOMMUNICATION



System configuration

- Frequency Shifting Converter (FSC) is designed to convert several (from one to four) LTE/UMTS carriers of BTS to retransmission link
- Frequency Shifting Repeater (FSR) is designed to retransmit signals in two-side/one-side duplex mode





FSR/FSC module outlook

Relay module (RM) outlook



2 (or 4) coverage sectors (one carrier BTS in each sector).

RADIUS OPERATING PRINCIPLE

from BTS, convert them to

retransmission link frequency, and transmit to a distance.





DMR radios

Application: analogue and digital radio networks

RB011

base stations/repeaters

The radios are designed to build distributed DMR digital radio networks of Tier II and Tier III levels.



SPECIFICATION	
Parameter	Value
Frequency range	VHF / UHF 136-174 / 401-486 MHz
Channel spacing	25/12.5 kHz
Protocol	SIP, RTP
Power supply	220 VAC, 48 VDC

RM211

mobile radios

The radios are designed to operate in DMR digital networks of Tier II and Tier III levels. The radios are equipped with GLONASS/GPS navigation receiver.



SPECIFICATION	
Parameter	Value
Frequency range	VHF / UHF 136-174 / 401-486 MHz
Channel spacing	25/12.5 KHz
Output power	1-25 W
Power supply	13±3 V

TELECOMMUNICATION



RN311 portable radios

The radios are designed to operate in DMR digital radio networks of Tier II and Tier III levels. The radios are equipped with GLONASS/GPS navigation receiver.



SPECIFICATION

Parameter	Value
Frequency range	VHF / UHF 136-174 / 401-486 MHz
Channel spacing	25/12.5 kHz
Output power – rated – increased	2 W 5 W
Battery operating time	up to 12 h

PS7, PS12 dispatcher consoles

The consoles are designed for operation by dispatchers in analogue and digital radio networks, voice communication, vizualization of network processes.



Parameter	Value
Interface	Ethernet 10/100BASE-T
Display	Touch screen
Protocols – connection control – voice – monitoring	SIP RTP SNMP





RVS-1 train/fixed radio

Application:

train or fixed radio for DMR, GSM-R, TETRA train, maintenance, and station MF / VHF radio railway networks



- automatic remote monitoring function for train radios
- fixed radios are suitable for linear digital networks supporting radio monitoring and administration functions
- supports networks with integarted monitoring and administration
- easy repair and upgrade due to modular design of the radio
- controlled by one or several consoles

SPECIFICATION		
Parameter	MF	VHF
Frequency range	2.130 and 2.150 MHz	151.725 – 156.000 MHz
Channel spacing	20 kHz	25 kHz
Output power – rated – reduced	12±2 W _	9±1 W 1, 3, 5, 7
Receiver sensitivity	5 μV	0.5 μV
Power supply	10-32 V or 35-155 V	
Radio unit dimensions	240x205x130 mm	
Standards supported	DMR, GSM-R, TETRA	
Built-in voice recorder	optional	
Built-in GPS/GLONASS receiver	optional	

TELECOMMUNICATION



RS-46MC fixed simplex radio

Application:

train, maintenance, and station MF / VHF radio networks

- controlled by a dispatching radio or control panels located at a distance up to 20 km through wire or radio links
- · integration with existing railway radio equipment
- main and backup power supply, automatic switch between main and backup power supply units
- easy repair and upgrade due to modular design of the radio



SPECIFICATION		
Parameter	VHF	MF
Frequency range	151.725–156.000 MHz	2.130 and 2.150 MHz
Channel spacing	25 kHz	20 kHz
Output power	10 W	12 W
Receiver sensitivity	0.5 μV	5 μV
Main power supply	220 (-33+22) V	
Backup power supply	24 or 48 V	





SR-C-03 terminal (dispatching) radio

Application:

control and monitoring of MF / VHF analogue and digital train and maintenance railway radio networks



SPECIFICATION	
Parameter	Value
Ethernet – linear interface – administration/monitoring protocol	10/100 BASE-T (Ethernet) SNMP
Analogue channel – linear interface – connection control protocol	analogue, 2- or 4-wired dual tone SIP
Number of dispatching consoles	up to 3
Number of radio communication loops	up to 3
Number of radios per 1 loop	up to 56
Form factor	19" x 3U

- supports networks with integarted monitoring and administration
- supports up to 3 dispatching consoles, monitoring and administration tools, equipment for internet and intranet connections
- voice recording to built-in volatile memory or external recorder
- main and backup power supply, automatic switch between main and backup supply units

TELECOMMUNICATION



RVS-1-20 fixed radio

Application:

linear fixed dual-band simplex radio for train and maintenance railway MF / VHF radio networks



- integration with existing railway radio equipment
- built-in faults monitoring of radio modules
- sending status of radio to integrated monitoting and administration network
- integration with IP-networks, analogue 2- or 4-wire dispatching lines
- consoles can be used remotely up to 20 km via analogue dual-band links
- small dispatching radio operation mode

SPECIFICATION		
Parameter	MF	VHF
Frequency range	2.130 and 2.150 MHz	151.725-156.000 MHz
Channel spacing	20 kHz	25 kHz
Ouput power – rated – reduced	12±2 W 6 W	9±1 W 1, 3, 5 W
Linear interface	10/100 BASE-T (Ethernet)	
Connection control protocol	SIP	
Voice protocol	RTP with G.711 coding	
Monitoring/administration protocol	SNMP	
Main power supply	220 (-33+22) V	
Backup power supply	from 36 to 72 V	





IRZ-Lokomotiv service center

The service department is the team of highly skilled specialists performing the following tasks:

- products start-up and commissioning
- warranty and post-warranty servicing
- training customer personnel how to operate, troubleshoot and maintain products of the company

Staff training is licensed by the Department of Education and Science of Udmurt Republic.





Built-to-print manufacture

Experienced engineers working at IRZ-Lokomotiv ensure:

- development of design documentation and R&D work
- production according to customer design
- · start-up and commissioning of products products tests

























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