CONTENTS

ENTERPRISE PROFILE

RELATIONSHIPS WITH CUSTOMERS
are built on close cooperation, allowing to optimize the cost of delivered products and software. Individual approach to each client enables the production of systems, the utmost satisfying the customer's requirements.

EACH IDEA FINDS ITS REALIZATION –
that is how new developments are created: from universal systems to "turnkey" solutions.

PROFESSIONALISM, MAINTENANCE, SERVICE.
High professional qualities of our personnel allow to satisfy the Customer's requirements at different stages of cooperation, from planning and design to implementation and technical support of projects.

Closed Joint Stock Company "Electronic technologies and metrology systems" was created in 1992.

Main areas of activity:

- Manufacture of devices for vibro-acoustic monitoring and analysis in the industry.
- Automation of measuring, testing, and verification processes.
- Design and manufacture of measuring equipment.
- Development of methodologies for the test equipment certification.
- Training of the customer firm personnel.
- Design and manufacture of devices and systems for data collection and processing.
- Software development for vibro-acoustic analysis, tensometry and seismology.
- Manufacturing of "turnkey" systems for complex solutions of measurement tasks, diagnostics, monitoring and management of various technological processes.
- Design and manufacturing of input/output devices for analog and digital signals and digital signal processing devices.
- Manufacturing and supply of primary transducers: vibration sensors, microphones, hydrophones, speed sensors, current and voltage sensors.

Application range of our equipment:

1. Acoustic, vibro-acoustic analysis, seismic and strain measurement, acoustic emission.
2. Measurement and valuation of noise and vibration levels.
3. Monitoring and diagnostics of technological processes parameters.
4. Continuous monitoring of machine condition.
5. Automated control systems for testing on a shaker and impact testing machine.
6. Testing automation.
7. Low-frequency measurements of electric and magnetic fields.
8. Calibration of measuring devices and test equipment certification.
9. Electric power quality monitoring systems.
10. Multichannel measurements with high dynamic range and low intrinsic noise level.

Quality program

High quality, functionality and reliability of the product are provided by appropriate level of enterprise staff professionalism, using the latest advances and introduction of latest technologies available on the market. Our products are used in measuring systems of government and military standards, high precision units. The equipment manufactured by JSC "Electronic technology and metrology systems" is operated by more than 1,000 leading enterprises of the country in various sectors.

Measuring equipment

Measuring equipment is intended for registration of signal parameters from sensors and control of actuators and test equipment in various operating conditions.

Instruments in this series are characterized by high accuracy, versatility and reliability, and are widely used in various fields: measurement of noise and vibration levels, thermometry and strain measurement, seismology and geophysics.

Different versions allow you to apply the equipment presented for monitoring, diagnostics, control and management systems, as well as for mobile and bench tests.

Specialized software supplied with measuring equipment of ZETLAB company, provides the user with all the necessary tools for analysis and processing of data in the selected area, as well as various means of recording the original signals and measurement data. Intuitive software interface and convenient parameter setting windows corresponding to the usual terminology, will make your work with instruments simple and do not require extensive training or high qualifications.

Instruments meet national and international standards.

SPECTRUM ANALYZERS

Spectrum analyzers are designed to measure the parameters of the spectral components of signals of different nature, to analyze the correlation structure of signals, and to generate electrical signals with normalized metrological parameters.

Spectrum analyzers are used for vibration and acoustic measurements, continuous monitoring, diagnostics of the mechanisms condition, test equipment control, regulation of technological processes parameters, automation of acceptance testing, etc.

Different versions (laboratory, portable, industrial, underwater, etc.) and interfaces of PC connection (USB, Ethernet, Wi-Fi) allow the use of spectrum analyzers in fixed, mobile, autonomous, industrial, distributed and dynamic systems in various ambient conditions.

APPLICATION

ZET 017-U2

- autonomous measurements in the field conditions;
- diagnostics of gears, bearings, rotors and turbines;
- evaluation of structures sound insulation
- and sound-absorbing properties of materials;
- vibration testing.

ZET 017-U8

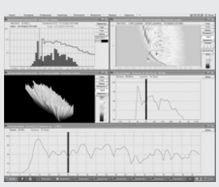
- measurement automation;
- continuous monitoring of extended processes;
- calibration of vibration sensors and microphones;
- measurement and valuation of noise and vibration levels
- in octave and 1/3-octave bands.

A19-U2

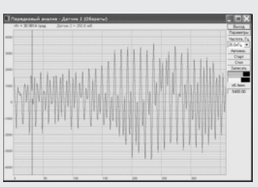
- hydroacoustic measurements;
- analysis of irregular shaft rotation, torsiography;
- monitoring and diagnostics using acoustic emission method;
- high frequency precision measurements.

Module	ZET 017-U2	ZET 017-U8	A19-U2
Description	handheld low frequency range spectrum analyzer	multifunctional audio range spectrum analyzer	handheld ultrasound range spectrum analyzer
Appearance			
Basic equipment			
Interface	USB 2.0	USB 2.0	USB 2.0
Power	From the USB bus	AC adapter 220 V → 12 V	From the USB bus
Cable	USB 2.0 AM-BM BNC-BNC	USB 2.0 AM-BM BNC-BNC	USB 2.0 AM-BM BNC-BNC
Accessories	Bag for storage and transportation	Bag for storage and transportation	Bag for storage and transportation
Additional equipment and options			
Interface	Ethernet, Wi-Fi, WiMAX	Ethernet, Wi-Fi, WiMAX	Ethernet, Wi-Fi, WiMAX
Flash-drive	32 GB, built-in	32 GB, removable	32 GB, built-in
Power	AC adapter 220 V → 5 V, Ethernet (PoE), Storage battery	Ethernet (PoE), Storage battery	AC adapter 220 V → 5 V, Ethernet (PoE), Storage battery
Version	With extended temperature range	Industrial. With extended temperature range. Dust- and waterproof. Field version.	With extended temperature range
Software	SCADA system ZETVIEW	SCADA system ZETVIEW	SCADA system ZETVIEW

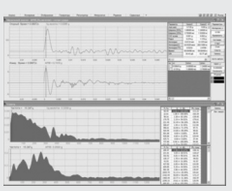
MAIN FUNCTIONS



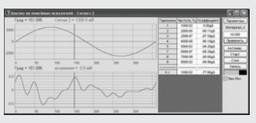
Measurement of signal level in octave bands and display in the form of graphs, spectrograms and 3D-spectrograms



Diagnostics and balancing of rotating machinery and gear transmissions using method of synchronous signal acquisition (sequential analysis)



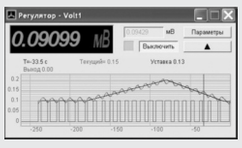
Analysis of pulse and transient characteristics during testing by impact excitation of the structure (modal analysis)



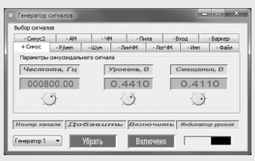
Analysis of nonlinear signal distortion

SPECIFICATIONS	ZET 017-U2	ZET 017-U8/U4	A19-U2
ANALOG INPUT (ADC)			
Number of analog inputs for voltage and ICP *	2	4, 8 ... 160	2
Number of ADC bits	16	16	16
Programmable gain	1, 10, 100	1, 10, 100, 1 000	1, 10, 100
Frequency band (Hz)	0 ... 20 000	0 ... 20 000	0 ... 100 000
Frequency response unevenness (dB)	± 0,25	± 0,25	± 0,1
Range of measured voltage (V)	± 10	± 10	± 10
Equivalent intrinsic noise level (at max gain) (mV)	< 5	< 1	< 5
Dynamic Range (dB)	130	125	126 (up to 100 Hz) 116 (up to 1 kHz) 106 (up to 10 kHz) 96 (up to 100 кГц)
Identity of channels in the passband, %	0,1	0,1	0,1
Input impedance (kΩ)	100	100	100
ANALOGUE OUTPUT (DAC)			
Number of analog outputs	1	1	1
Number of DAC bits	16	16	16
Frequency range of the generated sinusoidal signal (Hz)	0,03 ... 20 000	0,03 ... 20 000	0,03 ... 200 000
Output Voltage Range (V)	± 10	± 10	± 10
Output impedance (kΩ)	50	50	50
Maximum output current (mA)	20	20	20
Short circuit protection	+	+	+
DIGITAL INPUT / OUTPUT			
Number of lines (bits)	8	8	8
Logic Type (V)	TTL 3.3	TTL 3.3	TTL 3.3
AUTONOMOUS RECORDER (OPTIONAL)			
Flash-накопитель	built-in	removable	built-in
Capacity (GB)	32	32	32
Maximum sampling rate when writing to a flash drive on the channel (kHz)	50	50	250
Time of writing to a flash drive on all channels at maximum frequency (hours)	43,2	10,8	11
ADDITIONAL CHARACTERISTICS			
Type of input / output channel connectors	BNC	BNC	BNC
Type of digital input / output connector	DSUB DB-9 M	DSUB DB-9 M	DSUB DB-9 M
Exchange rate via Ethernet bus* (Mbit/s)	100	100	100
Exchange rate via HighSpeed USB 2.0 (Mbit/s)	480	480	480
Dimensions (mm)	115 x 180 x 35	(160 x 270 x 70)**	115 x 180 x 35
Weight (kg)	0,4	1 **	0,4
Ability to synchronize with other spectrum analyzers	+	+	+

* Option.
** For the standard version.

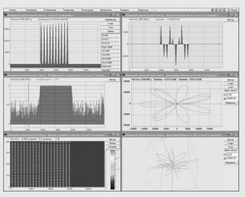


Two-point and proportional-integral-derivative (PID) control.



Generation of various forms of signals for reproducing test signals during the test.

Measurement of vibration parameters.



Calculation of inter-spectral functions.

STRAIN GAUGE STATION

Strain gauge station **ZET 017-T8** is designed for multi-channel strain-gauge.

Strain gauge station **ZET 017-T8** supports following connections:

- strain gauges in a bridge circuit;
- strain sensors using 6-wire and 4-wire lines;
- thermal resistors (rated from 50 to 1000 Ω);
- displacement sensors;
- pressure sensors;
- force sensors.

Sensor power supply can be carried out by AC or DC voltage. Converting signals from strain sensors can be carried out using calibration tables.

Strain gauge station can have laboratory or industrial embodiment, work offline and be used as a controller in the control systems.

Module	ZET 017-T8
Description	a multi-channel device for strain-gauge measurements
Appearance	

Basic equipment	
Interface	USB 2.0
Power	AC adapter 220 V → 12 V
Cable	USB 2.0 AM-BM 8 cables for connection of strain gauges and strain sensors
Accessories	Bag for storage and transportation

Additional equipment and options	
Interface	Ethernet, Wi-Fi, WiMAX
Flash-drive	32 GB, removable
Version	Industrial. With extended temperature range. Dust- and waterproof. Field version.

APPLICATION

- automating the testing of materials for tension / compression;
- analysis of the strain distribution;
- in machine components, structures and facilities.
- monitoring of the parameters of the stress-strain state.

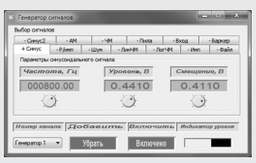
Possibility to connect a variety of sensors allows to use the strain-gauge station to control all the technological processes parameters or test.

Strain gauge stations are used to automate tensile testing machines, test presses, hydraulic stands, etc.

MAIN FUNCTIONS

Measurement of force, weight, strength and other strain parameters using strain gauges and strain sensors.

Temperature measurement with thermocouple thermometers and thermal resistance thermometers.

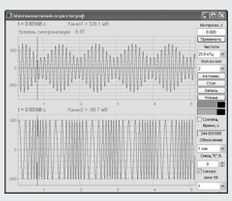


Generation of AC and DC signals for power supply of active and passive sensors.

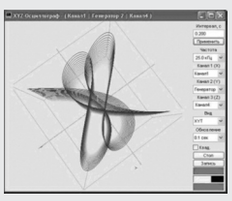
Measurement of uneven rotation of moving parts of various mechanisms.

SPECIFICATIONS	ZET 017-T8
ANALOG INPUT (ADC)	
Number of analog inputs	8 ... 160 *
Number of ADC bits	16
Programmable gain	1, 10, 100, 1 000
Frequency band (Hz)	0 ... 20 000
Frequency response unevenness (dB)	± 0,25
Range of measured voltage (V)	± 10
Equivalent intrinsic noise level (at max gain) (μV)	< 1
Dynamic Range (dB)	90
Identity of channels in the passband, %	0,1
Input impedance (kΩ)	100
Protection when the power input (V)	± 30
* Number of channels may be increased due to the connection of additional modules.	
ANALOGUE OUTPUT (DAC)	
Number of analog outputs	1
Number of DAC bits	16
Frequency range of the generated sinusoidal signal (Hz)	0,03 ... 20 000
Output Voltage Range (V)	± 10
Output impedance (Ω)	50
Maximum output current (mA)	20
Short circuit protection	+
DIGITAL INPUT / OUTPUT	
Number of lines (bits)	8
Logic Type (V)	TTL 3,3
AUTONOMOUS RECORDER (OPTIONAL)	
Flash-drive	removable
Capacity (GB)	32
Maximum sampling rate when writing to a flash drive on the channel (kHz)	50
Time of writing to a flash drive on all channels at maximum frequency (hours)	10,8
ADDITIONAL CHARACTERISTICS	
Type of input channel connectors	miniXLR 92M-502(5P)
Type of output channel connectors	BNC
Type of digital input / output connector	DSUB DB-9 M
Exchange rate via Ethernet bus* (Mbit/s)	100
Exchange rate via HighSpeed bus USB 2.0, (Mbit/s)	480
The ability to synchronize with other strain gauge station*	+
Dimensions (mm)	(160 x 270 x 70)**
Weight (kg)	1 **

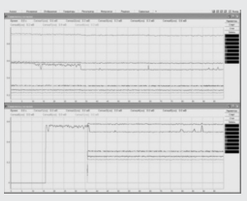
* Option.
** For the standard version.



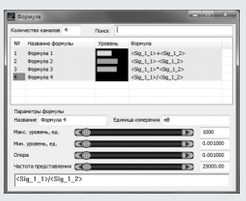
Display of signals and measurement information on multiple channels.



Parametric display of signals in the form of Lissajous figures.



Continuous recording of measurement results on multiple channels into a single file.



Processing of measurement results by the given formula for obtaining the secondary parameters.

SEISMIC STATION

Seismic station **ZET 048** – high-quality 24-bit seismic signals digital conversion module. Simultaneous polling of all channels is carried out by independent analog-to-digital converters.

Seismic station **ZET 048** allows connection of various types seismic sensors: seismic receivers, velocimeters and displacement sensors. Possibility to apply external calibration signal allows sensors calibration without dismantling. Continuous sensor power supply monitoring function allows you to monitor the disconnections in real time and take timely measures to eliminate them.

Multifunctional software ZETLAB SEISMO, included in scope of supply, allows to use seismic station **ZET 048** for a wide range of tasks in the field of seismic survey, diagnostics of the building structures condition, seismic activity monitoring, implementation of security activities, etc.

Module	ZET 048-E	ZET 048-I	ZET 048-C
Description	Mobile seismic station for autonomous measurements and field testing	Industrial seismic station for monitoring, control and management systems	Downhole version of seismic station with built-in sensing element
Appearance			

APPLICATION

ZET 048–E

- diagnostics of technical condition of building structures (bridges, buildings);
- trajectory testing of high-speed guided missile system products.

ZET 048–I

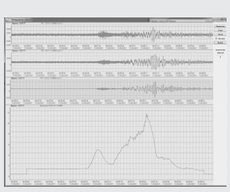
- seismic activity monitoring in areas of the pipelines, buildings, dams;
- leaks localization and control .

ZET 048–C

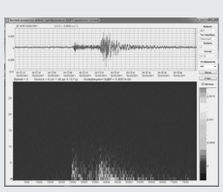
- autonomous registration of seismic data;
- passive seismic location.

	ZET 048-E	ZET 048-I	ZET 048-C
Basic equipment			
Version	Expeditionary	Industrial	Downhole
Interface	USB 2.0, Ethernet	USB 2.0, Ethernet	USB 1.1, Ethernet
Flash-drive	2 x 32 GB, removable	32 GB, built-in	32 GB, built-in
Power	From internal batteries	AC adapter 220 V → 5 V	From internal batteries
Software	ZETLAB SEISMO	ZETLAB SEISMO	ZETLAB SEISMO
Cable	USB 2.0 AM-BM	USB 2.0 AM-BM	
Additional equipment and options			
Interface	Wi-Fi, Wi-MAX	Wi-Fi, Wi-MAX	Wi-Fi, Wi-MAX
Power	–	Autonomous power supply module over Ethernet (PoE)	–
Version	–	With extended temperature range. Dust- and waterproof.	–
Software	SCADA system ZETVIEW	SCADA system ZETVIEW	SCADA system ZETVIEW

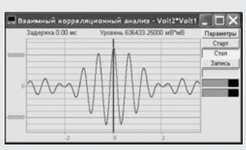
MAIN FUNCTIONS



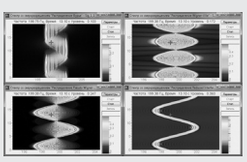
Detecting seismic events, blasts of different nature, structural defects in the initial stage with STA / LTA detector.



Wavelet analysis to represent non-stationary signals whose properties change over time or space (the system dynamics analysis).



Determination of the coordinates of noise and vibration sources by method of mutual correlation analysis.

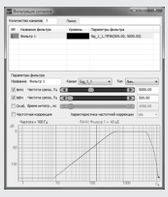


Spectral analysis of non-stationary signals with high frequency resolution.

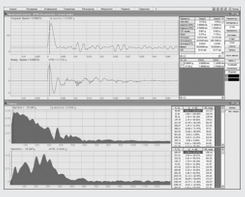
SPECIFICATIONS	ZET 048-E	ZET 048-I	ZET 048-C
ANALOG INPUT (ADC)			
Number of input channels	4, 8, 16	4, 8, 16	built-in BC 1313 with axes X, Y, Z and power control
Number of ADC bits	24	24	24
Type of input channels	differential	differential	–
Conversion frequency for each channel (kHz)	< 2,5	< 2,5	< 2,5
Frequency band (Hz)	DC ... 1 000	DC ... 1 000	0,1 ... 400
Maximum input range (V)	-10 ... +10	-10 ... +10	-20 ... +20 m/s²
Maximum input range for inverting / non-inverting input (V)	-5 ... +5	-5 ...+5	-5 ... +5
Equivalent intrinsic noise level (at a sampling frequency of 50 Hz) (μV)	< 4	< 4	< 0,004 m/s²
Dynamic Range (dB)	130	130	130
Input impedance of the analog section (kΩ)	100	100	–
Input capacity of the analog section, not more (pF)	10	10	–
DIGITAL INPUT / OUTPUT			
Number of lines (bits)	–	8	–
Logic Type (B)	–	TTL 3,3	–
AUTONOMOUS RECORDER			
Flash-drive	2 removable	built-in	built-in
Capacity (GB)	2 x 32	32	32
Maximum sampling rate when writing to a flash drive on the channel (kHz)	< 1	< 1	< 1
Time of writing to a flash drive by 4 channels at a sampling rate of 500 Hz (hours)	more 1 000	more 1 000	more 1 000
ADDITIONAL CHARACTERISTICS			
Type of input channel connectors	2РМ24Б19Г1В1	DSUB DB-25 M	–
Type of digital input / output connector	–	DSUB DB-9 M	–
Exchange rate via Ethernet bus* (Mbit/s)	100	100	100
Exchange rate via HighSpeed bus USB 2.0, (Mbit/s)	480	480	12
Time for getting mode of GPS receiver (minutes)	from 2 to 15	from 2 to 15	from 2 to 15
Accuracy of the clock generator (ppm)	0,1	0,1	0,1
Power Consumption (W) 4 channels / 16 channels	0,6 / 4	0,6 / 4	0,6
Ability to synchronize by PTP	+	+	+
Dimensions (mm)	360 x 290 x 165	222 x 150 x 82	ø 120 x 280
Weight (kg)	6	2	3

Advantages:

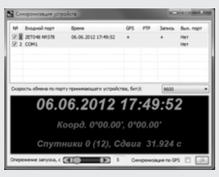
- creation of multichannel distribution systems operating in the single time system, including synchronization of signal time by the GLONASS / GPS satellite system and / or the PTP protocol (IEEE 1588);
- connection to third-party SCADA systems as OPC Client or OPC Server;
- binding to the ground using GPS devices;
- generation of signals such as "dry contact" on excess of specified level;
- full remote control of sensors and connected devices.



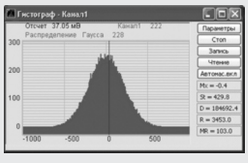
Signal Filtering: LPF, HPF, integration, differentiation, envelope, correction filters.



Modal analysis of structures during testing by impact force.



Synchronization of distributed seismic stations, including PTP protocol, using GLONASS / GPS satellites.



Statistical analysis of the signals and plotting of histograms from the data obtained.

SOUND LEVEL METERS AND VIBRATION METERS

The **ZET 110** and **BC 308** instruments are portable devices designed to measure noise and vibration with different frequency and temporal characteristics. The measurement results can be seen on the LCD display in real time or stored on non-volatile drive.

APPLICATION

ZET 110

- determination of the noise and vibration parameters during analysis, testing, and operation of machines and mechanisms;
- assessment of the sound impact on the human at the manufacture, in residential and public buildings.

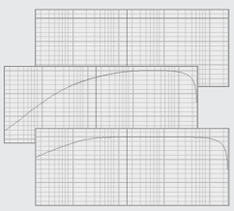
BC 308

- workplaces assessment;
- identification of sources and characteristics of noise in the workplace, in residential and public buildings and in residential areas for compliance with sanitary standards.

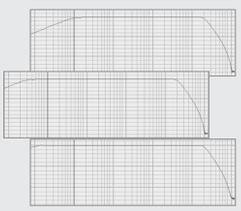
Sound level meters and vibration meters	ZET 110	BC 308
Description	Noise and vibration meter and data recorder	Sound level meter off accuracy class 1
Appearance		

	ZET 110	BC 308
Basic equipment		
Sound level meters and vibration meters	ZET 110	BC 308
Cable	BNC-BNC USBAB/M-1J	USBAB/M-1J
Flash-drive	2 GB, built-in	32 GB
Batteries	AA HRG 1,2 V 2500 mAh or more, 4 pcs.	AA HRG 1,2 V 2500 mAh or more, 4 pcs.
Charger	4 AA batteries	4 AA batteries
CD-drive	Software ZETLAB NOISE	–
Accessories	Protective case	Protective case
Additional equipment and options		
Accelerometer	BC 111	–
Microphone	MPA 201, MPA 261, BC 501	MPA 231T
Sensor equivalents	Microphone electric impedance equivalent (16 pF) Accelerometer electric impedance equivalent	Microphone electric impedance equivalent (16 pF)

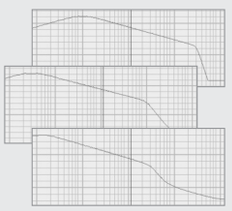
MAIN FUNCTIONS



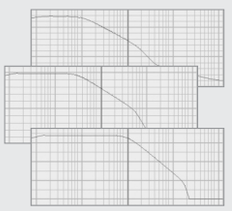
Noise measurement with frequency correction A, C, Linear



Measurement of acceleration with the low pass filters HP1, HP3, HP10.



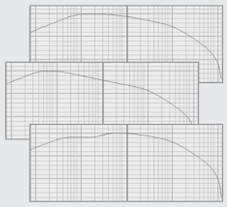
Measurement of vibration velocity (integrating filters Vel1, Vel3, Vel10).



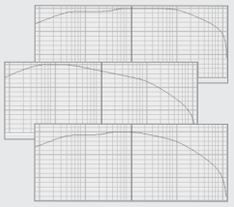
Measurement of vibrodisplacement (dbl. integrating filters Dil1, Dil3, Dil10).

SPECIFICATIONS	ZET 110	BC 308
ANALOG INPUT (ADC)		
Number of analog inputs	1	1
Input Type	ICP / voltage	ICP
Number of ADC bits	16	16
Programmable gain	1, 10, 100	1, 10, 100
Frequency band (Hz)	0 ... 20 000	20 ... 20 000
Output Voltage Range (V)	-10 ... +10	-10 ... +10
Electric noise level (μV)	< 4	< 4
Dynamic Range (dB)	126 (up to 100 kHz) / 116 (up to 1 kHz) 106 (up to 10 kHz)	102
Input impedance (kΩ)	100	100
SPECIFICATIONS IN THE "SOUND LEVEL METER" MODE		
Input signal frequency (Hz)	20 ... 12 500	20 ... 20 000
Measuring range (dBA)	25 ... 135	29 ... 131
Measured parameters	LEQ, PEAK, MAX, MIN	SPL, LEQ, PEAK, MAX, MIN. Simultaneous measurement of the three profiles with independent sets of frequency filters and temporal characteristics
Weighting filters	A, C, Linear	A, C, Linear
Temporal characteristics	Fast, Slow, Impulse	Fast, Slow, Impulse
SPECIFICATIONS IN THE "VIBRATION METER" MODE		
Input signal frequency (Hz)	1 ... 1 250	–
Measuring range, frequency response Fk (dB)	40 ... 140 15 ... 125	–
Measured parameters	SPL, LEQ, PEAK, MAX, MIN	–
Compensating filters	HP1, HP3, HP10, Vel1, Vel3, Vel10, Dil1, Dil3, Dil10, MF Vel, Wb, Wc, Wd, We, Wj, Wk, Wm, Fk, Fm, Wh, Fh	–
ADDITIONAL CHARACTERISTICS		
Standard	–	IEC 61672 – Class 1 JJG – Class 1
Type of connector to plug sensors	BNC	TNC
Nonvolatile memory (GB)	> 2	> 4
Dimensions (mm)	180 x 80 x 35	300 x 70 x 36*
Weight (kg)	0,46	0,62
Graphic display	backlit LCD, 98x32 points 15x43 mm	backlit LCD, 160x160 points, 50x45 mm
Power	4 AA batteries	4 AA batteries
Consumption of devices (not more, W)	1,6 (without lighting) 1,75 (with lighting)	1,6 (without lighting) 1,75 (with lighting)

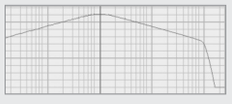
* Together with microphones.



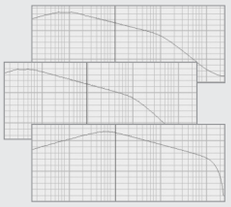
Vibration measurement with corrective filters Wb, We, Wm.



Vibration measurement with corrective filters Wk, Wd, Wc, Wj, Wh (in acc. with ISO 8041)



Vibration measurement on machines with a bandpass filter VelMF (in acc. with ISO-10816)



Vibration measurement with corrective filters Fk, Fm, Fh (linear bandpass filter).

VIBRATION CONTROL SYSTEM FOR SHAKER ZET 017-U

Vibration control system for shaker (VCSS) **ZET 017-U** represents hardware and software system designed to test elements, equipment and other products that may be exposed to random vibration or harmonic origin vibration during transportation or operation.

ZET 017-U VCSS allows to carry out vibration tests on electrodynamic and hydraulic shakers.

APPLICATION

- tests for the impact of broadband random vibration;
- tests for the impact of sinusoidal vibration at fixed frequencies;
- tests for the impact of sinusoidal vibration using frequency sweeping method;
- tests for the impact of broadband random vibration with sinewave superposition;
- tests for impact effect (classic impact, vibroimpact);
- simulation of the impact of gun armament.

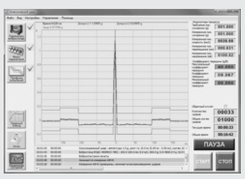
Система	ZET 017
Description	Full range of solutions in the field of vibration testing
Appearance	

Basic equipment of the system		
Analyzer	ZET 017-U4	ZET 017-U8
Version	industrial	
Interface	USB 2.0	
Power	AC adapter, 220 V → 12 V	
Software	ZETLAB VIBRO	
Cable	USB 2.0 AM-BM, BNC-BNC	
Accessories	Bag for storage and transportation	

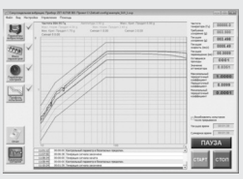
Additional equipment and options	
Vibration control system for shaker	BC 133, TV 52110, TV 50101-80, VED 4000, VED 80000
Vibration sensors	BC 110, BC 111
Force sensor	AC 20 AC 21
Impact hammers	AU 02, AU 03
Computer	PC or laptop
Equivalents of sensors for the controller verification and check of charge amplifiers working capacity	E0.95, E3.30, E1000

Vibration control system for shaker	BC 133	TV 52110	TV 50101-80	VED 4000	VED 80000
Shaker	+	+	+	+	+
Power amplifier	+	+	+	+	+
Fan	–	–	+	+	+
Compressor for pneumatic conveying system	–	–	–	+	+

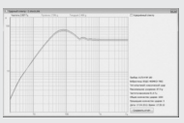
MAIN FUNCTIONS



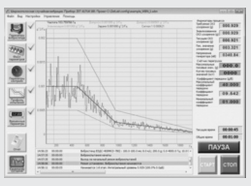
Testing for the effect of the classical impact according to IEC 68-2-27-87 and IEC 68-2-29-87.



Tests for the effect of sinusoidal vibration according to IEC 68-2-6-82.



Calculation of impact spectra according.

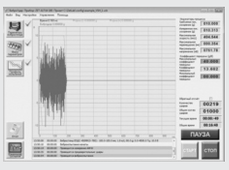


Tests for the effect of broadband random vibration according to IEC 60068-2-64-93.

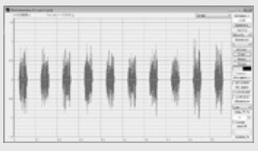
ANALYZER	ZET 017-U4	ZET 017-U8
METROLOGICAL AND TECHNICAL CHARACTERISTICS		
Number of input channels	4	8
Number of output channels	1	
Maximum sampling rate (kHz)	50	
Input AC voltage range, amplitude values (V)	from 0,001 to 10	
Measurement error for the input signal voltage	± 4,0	
Output AC voltage range, amplitude values (V)	from 0,01 to 10	
Output signal voltage setting error (%)	< 0,2	
Output signal frequency setting error (%)	< 0,1	
SINUSOIDAL VIBRATION MODE		
Frequency band (Hz)	from 3 to 10 000	
Dynamic range of automatic control (dB)	80	
Frequency response unevenness of measuring channels (dB)	± 0,25	
Total harmonic distortion of the output signal, less than (%)	1	
IMPACT MODE		
Impact pulse shapes	half sine, sawtooth, triangular, trapezoid, rectangular	
Maintenance error for impact pulse amplitude (%)	< 5	
Maintenance error for impact pulse duration (%)	< 5	
BROADBAND RANDOM VIBRATION MODE		
Frequency band (Hz)	from 3 to 10 000	
Dynamic range of automatic control (dB)	> 60	
Number of spectral lines	15 000	
ADDITIONAL CHARACTERISTICS		
Power supply from the AC, frequency (50 ± 1) Hz (V)	from 198 to 242	
Power consumption, not more (V*A)	110	
Dimensions (mm)	200 x 320 x 55	
Weight of instrumentation unit (kg)	1,6	

VIBRATION SYSTEM CONTROL	BC 133	TV 52110	TV 50101-80	VED 4000	VED 80000
METROLOGICAL AND TECHNICAL CHARACTERISTICS					
Frequency band (Hz)	10 ... 1 000	2 ... 7 000	DC ... 7 000	5 ... 4 000	5 ... 2 500
Nominal force (N): • sine • broadband random vibration • impact	 25 – –	 100 50 –	 650 420 840	 4 000 2 800 8 000	 80 000 56 500 200 000
Maximum acceleration (g): • sine • broadband random vibration • impact	 5 – –	 50 25 –	 42 27 54	 69 48 120	 130 70 140
Maximum stroke (mm)	1	15	25,4	50	70
Maximum speed (m/s)	0,1	1,5	1,5	1,8	1,8
Maximum loading weight (kg)	1	3	20	200	700
Diameter of working table (mm).	65	60	80	170	440

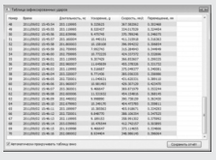
VIBRATION SENSORS	BC 110	BC 111
Number of measuring axes	1	1
Sensitivity (mV/g)	100	10
Frequency range (Hz)	0,5 ... 10 000	0,5 ... 15 000
Amplitude range (g)	± 50	± 500
Weight (g)	30	12



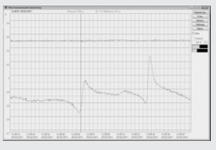
Tests for the effect of vibroimpact according.



Simulation of gun armament.



Recording the results to a file.



Multichannel signal recorder.

ELECTRICAL CIRCUITS CONTROL DEVICE

Electrical circuits control device **ZET 452** – the instrument for unattended measurement of electrical circuits resistance errors and electrical insulation resistance values in automatic mode by a given program. The device more than 20 times reduces the time required to carry out inspections, as compared to using standard instrumentation.

Module	ZET 452
Description	Compact unit for measuring the electrical circuits and electrical insulation resistance automatically
Appearance	
	№ 54884-13

General characteristics	
Number of measuring channels	72*
Maximum current consumption at a supply voltage of 220 V (A)	1
Function of device under test recognition	+

* Number of measuring channels may be increased due to the connection of additional modules.

Characteristics of the resistance mode	
Range of measured resistance (Ω)	0,1 ... 200*10⁶
Test DC voltage (V)	2,5
Maximum permissible errors for resistance measurement, range: (0,1 ... 10) Ω, (Ω) 1 ... 10 Ω, (Ω) 100 кΩ ... 1 МΩ (%) (1 ... 200) МΩ (%)	 ± 0,1 ± 0,3 ± 3 ± 10
Speed of measurements per minute	600

Characteristics of the insulabion resistance mode	
Range of measured insulation resistance (МΩ)	from 1 to 100
Test DC voltage (V)	100
Limits of permissible absolute error of insulation resistance measurement (%)	± 20
Speed of measurements per minute	600

Dimensions and weight	
Weight (kg)	> 3,5
Dimensions / L x W x H (mm)	302 x 260 x 72

Basic configuration	
Module	ZET 452
Cables	Supply cord 220 V High Speed USB 2.0
CD-drive	Software ZETCABLETEST
Cable	High Speed USB 2.0
Accessories	Control plug Technological plug

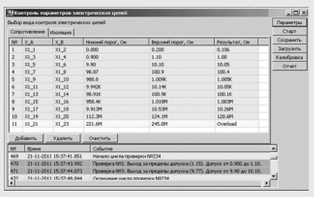
Additional accessories and options	
Expansion	Modules synchronization
Accessories	Adapters to connect devices under test
Expansion module	ZET 454 MP
Switching unit	ZET 453

APPLICATION

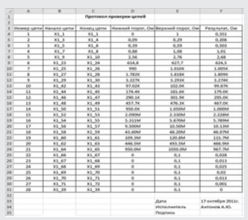
- testing and control and measuring systems;
- implementation of continuous technological process control;
- carrying out acceptance testing;
- scientific and technical research.

Electrical circuits control device **ZET 452** provides the function of unit undet test recognition. During the unit identification occurs automated loading of test program. This feature allows full automation of verification process, and eliminates checking program selection error. To perform measurements it is enough to connect the unit under test to the **ZET 452** device and initiate the verification by activation of "Start" button!

MAIN FUNCTIONS



Measurement of resistance and insulation resistance. Output of results with a color indication of parameters that are not in tolerance.



Recording the reports to a file.

Data collection and processing modules

Data collection and processing modules are multi-channel instruments with analog and digital inputs and outputs and are designed to solve the problems of measuring and control at an affordable price.

Devices in this series have small dimensions and weight, support the connection of various sensors and implement the functions of the variety of devices, thus representing a "lab on a palm."

Modules for data collection and processing can be connected to a computer via various interfaces or work in offline mode, allowing their use for a wide range of tasks from monitoring of technological processes parameters to bench and field testing.

All modules are manufactured at our own production facilities using surface mount technology.

Thanks to the optimal combination of versatility and efficiency, these devices are of interest for both projecting organizations and APCS enterprises, as well as for universities and hobbyists.

ADC-DAC MODULES

Economical high quality ADC / DAC modules **ZET 210**, **ZET 220** and **ZET 230** are designed mainly for measuring of signals from various primary transducers and their processing.

Modules have different analog-to-digital (ADC) and digital-to-analog (DAC) converters digit capacity and frequency ranges that allows you to find the optimal solution for the problem in hand.

Digital and analog outputs of modules can be used in control circuits of various actuators.

ADC / DAC modules can operate autonomously (without a PC connection) and keep a record of signals to the non-volatile drive.

Software ZETLAB BASE, supplied with the these modules allows you to begin the process of measurement and control immediately after module connection to a PC. It already includes all the necessary programs for testing and measurements by several selected measurement channels, monitoring of measured values, the output of the currently measured parameters on a PC monitor.

To extend the functionality of modules, provide universalization and increase the range of connected sensors preamplifiers **ZET 410** and **ZET 412** can be used.

ADC / DAC modules can be used as controllers for signals collection and processing systems and control of connected devices.

APPLICATION

ZET 210

- measurement of signal parameters in laboratory systems;
- generation of signals for process modeling.

ZET 220

- determination of signal parameters in the inertial measurement systems;
- design of technological cycles and their automation;
- monitoring of various production process parameters.

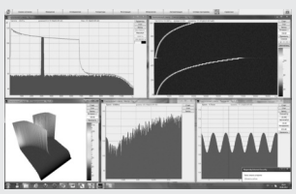
ZET 230

- measurement of high-speed process parameters;
- analysis of condition using acoustic emission method;
- synchronous signal generation.

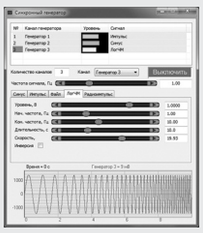
Module	ZET 210	ZET 220	ZET 230
Description	Universal Measurement Laboratory in the palm	Multichannel device for precision measurements	ADC / DAC module for dynamic measurements
Appearance			
Basic equipment			
Interface	USB 2.0	USB 2.0	USB 2.0
Power	from the USB bus	from the USB bus	from the USB bus
CD-drive	ZETLAB BASE	ZETLAB BASE	ZETLAB BASE
Cable	USB 2.0 AM-BM	USB 2.0 AM-BM	USB 2.0 AM-BM
Accessories	terminal block	terminal block	terminal block
Additional equipment and options			
Interface	–	Ethernet, Wi-Fi, WiMAX	Ethernet, Wi-Fi, WiMAX
Flash-drive	2 GB, built-in	2 GB, removable	2 GB, removable
Power	AC adapter 220 V → 5 V, Autonomous power supply module	Ethernet (PoE) AC adapter 220 V → 5 V, Autonomous power supply module	Ethernet (PoE) AC adapter 220 V → 5 V, Autonomous power supply module
Version	With extended temperature range	With extended temperature range	With extended temperature range
Software	Recording and reproducing means, SCADA system ZETVIEW	Recordin and reproducing means, SCADA system ZETVIEW	Recordin and Teproducing means, SCADA system ZETVIEW

MAIN FUNCTIONS

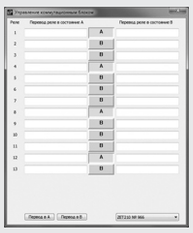
Measurement of AC and DC signal parameters



Measurement of signal level in uniform spectral bands.



Synchronous generation of various shape signals.



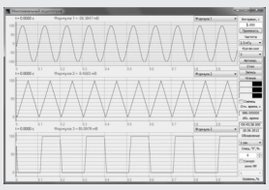
Control of switching unit from a digital port.

SPECIFICATIONS	ZET 210	ZET 220	ZET 230
ANALOG INPUT (ADC)			
Number of analog inputs	16 common mode or 8 differential analog inputs	16 common mode or 8 differential analog inputs	4 common mode or 4 differential analog inputs
Number of ADC bits	16	24	24
Total conversion frequency for all channels enabled (kHz)	< 500 *	< 8	< 100
Maximum frequency response unevenness (in the frequency range) (dB)	± 1 (10 Hz ... 200 kHz)	± 1 (10 Hz ... 2 kHz)	± 1 (10 Hz ... 20 kHz)
Range of measured voltage (V)	± 7	± 10	± 10
Equivalent intrinsic noise level (at the maximum sampling rate) (mV)	< 0,5	< 0,05	< 0,05
Dynamic range (dB)	84	100 (8 kHz) 110 (800 Hz) 120 (80 Hz)	100
Input impedance (kΩ)	2	100	100
Input protection (V)	± 30	± 30	± 30

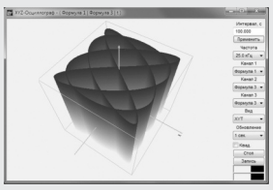
* Correct work in multi-channel mode is provided by total conversion frequency up to 400 kHz.

ANALOGUE OUTPUT (DAC)			
Number of outputs	2 common mode or 1 balanced output	2 common mode or 1 balanced output	4 balanced output
Number of DAC bits	16	16	16
Conversion frequency (kHz)	< 500	< 200	< 100
Output Voltage Range (V)	± 2,5	± 10	± 10
Auxiliary output for power supply of sensors, accelerometers, microphones, cold junction compensators	–	5 V (< 30 mA)	5 V (< 30 mA)
Short-circuit protection	–	+	+
DIGITAL INPUT / OUTPUT			
Number of lines (bits)	14	8	8
Logic Type (V)	TTL 3,3	TTL 3,3	TTL 3,3
AUTONOMOUS RECORDER (OPTIONAL)			
Flash-drive	built-in	removable	removable
Capacity (GB)	2	2	2
The total sampling frequency for all channels (kHz)	20	8	100
Dimensions without the terminal block	10,8	700	10,8
ADDITIONAL CHARACTERISTICS			
Type of analog input / output connector	DSUB DB-25 M	DSUB DB-25 M	DSUB DB-25 M
Type of digital input / output connector	DSUB DB-15 M	DSUB DB-9 M	DSUB DB-9 M
Exchange rate via Ethernet bus* (Mbit/s)	480	480	480
Exchange rate via HighSpeed USB 2.0 (Mbit/s)*	–	100	100
Weight (kg)	< 0,2	< 0,3	< 0,3
Dimensions (mm) **	90 x 110 x 50	90 x 110 x 50	90 x 110 x 50

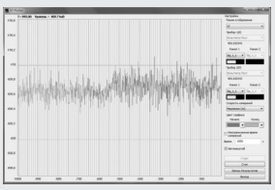
* Option.
** Without terminal block.



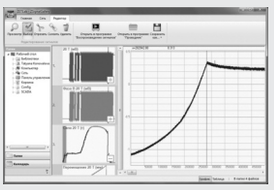
Display of the waveform for multiple channels with ability to synchronize



Display of signals parametric dependence on the plane and in the volume.



Visualization of mutual characteristics of two measured values on the plane and in the volume



Viewing and processing of signals stored on any computer.

PRELIMINARY AMPLIFIERS

Preliminary amplifiers **ZET 410** and **ZET 412** are designed to amplify and transmit to the measuring device signals from passive and active sensors, with the ability to supply connected sensors with DC and AC voltage and from the power source.

Preliminary amplifiers **ZET 410** and **ZET 412** are used as signal amplifiers in the processing and control systems of various devices and actuators. Can be used in industry, laboratory and mobile researches. You can connect to an amplifier both passive (resistive) sensors (measuring the relative deformation, twisting and bending moments, forces and other parameters), and sensors on integrated circuits (miniature accelerometers, magnetic and electric field sensors, etc.). Gain factors – fixed (1, 10, 100 or 1000) – are selected using DIP switches located on the front panel of the amplifier.

The unique features of the amplifiers **ZET 410** and **ZET 412** allow to connect almost all known types of primary transducers of physical values into electrical. Amplifiers can be supplied from

PC USB bus, AC adapter 220 V → 5 V or autonomous power supply module, which makes them a versatile tool in the construction of measurement systems using ADC / DAC modules.

Module	ZET 410	ZET 412
Description	galvanic separation signal amplifier	pseudo galvanic separation signal amplifier
Appearance		

	ZET 410	ZET 412
Basic equipment		
Power	from the USB bus	
Cable	USB 2.0	
Accessories	Terminal blocks on the input and output terminals	
Additional equipment and options		
Power	AC adapter 220 V → 5 V Модуль автономного питания	
Accessories	Mounting plate for components Probes complete with transition terminals	

SPECIFICATIONS	ZET 410	ZET 412
SENSOR INPUT / POWER SUPPLY		
Number of analog inputs	2 differential	2 differential
Frequency band (kHz)	< 20	< 20
Input voltage range for KU = 1 (V)	± 10	± 10
Input impedance (MΩ)	1	1
Intrinsic noise level for CS = 1000 (μV)	< 2	< 2
Interchannel interference (dB)	- 72	- 72
Gain	1, 10, 100, 1 000	1, 10, 100, 1 000
Isolation of input channels	–	pseudo-galvanic
Output capability (mA)	< 10	< 10
Output voltage range (V)	±10	±10
Rated current consumption for passive (resistive) sensors (mA)	3 ±5 % (12 V)	3 ±5 % (12 V)
Rated supply voltage for active sensors (V)	+5 ±5 % (< 10 mA)	+5 ±5 % (< 10 mA)
Protection against voltage source short-circuit	+	+
OUTPUT		
Number of analog outputs	2 asymmetrical	2 asymmetrical
Frequency band (kHz)	< 20	< 20
Output voltage range (V)	±10	±10
Input impedance (MΩ)	100	100
Gain	2	1
Output voltage range (V)	± 7	± 10
Output Current (mA)	< 10	< 10
ADDITIONAL CHARACTERISTICS		
Connectable sensors	bridge, strain gauges, thermocouples, thermal resistance, piezoresistive sensors, potentiometric sensors, active sensors on integrated circuits	
Own power consumption (no load) (W)	< 2	< 1,2
Power supply (V)	+ 5	+ 5
Type of input connector	DSUB DB-15 M	DSUB DB-15 M
Type of output connector	DSUB DB-9 M	DSUB DB-9 M
Weight (kg)	< 0,15	< 0,15
Dimensions (mm) *	90 x 110 x 35	90 x 110 x 35

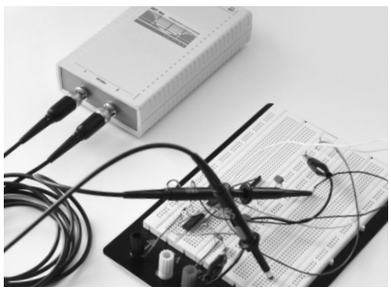
* Without terminal blocks for input and output connectors.

USB OSCILLOGRAPH

Digital oscillograph **ZET 302** designed to monitor signals in the frequency range up to 20 MHz. Application of equivalent sampling mode allows to increase the effective sampling frequency up to 500 MHz.

Oscillograph **ZET 302** is a compact device that fits in the palm, which allows to save space in the lab. Work is carried out through a specialized software environment ZETSCOPE, supplied with the instrument that emulates the work of desktop oscilloscope.

ZETSCOPE software allows to monitor signal spectrum and estimate the following signal parameters: average value, rms value, peak value, Vpp, signal frequency, period. Additional vertical and horizontal cursors facilitate the task of measuring the signal parameters: rise time, fall time.



Module	ZET 302
Description	USB oscillograph for high-frequency signal monitoring
Appearance	

Basic equipment	
Interface	USB 2.0
Power	AC adapter 220 V → 5 V
Flash-drive	ZETSCOPE
Cable	USB 2.0 AM-BM
Accessories	Probes (2 pcs.)

Additional equipment and options	
Accessories	Prototyping board
Flash-drive	SCADA system ZETVIEW

SPECIFICATIONS

ANALOG INPUT (ADC)

Number of analog inputs	2
Sampling frequency (MSamples/s)	< 500
Bandwidth (MHz)	0 ... 20
Number of ADC bits	8
Maximum input voltage (1:1), (V)	± 250 *
Dynamic range (dB)	< 84
Input impedance (MΩ)	1
Input capacity (pF)	20
Input protection (V)	± 200
Interchannel interference** (dB)	- 50
Input connection type	by DC, by AC
Supported attenuation factor of the probe	1X 10X

* is measured at the same values of volts/div.
** Oscillograph "earth" = computer "earth"

ADDITIONAL CHARACTERISTICS

Power consumption (W)	< 5
Power supply (V)	5
Weight (kg)	< 0,4
Dimensions (mm)	115 x 180 x 35

DATA RECORDING

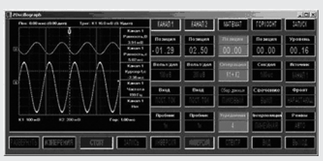
Data recording modes	sample, peak detection, averaging
The number of averages in averaging mode	4, 8, 16, 32, 64
Linear signal interpolation	sin(x)/x
Range of volts/division	2 mV/div – 5 V/div
Range of sec./division	10 ns/div – 50 s/div

SYNCHRONIZATION

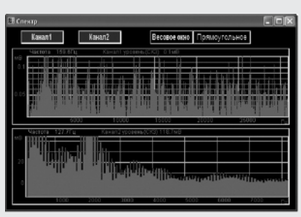
Synchronization types	by increasing edge by decreasing edge
Synchronization source	1 channel, 2 channel
Synchronization modes*	automated, common
Synchronization delay	up to half of displayed interval

* In common mode, data collection occurs only when the synchronization conditions are met.

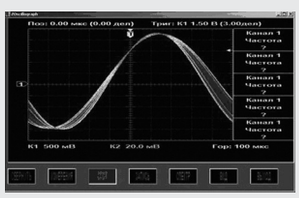
MAIN FUNCTIONS



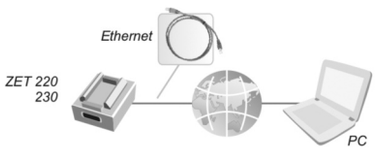
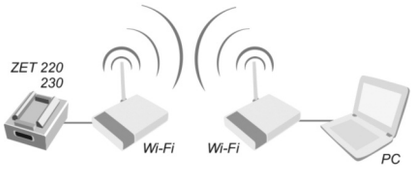
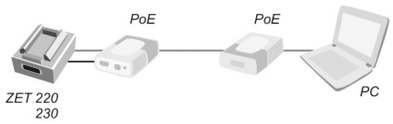
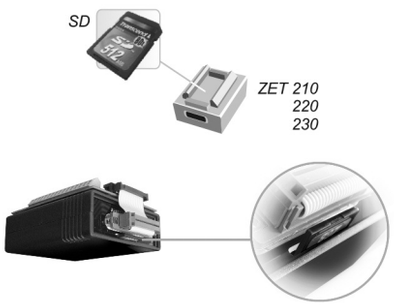
Measurement of more than 20 signal parameters, holding up to 5 measurements simultaneously, performing mathematical operations on signals, synchronized data collection, recording the results to a file.



Calculation of the signal spectrum using the fast Fourier transformation with different weighting functions.

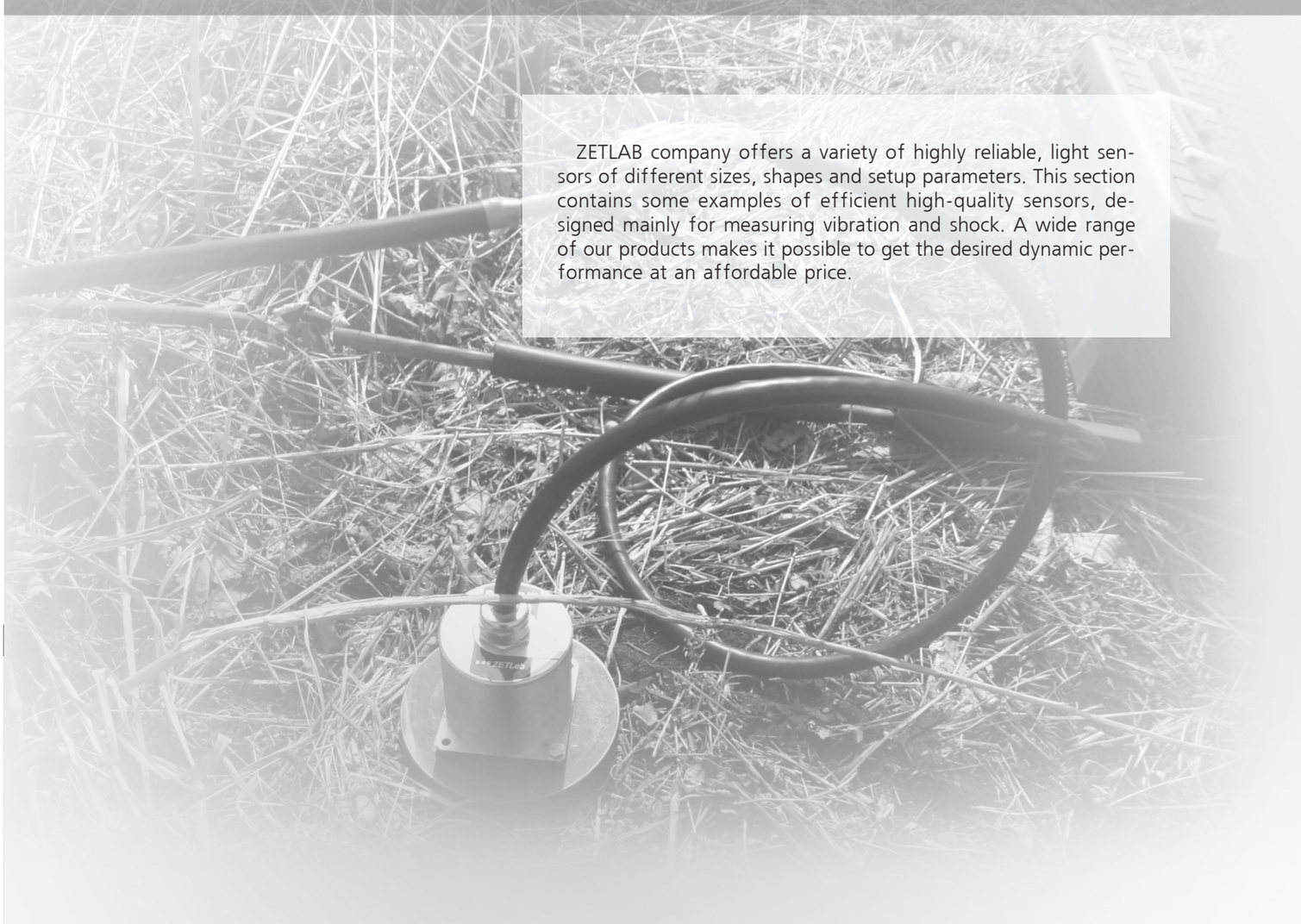


Simulation of the analog afterglow and digital afterglow with color gradation depending on the distribution density.

OPTION	DESCRIPTION
Interface Ethernet 10/100	 Interface Ethernet 10/100 implemented on ADC modules **ZET 220**, **ZET 230**. Units apply transformer isolation on Ethernet signal lines. This connection provides a complete galvanic isolation of the measuring circuits and computer digital circuits. Ethernet connection allows you to place the measuring part at a large distance from the PC and create distributed systems. Creating a distributed system can significantly reduce the length of the analog lines from the sensor to the ADC. When using a direct cable UTP (Unshielded Twisted Pair), the distance between the PC and the ADC can be up to 100 m. Using repeaters allows to increase distance manyfold. When registering the IP address of the PC and the ADC module in the Internet, the data between the module and the PC can be transferred to any distance and in the any part of the world where the Internet access is available.
Wireless connection via Wi-Fi and WiMAX	 Areas of application of ADC/DAC modules **ZET 220/230** wireless connection to PC via Wi-Fi and WiMAX: • complete galvanic isolation of the measuring circuits and computer digital circuits, minimum additional capacity between measuring and digital "earth". • measurements on the movable structure elements, for example, **ZET 220/230** set and a Wi-Fi are mounted on the movable part: on a revolving shaft of slowly rotating turbine, on the car, while the PC is installed at a distance up to 500 m (depending on the supplied antenna) on the fixed part. • measurements at large distances using WiMAX interface, when the test object is located at a distance up to 10 km within line of sight of the operator's position. In this case, construction costs of the measuring system are reduced, since the need for a cable connection is eliminated.
Power over Ethernet (PoE)	 Power over Ethernet – PoE – is technology using existing Ethernet cables for simultaneous data transmission and power supply. Now you do not need additional power cables and the availability of power outlets near the place of **ADC/DAC** modules installation. Power to the **ADC/DAC** modules can be supplied through the Ethernet cable. Power over Ethernet technology simplifies installation and reduces the associated costs, which enables positioning of data collection modules in arbitrary locations, including outdoors.
SD card	 To perform autonomous measurements, **ADC/DAC** modules can be completed with SD-card. Module is connected to PC and the work script is set. Upon reaching the preset parameters signal recording to SD-card begins in accordance with the selected algorithm. After recording signals are processed by **ZETLAB** programs. Autonomous mode is useful when conducting occasional field testing – no additional equipment required. Autonomous recorder mode with cyclic recording of signals from the sensors is also convenient.

Sensors

ZETLAB company offers a variety of highly reliable, light sensors of different sizes, shapes and setup parameters. This section contains some examples of efficient high-quality sensors, designed mainly for measuring vibration and shock. A wide range of our products makes it possible to get the desired dynamic performance at an affordable price.



VIBRATION SENSORS OF GENERAL PURPOSE

Piezoelectric accelerometers **BC 110**, **BC 111** are designed to determine the vibration parameters in laboratory complexes and field tests. These vibration sensors are used for bearing diagnostics, general monitoring of moving mechanisms, for measuring the vibration (vibroacceleration) parameters on the moving parts of machinery and equipment, as well as for spectral-correlation analysis of vibrations.

Built-in preamplifier of ICP (IEPE) standard allows direct connection of accelerometers to a spectrum analyzers **ZET 017** and **A19**.

APPLICATION

BC 110

- bearing diagnostics;
- general monitoring of moving mechanisms;
- rotor balancing.

BC 111

- automated measuring systems for technical diagnostics of machine equipment;
- laboratory researches and monitoring for health standards and regulations;
- testing on electrodynamic shakers and impact testing machines.

Sensor	BC 110	BC 111
Description	General purpose accelerometer with integrated electronics	Vibration and shock sensor with integrated electronics
Appearance		
Versions	with output on top	with output on side

SPECIFICATIONS	BC 110	BC 111
Axial sensitivity (mV/g)	100	10
Relative transverse sensitivity (%)	<5	<5
Frequency Range (Hz)	0,5 ... 10 000	0,5 ... 15 000
The intrinsic noise, RMS (mg)	< 0,5	< 5
Amplitude range (g)	± 50	± 500
Output impedance (Ω)	< 500	< 500
Temperature range (°C)	-40 ... +70	-40 ... +70
Supply voltage (V)	+(18...30)	+(18...30)
Current consumption (mA)	3	3
DC voltage level at the output (V)	10 ... 13	8 ... 12
TEDS support	+	–
Case material	stainless steel	stainless steel
Cable, length (m)	2	2
Dimensions (mm)	ø 17 x 34	ø 12 x 17
Weigh, without cable (g)	30	12

BC 112 accelerometers are designed to measure vibration and shock acceleration in stationary diagnostic systems.

When connected to the measuring modules of **ZETSENSOR** series accelerometers form intelligent sensors for measuring vibration parameters (using modules **ZET 7051** or **ZET 7151**).

Main features:

- wide temperature range;
- sturdy construction and sealed enclosure;
- closed-end cable termination;
- stable performance and high reliability during operation;
- the ability to connect by the differential and symmetrical pattern.

APPLICATION

- wide temperature range;
- sturdy construction and sealed enclosure;
- closed-end cable termination;
- stable performance and high reliability during operation;
- the ability to connect by the differential and symmetrical pattern.

Sensors	BC 112
Description	vibration sensor with charge output
Appearance	

SPECIFICATIONS	BC 112
Axial sensitivity (mV/g)	100
Relative transverse sensitivity (%)	< 5
Amplitude range (g)	± 50
Working temperature range (°C)	-40 ... +70
Weight, without cable (g)	30

BC 201 and **BC 202** – capacitive accelerometers designed to measure variable and constant signal components, therefore they can be used as linear acceleration sensors and position sensors. The advantages of these accelerometers are their versatility and ease of calibration. When you install **BC 201** and **BC 202** accelerometers on inclined surface, it is possible to measure the centrifugal acceleration.

BC 201 and **BC 202** accelerometers are connected to the ADC/DAC boards and spectrum analyzer via the amplifier **ZET 410** or **ZET 412**, providing a nominal power supply for sensors.

Sensor	BC 201	BC 202
Description	highly sensitive capacitive accelerometer	general purpose capacitive accelerometer
Appearance		
Versions	with output on top	with output on top

APPLICATION

- trim and list sensor;
- position sensor;
- measuring of linear accelerations when tested vehicles;
- inertial measurements for monitoring railway gage, determining the lift position and motion parameters;
- registration of extremely low frequency oscillations;
- measuring variable and constant signal components.

SPECIFICATIONS	BC 201	BC 202
Rated axial sensitivity (mV/g)	1 000	100
Relative transverse sensitivity (%)	≤5	≤5
Frequency range from constant component to (Hz)	500	500
The range of measured vibroacceleration values	from 0,01 to 1	from 0,02 to 10
The intrinsic noise, RMS (g)	0,005	0,05
Amplitude range (g)	1,7	18
Output impedance (Ω)	≤ 500	≤ 500
Three-wire connection diagram	earth / output signal / power	earth / output signal / power
Supply voltage (V)	5	5
Current consumption (mA)	5	5
DC voltage level at the output (V)	0,8	1,8
Fastening devices	on M5 stud	on M5 stud
Cable	2 m (built-in)	2 m (built-in)
Case material	stainless steel	stainless steel
Weight, without cable (g)	16	16

ACCESSORIES

Set of fastening accessories (for installing sensors on the calibration stand)

Stud for mounting the accelerometer

ZET 440 – charge amplifier.

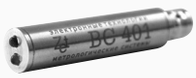
Smart sensors

OPTICAL SENSORS

Non-contact optical speed sensors **BC 401**, or tachometer transducers, provide pulse shaping where pulse repetition frequency is proportional to passage frequency of tachometric mark, installed on the rotating object element (shaft), through the sensitive area of the sensor. Speed sensor is directly connected to a spectrum analyzers. Cable length can reach 50 m. Power supply meets the ICP standard.

APPLICATION

- rotor balancing;
- bearing diagnostics.

Sensors	BC 401
Description	Non-contact optical speed sensor
Appearance	

SPECIFICATIONS	BC 401
Sensitivity for λ=940 nm, E=1 mW/K•m² (mV)	750
Speed measurement range (rev/min)	0 ... 20000
Viewing angle (°)	±20
Distance to the rotating object (mm)	from 2 to 15
Output impedance (Ω)	< 500
Temperature range (°C)	-20 ... +70
Supply voltage (V)*	+(18 ... 30)
Current consumption (mA)	3 ... 4
DC voltage level at the output (V)	20
Weight, without cable (g)	30

* Possible version of the sensor – with +5 V supply with 3-wire diagram. Determined by the order.

ACCESSORIES

System of seismic receivers verification

Tripods for speed sensors installation.

MEASURING MICROPHONES

BC 501 microphones allow you to convert sound pressure into an electrical signal and serve as a primary transducer in the chain of audio recording tract.

Supplied microphone is of ICP standard (with integrated electronics). Availability of the ICP standard preamplifier in spectrum analyzers allows you to connect microphones directly to the spectrum analyzer **ZET 017** and a portable sound level meter **ZET 110** without use of intermediate amplifiers.

ZETLAB software, supplied with the sound level meters and spectrum analyzers, can not only measure the overall noise level, but carry out signal spectrum analysis with an uniform or octave (1/1, 1/3, 1/12, 1/24) frequency sweep, apply different filters, take amplitude-frequency characteristics, conduct signal correlation analysis and more.

Sensors	BC 501
Description	Accuracy class 3
Appearance	

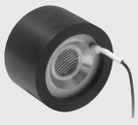
APPLICATION

• measurement of sound pressure levels at workplaces, in residential and public buildings and in residential areas for compliance with sanitary standards.

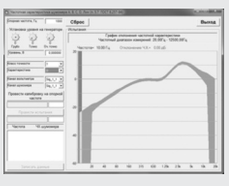
SPECIFICATIONS	BC 501 accuracy class 3 (standard IEC61672)	
	ICP	Powered by 5V source
Measurement conditions	in a free field	
Sensitivity, ± 2 dB (mV/Pa)	50	15
Frequency Range (Hz)	50 ... 13 000	50 ... 13 000
Frequency response unevenness in the frequency range (dB)	2	2
Dynamic range (dBA)	35 ... 140	35 ... 140
Equivalent intrinsic noise level (dBA)	35	35
Temperature range (°C)	-20 ... +80	-20 ... +80
Temperature coefficient (dB/°C)	0,02	0,02
Output impedance (Ω)	< 110	< 110
Maximum output voltage, RMS (V)	5	5
Capsule diameter (inch)	1/2	1/2
Length (mm)	65,2	61
Cable* (m)	BNC-BNC, 2*	integrated cable with fan-out end
Technology of TEDS sensors polling	–	–
Measurement error at the nominal frequency of 1000 Hz (dB)	2	2
Output impedance (Ω)	< 500	< 500
Supply voltage (V)	+ (18 ... 30)	+ 5
Current consumption (mA)	3	<=1
Case material	stainless steel	stainless steel
Weight (g)	40	40

* length determined by the order, standard – 2m.

Calibrators for microphones and sound level meters. Reproduction of sound pressure level 94 dB and 114 dB at 1000 Hz frequency. Calibration accuracy 0,3 dB.



Actuator for microphones.



Calibration program for microphones and sound level meters.

EDDY CURRENT TRANSDUCERS

Eddy current transducer **BC 701** designed for contactless measurement of vibration, axial displacement, speed, details position control, and other important technical parameters.

Eddy current transducer **BC 701** used for diagnostics of complex industrial machinery, turbines and electric drives.

Eddy current transducer **BC 701** is equipped with an intelligent eddy current module with CAN interface with **ZET 7140-S EddyCurrent-CAN** and interface converters **ZET 7174** (USB – CAN) or **ZET 7176** (Ethernet – CAN).

Eddy current transducer **BC 701** can be used independently, but more often these transducers are the components of non-destructive testing systems, which allows to carry out full technical diagnostics of various machinery and parts without dismantling.

Sensors	BC 701		
	BC 701-05	BC 701-07	BC701-17
Description	eddy current transducer	eddy current transducer	eddy current transducer
Appearance			

SPECIFICATIONS	BC 701-05	BC 701-07	BC 701-17
Working temperature range (°C)	- 40 ... + 180	- 40 ... + 180	- 40 ... + 180
Case material	stainless steel	stainless steel	stainless steel
Tip material high	strength pressmaterial	strength pressmaterial	strength pressmaterial
Cable			
Connector	coaxial	coaxial	coaxial
Tip diameter (mm)	7,7	9,5	20,5
Coil diameter (mm)	5	7	17
Mounting thread (mm)	M10 x 1	M12 x 1	M24 x 1

Intelligent module	ZET 7140-S		
	supplied with BC 701-05	supplied with BC 701-07	supplied with BC 701-17
Appearance			
Measured value (µm)	distance	distance	distance
Method of measurement	contactless	contactless	contactless
Sensor connector	SMA	SMA	SMA
Measuring range (µm)*	0 ... 2 500	0 ... 3 500	0 ... 8 000
The rms value of noise reduced to the input at the data output frequency of 50 Hz* (µm)	< 5	< 8	< 20
Data output frequency (Hz)	50, 100, 500, 1 000, 5 000, 10 000	50, 100, 500, 1 000, 5 000, 10 000	50, 100, 500, 1 000, 5 000, 10 000
Data transfer interface	CAN 2.0	CAN 2.0	CAN 2.0
Device power supply (V)	from 9 to 24	from 9 to 24	from 9 to 24
Current consumption at 12 V (mA)	> 110	> 110	> 110
Overall dimensions, mm	83 x 37 x 14	83 x 37 x 14	83 x 37 x 14
Weight, without sensor (g)	40	40	40

* depends on the type of eddy current probe.

ACCESSORIES

Tripod.

Smart sensors
ZET 7140-S, ZET 7174.

ACOUSTIC EMISSION TRANSDUCER

Acoustic emission transducer is part of acoustic emission nondestructive testing system. Acoustic emission sensors convert AE process acoustic signal into an electrical signal whose parameters are used to estimate acoustic emission sources. **BC 501** acoustic emission transducer has leakproof construction. Acoustic emission transducers can be connected directly to the spectrum analyzer **A19**, and complete with a measuring module **ZET 7140 AcousticEmission-CAN** form intelligent acoustic emission sensor that transmits the measured values of AE parameters via CAN interface to the measuring system computer. Data can also be transmitted by radio.

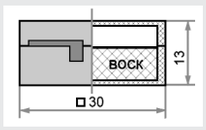
Sensors	BC 601
Description	Acoustic emission transducer
Appearance	

APPLICATION

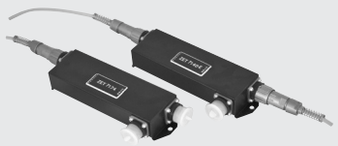
• Registration and conversion info an electrical mechanical waves propagating from the place of origin and development of the defect metal. Technical diagnostics using passive ultrasound.

SPECIFICATIONS	BC 601
Type	broadband
Electroacoustic conversion factor, dB rel. 1V/m/s	> 45
Operating frequency (kHz)	300
Bandwidth, kHz	100 ... 800
Electrical capacitance, pF	350 ... 450
Insulation resistance, MOhm	> 100
Temperature range (°C)	-40 ... +150
Case material	stainless steel
Built-in cable length (m)	0,5 *
Weight, without cable (g)	17

* Cable length determined by the order, standard length – 0,5 m.



AW01 – wax sealant. Composition basis – beeswax. Peel strength – 20 N/cm².



Smart sensors
ZET 7140-E, ZET 7174.

SENSORS

SEISMIC RECEIVERS

Piezoelectric seismic receivers **BC 1311** and **BC 1313** are designed to convert vibration parameters into a proportional electrical signal. In **BC 1313** measurements are performed simultaneously on three mutually perpendicular axes X, Y and Z.

For seismic receivers **BC 1311** and **BC 1313** is provided system of electrical excitation of the sensing element using the actuator to determine the actual value of the conversion efficiency upon their periodic check without dismantling. Seismic receivers also provided with power control system. Seismic receivers are connected directly to the seismic station **ZET 048**.

The software included in the seismic station package allows you to receive secondary vibration parameters (velocity and displacement) on a signal from seismic receiver. Measurement results can be displayed in numerical or graphical form, as well as continuously recorded to a file, using night / week breakdown. ZETLAB SEISMO software, supplied with seismic stations, also allows monitoring of structures and buildings by signals from seismic receivers.

APPLICATION

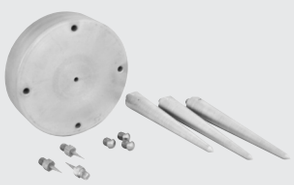
- seismic effects monitoring system;
- measurement of the low level vibration and frequency parameters;
- construction of passive seismic locators;
- determination of the slightly noicy object coordinates
- monitoring of structures and buildings;
- leaks monitoring and control systems.

Sensors	BC 1311	BC 1313
Description	One-component piezoelectric receiver	Three-component seismic accelerometer
Appearance		

SPECIFICATIONS	BC 1311	BC 1313
Measured parameter	vibroacceleration	vibroacceleration
Number of measurement axes	1	3
Sensitivity, conversion factor ($V/m*s^{-2}$)	0,5 (0,2; 1; 2; 5)*	0,5 (0,2; 1; 2; 5)*
Maximum deviation of the conversion factor from the nominal value (%)	± 10	± 10
Frequency Range (Hz)	0,3 ... 400	0,3 ... 400
Extended frequency Range (Hz)	0,1 ... 400	0,1 ... 400
Frequency response unevenness (dB)	±3 (<0,4 Hz), ±1 (0,4-300 Hz) ±3 (>300 Hz)	±3 (<0,4 Hz), ±1 (0,4-300 Hz) ±3 (>300 Hz)
The maximum value of measured acceleration, not less than (m/s^2)	10 (25; 5; 2,5; 1)*	10 (25; 5; 2,5; 1)*
RMS intrinsic noise level, not more than (m/s^2)	$4*10^{-5}$ ($1*10^{-4}$; $2*10^{-5}$; $1*10^{-5}$; $4*10^{-6}$)*	$4*10^{-5}$ ($1*10^{-4}$; $2*10^{-5}$; $1*10^{-5}$; $4*10^{-6}$)*
Own resonance frequency (Hz)	> 900	> 900
Embedded system of the sensing element excitation via the actuator	+	+
Level of the constant component of the output voltage, not more than (mV)	± 200	± 200
Resistance on the part of calibration input, not less than (Ω)	600	600
Insulation resistance, not less than (MΩ)	20	20
The power supply voltage value (bipolar) for matching amplifier (V)	±(10 ... 14)	±(10 ... 14)
Cable length, determined by the order (m)	- standard 2 - maximum (twisted pair cable), 600	- standard 2 - maximum (twisted pair cable), 600
Temperature range (°C)	-40 ... 70	-40 ... 70
Dimensions, without cable, not more than (mm)	Ø 80 x 76	Ø 80 x 76
Weight, without cable, not more than (kg)	1,0	1,2
Degree of protection against ingress of dust and moisture	IP68	IP68

* Options.

ACCESSORIES



Washers, supports.

Amplifier ZET 430.

Leak detection sensors **BC 120** and **BC 121** and seismic accelerometer **BC 131** designed for detecting mechanical oscillations and converting them into a proportional electrical signal.

Two versions of **BC 120** (modifications CM and SG with built-in magnet for mounting in confined areas) allow you to pick the most suitable method of the sensor attachment.

Vibrosensor **BC 121** is hermetically sealed and may be installed under water and in waterlogged soil. **BC 121** casing has a square shape for its convenient placement on the pipeline, insulated from the electrical circuit with simultaneous screening. Since the sensor output has low impedance, it is possible to use unshielded two-wire cable. Sensor power supply is protected against reverse polarity.

ICP standard built-in amplifier allows direct connection of sensors **BC 120**, **BC 121** and **BC 131** to the spectrum analyzers **ZET 017** and **A19**.

Sensors	BC 120	BC 121	BC 131
Description	leak detection sensor	leak detection sensor with advanced features	seismic accelerometer
Appearance			
Version	CM и SG modification	square-shaped case	square-shaped case

APPLICATION

BC 120

- piping leak detection sensor.

BC 121

- sensor with advanced features for piping leak detection.

BC 131

- leak detection sensor for large diameter pipes.

SPECIFICATIONS	BC 120	BC 121	BC 131
Axial sensitivity (mV/g)	5 000	2 000	25 000
Relative transverse sensitivity (%)	< 5	< 5	< 10
Frequency Range (Hz)	0,5 ... 3 000	0,5 ... 2 000	0,1 ... 400
Maximum impact (g)	± 10	± 10	± 1
Amplitude range	± 2	± 2	± 0,2
Own resonance frequency (Hz)	> 20 000	> 3 000	> 500
RMS (g)	< 0,00005	0,002	0,002
Output impedance (Ω)	< 500	< 500	< 500
Temperature range (°C)	-40 ... +125		-40 ... +125
ICP supply voltage (V)	+ (18 ... 30)	+(18 ... 30)	+ (18 ... 30)
Current consumption (mA)	3 ... 5	2 ... 5	3 ... 5
DC voltage level at the output (V)	10 ... 13	10 ... 13	10 ... 13
Operation mode setup time (s)	10	10	10
Case material	anodized steel	aluminum	aluminum
Cable length, twisted pair (m)	built-in, 2*	built-in, 2*	built-in, 2*
Weight, without cable (g)	640	200	200

* Cable length determined by the order, standard length – 2 m

Magnetic mount.

Spectrum analyzer.

HYDROPHONES

Hydrophones **BC 312**, **BC 313** are electroacoustic transducers used in the hydroacoustic to listen to the underwater signals and noise, for measurement purposes, as well as an element of the a directional receiving hydroacoustic antenna.

BC 312 hydrophones can be directly connected to spectrum analyzer **ZET 017**. **VS 312** hydrophones support the TEDS sensor polling technology (Transducer Electronic Data Sheet), that allows the spectrum analyzer to automatically detect the type of sensor and its sensitivity, in accordance with standard IEEE P1451.4.

BC 312 hydrophones can be connected to spectrum analyzer **ZET 017** via **ZET 430** amplifier, and from the spectrum analyzer internal oscillator via **ZET 430** testing signals are sent for calibration of hydrophones at the installation site.

Hydrophone **BC 311** reversible without built-in amplifier. Can be used both as a receiver and as a transmitter.

Intelligent hydrophone **BC 314** – a digital sensor for measuring dynamic pressure in liquid media with data transmission interface CAN 2.0. The results of the measurements are transmitted via Modbus protocol. Built-in meter of intelligent hydrophones **BC 314** allows to start measurements immediately after the power supply, because the measurement does not require setting of measuring channels, all the necessary parameters are set into the meter memory.

APPLICATION

BC 311

- both as a receiver and as a transmitter.

BC 312

- for the solution of hydroacoustics challenges: measurement of sound pressure level in liquid media, the study of cavitation processes.

BC 313

- in hydroacoustics for listening to underwater sounds, and for measuring purposes

BC 314

- in the measurements of sound propagating in the water;
- in the ultrasound measurements in liquid media;
- in the study of cavitation processes.

Sensors	BC 311	BC 312	BC 313	BC 314
Description	charge hydrophone (reversible)	Piezoelectric hydrophone with ICP output	Hydrophone with differential output	intelligent hydrophone with CAN interface
Insertion version				
Submerged version				
Explosion proof version	+	+	+	+

ACCESSORIES

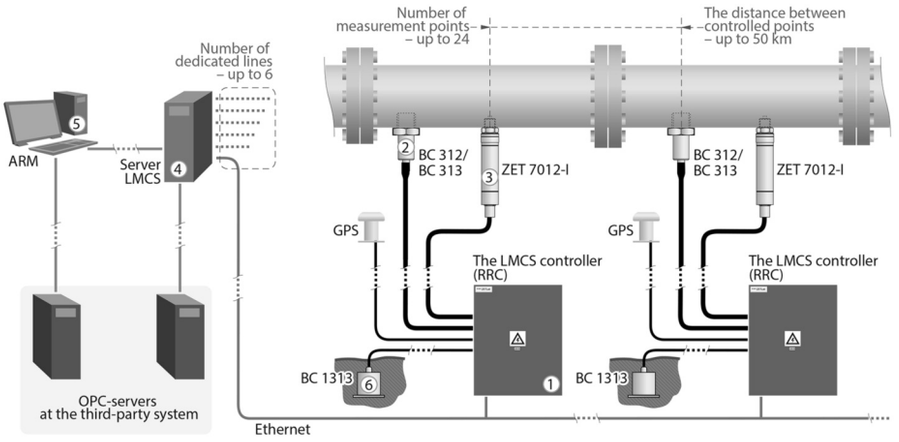
Amplifier ZET 420.

Amplifier ZET 430.

Cable reel.

SPECIFICATIONS *	BC 311	BC 312	BC 313	BC 314
Nominal sensitivity (μV/Pa)	56	250	500 5 000	–
Frequency Range (Hz)	3 ... 100 000	20 ... 20 000	20 ... 20 000	10 ... 5 000
Own resonance frequency (kHz)	> 150	> 50	> 50	> 50
The intrinsic noise, RMS (Pa)	–	0,02	0,2 2	1,5 15
Limit static pressure (MPa)	4	4	4	4
Measured maximum dynamic pressure (kPa)	–	50	1 10	5 50
Output impedance (Ω)	-	< 500	< 50	-
Temperature range (°C)	-20 ... +80	-20 ... +60	-20 ... +60	0 ... +70
Supply voltage (V)	-	+(18 ... 30), ICP	±(10 ... 14)	+(9 ... 24)
Current consumption (mA)	-	3 ... 12	20 ... 30	at a voltage +12V to 50
DC voltage level at the output (V)	-	10 ... 12	-	-
Case material	stainless steel	stainless steel	stainless steel	stainless steel
Weight, without cable (g)	< 150	< 170	200	< 320
Cable length (m)	2**	2**	2**	2**
Explosion proof version	on request	on request	on request	on request
Polling frequency (Hz)	-	-	-	1, 10
Amplitude range (Pa)	-	-	-	< 1 000
Interface	-	-	-	CAN 2.0

* The table shows the characteristics of submerged hydrophones version.
** Cable length determined by the order, standard length – 2 m.



Example of hydrophones use.

Amplifier ZET 440.

Spectrum analyzer ZET 017-U.

Spectrum analyzer A19.

NEW ITEMS IN 2014

ACOUSTIC EMISSION SENSOR BC 601

Set				
Name and appearance	 **BC 601**	 **ZET 7140-E**	 **ZET 7174**	 **ZETKEY**
Dedication	Acoustic emission transducer	Digitizes the signal from the transducer	Interface converter USB↔CAN	ZETLAB software

MEASUREMENT OF VIBRATION, DISPLACEMENT AND SPEED BC 701

Set				
Name and appearance	 **BC 701**	 **ZET 7140-S**	 **ZET 7174**	 **ZETKEY**
Dedication	Measurement of vibration, displacement and speed	Digitizes the signal from the transducer	Interface converter USB↔CAN	ZETLAB software

THREE-COMPONENT SEISMIC RECEIVER BC 1314

Set				
Name and appearance	 **BC 1314**			
Dedication	Three-component seismic receiver	Platform	supports	screws

Intelligent sensors

ZETSENSOR – family of intelligent miniaturized simple-to-use devices. The family was developed for installation in cases of various sensors. Each unit is one, two or three-channel, specialized for a particular type of sensor, and includes a digital signal processor that allows to perform calculations autonomously and transmit ready data to user, without further processing necessity. An important advantage of the series is the ability to use devices without complicated settings and configurations. Sensor starts to work and transmit data immediately after the power supply. Amplifying and processing are performed as close to the sensor as possible, and the data are transmitted in digital form, which reduces the requirements for the data channel.

With this family of devices it is possible to build distributed measuring networks. Unlike traditionally used centralized measurement schemes, star-delta connection is not required, which reduces the overall length of the chains.

INTELLIGENT STRAIN GAUGES

Intelligent sensors **ZET 7010 Tensometer-485** and **ZET 7110 Tensometer-CAN** designed to measure the relative deformation using force sensors or strain gauges in a bridge or half-bridge scheme.

Intelligent strain gauges **ZET 7111 Tensometer CAN** allow to measure the degree of compression and tension, torsion, bending, forces applied to the unit under test and other parameters.

Using intelligent sensors eliminates the need to configure the measurement channels and allows you to begin measurements immediately, getting results in the required units (kg, N, Pa, etc.). Using intelligent sensors is especially useful when building distributed measuring networks.

To connect measurement network to the **ZETLAB** and **ZETVIEW** systems use interface converter. Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

APPLICATION

- testing of materials for tension / compression;
- spring testing for resilience;
- wire and rolls tension measurement;
- tower structures control;
- monitoring installation loads in the automotive industry;
- industrial control of fitting, jointing, riveting, and stamping processes;
- in platform, automotive conveyor, wagon, crane, hopper scales, dispensers.

Sensor	ZET 7010 Tensometer-485	ZET 7110 Tensometer-CAN	ZET 7111 Tensometer-CAN
Description	Intelligent strain gauge for static measurements	Intelligent strain gauge for static measurements	Intelligent strain gauge for dynamic measurements
Standard version			
Industrial version			

SPECIFICATIONS	ZET 7010 Tensometer-485	ZET 7110 Tensometer-CAN	ZET 7111 Tensometer-CAN
Measured parameter	Relative strain, force, pressure, weight, intensity, forque, etc.		
Data output frequency (Hz)	5, 10, 25, 50, 125	5, 10, 25, 50, 125	50, 250, 625, 1250
Data transfer interface	RS-485	CAN 2.0	CAN 2.0
Accuracy class for bridge circuits with a sensitivity of 1 mV/V	0,05	0,05	0,05
Bridge circuits power supply	by DC voltage	by DC voltage	AC voltage
Device power supply (V)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 40	up to 50
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7010 Tensometer-485	ZET 7110 Tensometer-CAN	ZET 7111 Tensometer-CAN
Primary generator	Tension / compression force sensor of beam, cantilever, edge type, S-shaped strain gauge or bridge strain gauge	Strain gauge (bridge strain gauge) S-shaped strain gauge, tension/compression force sensor of beam or cantilever type	Strain gauge or bridge strain gauge
Measuring module	ZET 7010 Tensometer-485	ZET 7110 Tensometer-CAN	ZET 7111 Tensometer-CAN
Interface converter	ZET 7070 ZET 7076	ZET 7174, ZET 7176 ZET 7172S, ZET 7172M	ZET 7174, ZET 7176 ZET 7172S, ZET 7172M

INTELLIGENT MOTION SENSORS

ZET7111-L LVDT-CAN and **ZET 7140-S EddyCurrent-CAN** modules – intelligent sensors using CAN interface and designed for displacement measurement.

Using intelligent sensors do not require any special settings. Measurement starts immediately after power-up. In is possible to build distributed measurement networks based on intelligent sensors.

The delivery set of modules **ZET 7111-L** includes a program Modbus OPC Server. Software ZETLAB SENSOR is supplied with intelligent sensors optionally.

Sensor	ZET7111-L LVDT-CAN	ZET 7140-S EddyCurrent-CAN
Description	LVD Intelligent displacement sensor	Intelligent eddy current sensor
Standard version		
Industrial version		

APPLICATION

ZET 7140-L

• Measurement of linear displacement and, indirectly, all mechanical values convertible into displacement:
-in the machines;
- in servo drives;
- in engines;
- in testing benches;
- in production lines.

ZET 7140-S

• Contactless measurement of vibration, displacement and speed of conductive objects.

SPECIFICATIONS	ZET7111-L LVDT-CAN	ZET 7140-S EddyCurrent-CAN
Measured parameter	displacement	distance (micron)
Measurement type	contact	contactless
Types of connected sensors	LVDT-sensor	eddy current probe
Type of connector for the primary converter	Terminals	SMA
Measurement range	depends on the type of primary converter	depends on the type of primary converter
Polling frequency (Hz)	50, 250, 625, 1 250	50, 100, 500, 1 000, 5 000, 10 000
Data transfer interface	CAN 2.0	CAN 2.0
Device power supply (V)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 50	up to 110
Overall dimensions (mm)*	65 x 34 x 14	83 x 37 x 14
Weight, without sensor (g)*	35	40

* Standard version.

SENSOR CONFIGURATION	ZET7111-L LVDT-CAN	ZET 7140-S EddyCurrent-CAN
Primary generator	LVDT-sensor	eddy current probe
Measuring module	ZET7111-L LVDT-CAN	ZET 7140-S EddyCurrent-CAN
Interface converter	ZET 7174, ZET 7176	ZET 7174, ZET 7176

Connection circuit example

Name and appearance	 **Force sensor**	+	 **ZET 7111**	+	 **ZET 7174**	+	 **PC**
Dedication	Measurement of vibration, displacement, speed		Digitizing the converter signal		Interface converter USB↔CAN		ZETLAB software

INTELLIGENT PRESSURE SENSORS

Intelligent sensors **ZET 7012-A Pressure-485**, **ZET 7012-I Pressure-485**, **ZET 7112-A Pressure-CAN** and **ZET 7112-I Pressure-CAN** – are sensors for fast and easy pressure measurement.

Intelligent pressure sensors do not require configuration and further data processing, since the sensor parameters are recorded to meter memory, and values of measured pressure are brought at the output.

Complete with control modules, intelligent sensors can be used to accurately maintain the set parameters in various technological processes.

Based on intelligent sensors and control modules intelligent systems are built:

- distributed measurement networks ;
- various parameters measuring systems;
- automated complexes.

Measuring networks can also be connected to any system that uses the Modbus Protocol.

APPLICATION

ZET 7112-A PRESSURE-CAN

- used for pressure measurement:
  - in gas and water supply systems;
  - in the systems ensuring efficiency of road transport and shipping facilities;
  - in pipes and containers in the food industry;
  - in the manufacture of various materials;
  - in the production of heat and electricity.

ZET 7012-A/ZET 7012-I PRESSURE-485

- used in systems of automatic control, regulation and management of technological processes in various industries.

ZET 7112-I PRESSURE-CAN

- used in power engineering, metallurgy, chemical and food industry, leak control systems.

Sensor	ZET 7012-A Pressure-485	ZET 7012-I Pressure-485	ZET 7112-A Pressure-CAN	ZET 7112-I Pressure-CAN
Description	Intelligent absolute pressure sensor	Intelligent excess pressure sensor	Intelligent absolute pressure sensor	Intelligent excess pressure sensor
Appearance				
Version type	Standard Explosion-proof	Standard Explosion-proof	Standard Explosion-proof	Standard Explosion-proof

SPECIFICATIONS	ZET 7012-A Pressure-485	ZET 7012-I Pressure-485	ZET 7112-A Pressure-CAN	ZET 7112-I Pressure-CAN
Measured parameter	absolute pressure	excess pressure	absolute pressure	excess pressure
Area of application	regulating and control systems	regulating and control systems	regulating and control systems	regulating and control systems
Operating medium	liquids and gases compatible with titanium alloys and stainless steel	liquids and gases compatible with titanium alloys and stainless steel	liquids and gases compatible with titanium alloys and stainless steel	liquids and gases compatible with titanium alloys and stainless steel
Data output frequency (Hz)	5, 10, 25, 50, 125	5, 10, 25, 50, 125	5, 10, 25, 50, 125	5, 10, 25, 50, 125
Ranges of measured pressure (MPa)	0-0,16; 0-0,6; 0-6	0-0,16; 0-0,6; 0-6 0-16; 0-60	0-0,16; 0-0,6; 0-6	0-0,16; 0-0,6; 0-6 0-16; 0-60
Data transfer interface	RS-485	RS-485	CAN 2.0	CAN 2.0
Error, nonlinearity, variation, repeatability (%) not more than	± 0,1	± 0,1	± 0,1	± 0,1
Overloading (Pnom)	1,5	1,5	1,5	1,5
Device power supply (V)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 40	up to 40	up to 40
Overall dimensions (mm)	Ø 30 x 190	Ø 30 x 190	Ø 30 x 190	Ø 30 x 190

SENSOR CONFIGURATION	ZET 7012-A Pressure-485	ZET 7012-I Pressure-485	ZET 7112-A Pressure-CAN	ZET 7112-I Pressure-CAN
Primary generator	absolute value sensor (built-in)	absolute value sensor (built-in)	absolute value sensor (built-in)	absolute value sensor (built-in)
Measuring module	ZET 7012-A Pressure-485	ZET 7012-I Pressure-485	ZET 7112-A Pressure-CAN	ZET 7112-I Pressure-CAN
Interface converter	ZET 7070, ZET 7076	ZET 7070, ZET 7076	ZET 7174, ZET 7176, ZET 7172S, ZET 7172M	ZET 7174, ZET 7176, ZET 7172S, ZET 7172M

INTELLIGENT TEMPERATURE SENSORS

Intelligent temperature sensors **ZET 7020 TermoTC-485**, **ZET 7021 TermoTR-485**, **ZET 7120 TermoTC-CAN** and **ZET 7121 TermoTR-CAN** are sensors for faast and easy temperature measurement.

TermoTR-CAN designed for simple and fast temperature measurement. Using intelligent sensors eliminates the need to configure the measurement channels and data processing.

Intelligent sensor starts temperature measurement immediately after the power supply and does not require special maintenance. All the necessary settings are set at initial and periodic verifications and stored in the memory of the measuring module.

Thermocouple or thermal resistance type is selected in accordance with the particular tasks: desired measurement range, accuracy, operating conditions.

Distributed measurement networks are built based on intelligent sensors. Combined use of intelligent sensors and control modules allows building management systems, automated complexes, and various regulators.

APPLICATION

- temperature measurement in liquid, solid, gaseous, and granular media, non-corrosive to the thermocouple body material.
- in thermal power, metallurgy, chemical and other industries.

Sensor	ZET 7020 TermoTC-485	ZET 7021 TermoTR-485	ZET 7120 TermoTC-CAN	ZET 7121 TermoTR-CAN
Description	Intelligent thermocouple thermometer	Intelligent resistance thermometer	Intelligent thermocouple thermometer	Intelligent resistance thermometer
Standard version				
Industrial version				

SPECIFICATIONS	ZET 7020 TermoTC-485	ZET 7021 TermoTR-485	ZET 7120 TermoTC-CAN	ZET 7121 TermoTR-CAN
Measured parameter	Temperature	Temperature	Temperature	Temperature
Data output frequency (Hz)	1,4	10, 62	1,4	10, 62, 123, 242, 470
Data transfer interface	RS-485	RS-485	CAN 2.0	CAN 2.0
Types of connected sensors	Thermocouple type: R, S, B, J, T, E, K, N, A, L, M	Thermocouple type: 100P(0,00391), 50P(0,00391), Pt100(0,00385), Pt50(0,00385), 100M(0,00428), 50M(0,00428), Cu100(0,00426), Cu50(0,00426), 100H(0,00617), 50H(0,00617)	Thermocouple type: R, S, B, J, T, E, K, N, A1, A2, A3, L, M	Thermostors type: 100P(0,00391), 50P(0,00391), Pt100(0,00385), Pt50(0,00385), 100M(0,00428), 50M(0,00428), Cu100(0,00426), Cu50(0,00426), 100H(0,00617), 50H(0,00617)
Accuracy class	0,5	0,1	0,5	0,1
Device power supply (V)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 40	up to 50	up to 50
Data transfer interface	RS-485	RS-485	CAN 2.0	CAN 2.0
Power supply (V)	9 ... 24	9 ... 24	9 ... 24	9 ... 24
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14
Weight (g)*.	35	35	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7020 TermoTC-485	ZET 7021 TermoTR-485	ZET 7120 TermoTC-CAN	ZET 7121 TermoTR-CAN
Primary generator	Thermocouple	Resistive temperature transducer	Thermocouple	Resistive temperature transducer
Measuring module	ZET 7020 TermoTC-485	ZET 7021 TermoTR-485	ZET 7120 TermoTC-CAN	ZET 7121 TermoTR-CAN
Interface converter	ZET 7070, ZET 7076	ZET 7070, ZET 7076	ZET 7174, ZET 7176, ZET 7172S, ZET 7172M	ZET 7174, ZET 7176, ZET 7172S, ZET 7172M

INTELLIGENT ACOUSTIC EMISSION SENSOR

Intelligent acoustic emission sensor with CAN interface **ZET 7140 AcousticEmission-CAN** used to perform non-destructive testing.

Output of module ZET 7140 AcousticEmission-CAN transmits data that do not require additional processing, for example, following signal paramenetrs: MARSE, amplitude, oscillation number, duration, rise time, signal arrival time.

Choice of acoustic emission transducer to be used is determined by particular tasks. Using intelligent sensors eliminates the need to configure the measurement channels. Distributed measurement networks are built based on intelligent sensors. To connect measurement network to the **ZETLAB** and **ZETVIEW** systems use interface converter. Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

APPLICATION

- performing the non-destructive testing;
- determination of crack growth, inclusion fracture, delamination, corrosion, friction, hydrogen embrittlement, fluid or gas leakage etc.

Sensor	ZET 7140-E AcousticEmission-CAN
Description	Intelligent acoustic emission sensor
Standard version	
Industrial version	

SPECIFICATIONS	
Measured parameter	Amplitude, dB (rel. 1 mV), front microseconds, recession microseconds, the number of exceedances pcs, energy mV•s
Connector type for primary converter	SMA
Detection threshold (dB)	-6 ... +20 (rel. 1mV)
Input impedance (kΩ)	10
Gain	100
Input range (mV)	± 10
ADC digit capacity (bit)	14
Sampling frequency (MHz)	2,4
Performance (events/sec)	up to 4 000
Minimum time between events (microseconds)	100
Data transfer interface	CAN 2.0
Types of connected sensors	acoustic emission transducers
Device power supply (V)	+(9 ... 24)
Current consumption at 12 V	up to 110
Overall dimensions (mm)*	83 x 37 x 14
Weight (g)*	40

* Standard version.

SENSOR CONFIGURATION	
Primary generator	Acoustic emission sensor BC 601
Measuring module	ZET 7140-E
Interface converter	ZET 7174 / ZET 7172S / ZET 7172M / ZET 7176

INTELLIGENT PULSE COUNTER

ZET 7141 Counter-CAN intelligent pulse counter designed to measure the radio emission energy, the emission spectrum and distribution density.

Distributed measurement networks are built based on intelligent sensors. To connect measurement network to the **ZETLAB** and **ZETVIEW** systems use interface converter. Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

APPLICATION

- measurement of the radio emission energy, the emission spectrum and distribution density.

Sensor	ZET 7141 Counter-CAN
Description	Intelligent pulse counter
Standard version	
Industrial version	

SPECIFICATIONS	
Connector type for primary converter	SMA
Measured parameter	amplitude, mV / amplitude, code ADC front, mcs / recession, mcs / pulse duration, mcs
Detection threshold (mV)	20 ... 1 000
Input impedance (kΩ)	10
Gain	1

Input range (mV)	± 1000
ADC digit capacity (bit)	14
Sampling frequency (MHz)	16
Performance (events/sec)	up to 4 000
Minimum time between events (μs)	1
Data transfer interface	CAN 2.0
Device power supply (V)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 110
Overall dimensions (mm)*	83 x 37 x 14
Weight (g)*	40

* Standard version.

SENSOR CONFIGURATION	
Primary generator	Pulse counter
Measuring module	ZET 7141 Counter-CAN
Interface converter	ZET 7172, ZET 7174

INTELLIGENT ACCELEROMETERS

Intelligent accelerometers **ZET 7052 Vibrosensor3D-485**, **ZET 7152 Vibrosensor3D-CAN** have a miniature three-component capacitive sensing element and designed to measure the constant and the variable component of the vibration signal on three mutually perpendicular planes.

Lightweight sensing element significantly reduces the effects of the load from its own weight, and small vibration sensors size allows to use them for vibration measurements when placed in small spaces.

Intelligent vibration sensors features:

- configuration not required, characteristics are stored in the meter memory;
- built-in integrating filter allows to get measured vibration parameter value without further data processing;
- the measurement results are transmitted in digital form.

Following intelligent systems are built based on **ZETSENSOR** sensors: distributed measurement networks, control systems, automated complexes. To connect measurement network to the **ZETLAB** and **ZETVIEW** systems use interface converter. Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

ZETLAB software enables filtering signals, long-term signal parameters recording, calculation of signal spectral characteristics etc. **SCADA system ZETVIEW** allows to perform comprehensive analysis of signals from intelligent sensors, as well as set scenarios for **ZETSENSOR** control modules: delivery of signals such as "dry contact", control of analog and digital generators, etc.

Sensor	ZET 7052 Vibrosensor3D-485	ZET 7152 Vibrosensor3D-CAN
Description	Intelligent three-component accelerometer	Intelligent three-component accelerometer
Standard version		
Industrial version		

APPLICATION

- vibration measurement when placed in small spaces.

SPECIFICATIONS	ZET 7052 Vibrosensor3D-485	ZET 7152 Vibrosensor3D-CAN
Measured parameter, (g, m/s², mm/s², m/s, mm/s, mm)	RMS, average, min/max value, vibroacceleration, vibration velosity and vibro dispasement	RMS, average, min/max value, vibroacceleration, vibration velosity and vibro dispasement
Standard filter set	HP1, HP3, HP10, Vel1, Vel3, Vel10, VelMF, Dil1, Dil3, Dil10	HP1, HP3, HP10, Vel1, Vel3, Vel10, VelMF, Dil1, Dil3, Dil10
Sensor type	built-in, integral triaxial MEMS accelerometr	built-in, integral triaxial MEMS accelerometr
Range (g)	16 / 200	16 / 200
Frequency range (V)	0 ... 1 500	0 ... 1 500
Frequency of data output (Hz)	10	10
Sampling frequency (Hz)	3 200, 1 600, 800, 400, 200, 100	3 200, 1 600, 800, 400, 200, 100
Data transfer interface	RS-485	CAN 2.0
Device power supply (V)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 50
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7052 Vibrosensor3D-485	ZET 7152 Vibrosensor3D-CAN
Primary generator	built-in	built-in
Measuring module	ZET 7052 Vibrometer-485	ZET 7152 Vibrometer-CAN
Interface converter	ZET 7070, 7076	ZET 7174, ZET 7172, ZET 7176

INTELLIGENT VIBRATION SENSOR

Intelligent sensors **ZET 7051 Vibrometer-485** and **ZET 7151 Vibrometer-CAN** designed for a wide range of users: sanitary and industrial hygiene control authorities, testing centers, research organizations, etc. Allow to measure general and localized vibration both at work places and in residential and public buildings.

Feature of intelligent sensors **ZET 7051 Vibrometer-485** and **ZET 7151 Vibrometer-CAN** is the stability of characteristics and high reliability in operation.

Primary converter characteristics are set in the device memory, and measurements are carried out taking these parameters into account. Therefore, using intelligent sensors eliminates the need to configure the measurement channels and data processing.

Distributed measurement networks are built based on intelligent sensors.

APPLICATION

ZET 7051 VIBROMETER-485

- used to effectively analyze the status and perform fault diagnosis of various mechanisms in an industrial environment,
- in stationary and portable vibration monitoring systems for machine
- and machining equipment, transmissions and bearings.

ZET 7151 VIBROMETER-CAN

- sanitary and environmental vibration control;
- certification of workplaces on working conditions;
- measurement of machine vibration characteristics;
- vibration control of buildings and structures;
- scientific research;
- pulse process measurements.

Sensor	ZET 7051 Vibrometer-485	ZET 7151 Vibrometer-CAN
Description	Intelligent industrial accelerometer	Intelligent industrial accelerometer
Standard version		
Industrial version		

SPECIFICATIONS	ZET 7051 Vibrometer-485	ZET 7151 Vibrometer-CAN
Measured parameter, (g, m/s², mm/s², m/s, mm/s, mm)	RMS, average, min/max value, vibroacceleration, vibration velocity and vibrodisplacement	RMS, average, min/max value, vibroacceleration, vibration velocity and vibrodisplacement
Standard filter set	HP1, HP3, HP10, Vel1, Vel3, Vel10, VelMF, Dil1, Dil3, Dil10	HP1, HP3, HP10, Vel1, Vel3, Vel10, VelMF, Dil1, Dil3, Dil10
Types of connected sensors	vibration transducer with charge output	vibration transducer with charge output
Sensor connector	SMA	SMA
Data output frequency	10	10
Sampling frequency (Hz)	12 000, 8 000, 4 000, 2 000, 1 000, 500	12 000, 8 000, 4 000, 2 000, 1 000, 500
Data transfer interface	RS-485	CAN 2.0
Device power supply (V)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 50
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7051 Vibrometer-485	ZET 7151 Vibrometer-CAN
Primary generator	Transducer with charge output	Transducer with charge output
Measuring module	ZET 7051 Vibrometer-485	ZET 7151 Vibrometer-CAN
Interface converter	ZET 7070, ZET 7076	ZET 7174, ZET 7172, ZET 7176

INTELLIGENT METER

Measuring modules **ZET 7080-I Meter-4-20-485**, **ZET 7180-I Meter-4-20-CAN**, **ZET 7080-V Meter-0-10-485**, **ZET 7180-I Meter-4-20-CAN** combined with sensor with current or voltage output can form intelligent sensor for various parameters measurements.

Advantages of intelligent sensors:

• measuring module is installed as close to the sensor as possible (or embedded into sensor case), and the signal digitization is performed in close proximity to the sensin element, which reduces the effect of noise on the measurement results;

• intelligent sensor settings are stored in the measuring module memory that allows to start measurements immediately after power-up, without measuring channels configuration;

• intelligent sensor outputs ready data, i.e. measured parameter values, which means that additional data processing is not required;

• the organization of distributed measurement networks based on intelligent sensors do not require expensive cables, since data is transferred in digital form.

Distributed measurement networks are built based on intelligent sensors. To connect measurement network to the **ZETLAB** and **ZETVIEW** systems use interface converter. Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

APPLICATION

• pressure measurement in liquid and gaseous medium. (Recommended for use in the field of housing, energy, metallurgy, chemical and food industry);

• measurement of relative and absolute humidity;

• measurement of consumed natural gas, associated petroleum gas or other gases (air, nitrogen, oxygen, etc.), steam (saturated or superheated);

• measurement of fuel consumption in car engines, river boats, diesel-generators and boilers, burners and other liquid fuel consumers.

Sensor	ZET 7080-I Meter-4-20-485	ZET 7180-I Meter-4-20-CAN	ZET 7080-V Meter-0-10-485	ZET 7180-V Meter-0-10-CAN
Description	Measuring module for sensors with current output	Measuring module for sensors with current output	Measuring module for sensors with voltage output	Measuring module for sensors with voltage output
Standard version				
Industrial version				

SPECIFICATIONS	ZET 7080-I Meter-4-20-485	ZET 7180-I Meter-4-20-CAN	ZET 7080-V Meter-0-10-485	ZET 7180-V Meter-0-10-CAN
Measured parameter	determined by connected sensor type	determined by connected sensor type	determined by connected sensor type	determined by connected sensor type
Data output frequency (Hz)	10, 50, 100, 200, 400	10, 50, 100, 200, 400	10, 50, 100, 200, 400	10, 50, 100, 200, 400
Data transfer interface	RS-485	CAN 2.0	RS-485	CAN 2.0
Types of connected sensors	current output 4 ... 20; 0 ... 20; 0 ... 5	current output 4 ... 20; 0 ... 20; 0 ... 5	current output 0 ... 10; -5 ... +5	current output 0 ... 10; -5 ... +5
Sensor power supply (V)	24	24	24	24
Maximum relative measurement error (%)	< 1	< 1	< 1	< 1
Device power supply (V)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V, (mA)	up to 40	up to 40	up to 40	up to 40
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7080-I Meter-4-20-485	ZET 7180-I Meter-4-20-CAN	ZET 7080-V Meter-0-10-485	ZET 7180-V Meter-0-10-CAN
Primary generator	sensor with current output	sensor with current output	sensor with current output	sensor with current output
Measuring module	ZET 7080-I Meter-4-20-485	ZET 7180-I Meter-4-20-CAN	ZET 7080-V Meter-0-10-485	ZET 7180-V Meter-0-10-CAN
Interface converter	ZET 7070, ZET 7076	ZET 7174, ZET 7176	ZET 7070, ZET 7076	ZET 7174, ZET 7176

INTELLIGENT HYDROPHONE

Intelligent hydrophone **BC 314** – a digital sensor for measuring dynamic pressure in liquid media with data transmission interface CAN 2.0.

Built-in meter of intelligent hydrophones allows to start measurements immediately after the power supply, because the measurement does not require setting of measuring channels, all the necessary parameters are set into the meter memory. Since the output signal of intelligent sensor contains the measured pressure values, additional result processing is not required, it is enough to connect indicator to output or transmit data on the computer to record or display in digital or graphic form.

Intelligent systems are built based on **ZETSENSOR** series devices. To connect intelligent systems with CAN interface to **ZETLAB** and **ZETVIEW**, interface converter should be used.

APPLICATION

- the measurement of sound propagating in the water;
- the ultrasound measurements in liquid media;
- the study of cavitation processes.
- laboratory and factory sound measurement in liquid and gaseous media;
- noise measurements in wet and dirty environments;
- in hydroacoustics for listening to underwater sounds, and for measuring purposes.

Sensor	BC 314
Description	Intelligent hydrophone
Insertion version	
Submerged version	

SPECIFICATIONS	BC 314	BC 314-P
Measured parameter (Pa, dB)	Sound (variable) pressure: instantaneous, RMS, peak	Sound (variable) pressure: instantaneous, RMS, peak
Frequency Range (Hz)	10 ... 5 000	10 ... 5 000
Limit static pressure (MPa)	4	4
Measured maximum dynamic pressure (kPa)	5 50	10 100
The intrinsic noise (Pa)	1,5 15	3 30
Types of connected sensors	built-in piezoceramics	built-in piezoceramics
Frequency of data output (Hz)	12 000, 8 000, 4 000, 2 000, 1 000, 500, if the output is not instantaneous value of 10	12 000, 8 000, 4 000, 2 000, 1 000, 500, if the output is not instantaneous value of 10
Sampling frequency (Hz)	12 000, 8 000, 4 000, 2 000, 1 000, 500	12 000, 8 000, 4 000, 2 000, 1 000, 500
Data transfer interface	CAN 2.0	CAN 2.0
Temperature range (°C)	-20 ... +60	-20 ... +60
Device power supply (V)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 50	up to 50
Overall dimensions (mm)	Insertion: L=195, d=22 Submerged: L=265, d=22	Insertion: L=195, d=22 Submerged: L=265, d=22
Weight (g)	Insertion: m=300 Submerged: m=320	Insertion: m=300 Submerged: m=320

SENSOR CONFIGURATION	BC 314
Primary generator	Built-in piezoceramics
Measuring module	BC 314
Interface converter	ZET 7174, ZET 7176, ZET 7172S, ZET 7172M

INTELLIGENT CONTROL OF THE STEPPER MOTOR

Digital control modules of stepper motor (SM) **ZET 7060-S StepMotor-485** and **ZET 7160-S StepMotor-CAN** designed to control the stepper motor, integrated discrete output components used for connecting actuators with discrete control and data collection from the module digital inputs. To provide feedback, can be used intelligent encoder **ZET 7060-E Encoder-485** (for **ZET 7060-S StepMotor-485** module) or **ZET 7160-E Encoder-CAN** (for **ZET 7160-S StepMotor-CAN** module).

Features of **ZET 7060-S StepMotor-485** and **ZET 7160-S StepMotor-CAN**:

- starting the motor by setting the number of steps;
- starting the motor by setting the number of revolutions;
- setting the number of steps per revolution;
- setting the stepper motor rotation speed;
- setting acceleration / braking performance of stepper motor shaft;
- setting the SM step division mode;
- setting the SM current roll-off mode;
- setting the SM operating current;
- customizable sleep mode (reduced current in the SM windings);
- setting of discrete sensors type (normally closed / normally open);
- setting of discrete sensors debounce;
- possibility to operate discrete sensor in the mode of start / end position limit switch;
- "0" output mode, with the ability to set the direction of the shaft rotation at the "0" output, the speed of exit from limit switch.

Stepper motor control modules can be used separately or included in automated measuring systems. The modules control in **ZETLAB** system is carried out in the program "Device Manager". To connect intelligent network to **ZETLAB** and **ZETVIEW** systems use interface converter **ZET 7070** or **ZET 7174**. Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

Digital module **ZET 7160-RS PID-StepMotor-CAN** designed for PID control of stepper motor. To provide feedback to the PID controller intelligent encoder can be used.

Sensor	ZET 7060-S StepMotor-485	ZET 7160-S StepMotor-CAN	ZET 7160-RS PID-StepMotor-CAN
Description	Digital control module of the stepper motor	цифровой модуль управления шаговым двигателем	модуль ПИД-регулирования шаговым двигателем
Standard version			
Industrial version			

SPECIFICATIONS	ZET 7060-S StepMotor-485	ZET 7160-S StepMotor-CAN	ZET 7160-RS PID-StepMotor-CAN
Number of connected stepper motors (drivers)	1	1	1
Switching frequency (kHz)	up to 200	up to 200	up to 200
Number of control channels	4	4	4
Stepper motor types	4-, 3- or 2-phase	4-, 3- or 2-phase	4- or 2-phase
Output power supply (V)	5	5	5
Data transfer interface	RS-485	CAN	CAN
Device power supply (V)	+(9 ... 24)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 40	up to 40
Controlled device	Motor Driver	Motor Driver	Motor Driver
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35	35

* Standard version.

INTELLIGENT DIGITAL PORT

Digital modules **ZET 7060 Digital-485** and **ZET 7160 Digital-CAN** designed to control connected devices. Used in control and automation systems.

To connect control modules to **ZETLAB** and **ZETVIEW** systems use interface converter ZET 7070 (for **ZET 7060 Digital-485**) and **ZET 7174** (for **ZET 7160 Digital-CAN**). Control modules can also be connected to any system that uses the Modbus Protocol.

Sensor	ZET 7060 Digital-485	ZET 7160 Digital-CAN
Description	Digital input / logic analyzer	Digital input / logic analyzer
Standard version		
Industrial version		

SPECIFICATIONS	ZET 7060 Digital-485	ZET 7160 Digital-CAN
Number of channels (configurable for input / output)	4	4
Signal level (V)	5	5
Frequency of data output (Hz)	1, 10, 50, 100, 200	100, 500, 1 000, 1 500, 2 000
Output power supply (V)	5	5
Data transfer interface	RS-485	CAN
Device power supply (V)	+(7 ... 24)	+(7 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 40
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35

* Standard version.

INTELLIGENT ENCODER

Intelligent encoder **ZET 7060-E Encoder-485** is designed to measure angular and linear displacement, as well as determining the speed, acceleration and position of the rotary axis/shaft. Intelligent encoder **ZET 7160-E Encoder-CAN** designed to determine the rotation parameters: rotation angle, acceleration, velocity and displacement.

Following intelligent systems are built based on **ZETSENSOR** sensors: distributed measurement networks, control systems, automated complexes. To connect control modules to **ZETLAB** and **ZETVIEW** systems use interface converter **ZET 7070** (for **ZET 7060-E Encoder-485**) and **ZET 7174** (for **ZET 7160-E Encoder-CAN**). Measuring network can also be connected to any system that uses the Modbus Internet Protocol.

APPLICATION

- printing, woodworking, food industry;
- metal working and elevator machinery;
- machines for packing, packaging and bottling;
- test benches robots and other machines that require precise registration; indicators of the part movement.

Sensor	ZET 7060-E Encoder-485	ZET 7160-E Encoder-CAN
Description	Intelligent encoder	Intelligent encoder
Standard version		
Industrial version		

SPECIFICATIONS	ZET 7060-E Encoder-485	ZET 7160-E Encoder-CAN
Measured parameter	angle, velocity, displacement, acceleration	angle, velocity, displacement, acceleration
The frequency of the port to work with encoder (Hz)	1 000, 10 000, 50 000, 100 000, 200 000	1 000, 10 000, 50 000, 100 000, 200 000
Data output frequency (Hz)	1, 10, 50, 100, 200	200
Maximum input voltage (V)	5	5
Sensor power supply voltage (V)	5	5
Data transfer interface	RS-485	CAN 2.0
Device power supply (V)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 40
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14
Weight (g) *	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7060-E Encoder-485	ZET 7160-E Encoder-CAN
Primary generator	Encoder	Encoder
Measuring module	ZET 7060-E Encoder-485	ZET 7160-E Encoder-CAN
Interface converter	ZET 7070, ZET 7076	ZET 7174, ZET 7176

INTELLIGENT ANALOG GENERATOR

ZET 7090 Generator-485 and **ZET 7190 Generator-CAN** – analog two-channel synchronous generators designed to generate signal of sine, pulse and sawtooth shape. Can be used alone or in control and automation systems. Output channels control can be performed using **ZETLAB** software or any other software via Modbus protocol.

Areas of application of analog generators:

- heating elements control;
- AFC reading, when using measurement modules – AFC reading with feedback;
- vibration sensors and seismic receivers calibration: electrical method (non-dismantling calibration) or by comparison (vibration exposure using shaker);
- calibration of seismic stations, sound level meters, vibration meters and other measuring equipment.

To connect analog generators to **ZETLAB** and **ZETVIEW** systems use interface converter **ZET 7070** (for **ZET 7090 Generator-485**) or **ZET 7174** (for **ZET 7190 Generator-CAN**). Control modules can also be connected to any system that uses the Modbus Protocol.

Sensor	ZET 7090 Digital-485	ZET 7190 Digital-CAN
Description	цифровой порт/ логический анализатор	цифровой порт/ логический анализатор
Standard version		
Industrial version		

SPECIFICATIONS	ZET 7090 Generator-485	ZET 7190 Generator-CAN
Signal shapes	2 common mode 1 differential	2 common mode 1 differential
Signal shapes	sinus sawtooth puls	sinus sawtooth puls
Output signal range, V	0...5 to the "earth" ±2,5 differential mode relative to the signal 2,5 B	0...5 to the "earth" ±2,5 differential mode relative to the signal 2,5 B
Frequency range, kHz	0 ... 50	0 ... 50
Output power supply, V	5	5
Data transfer interface	RS-485	CAN 2.0
Device power supply, V	+(7 ... 24)	+(7 ... 24)
Current consumption at 12 V, mA	up to 40	up to 40
Sampling frequency, kHz	340	340
Overall dimensions, mm*	65 x 34 x 14	65 x 34 x 14
Weight, g*	35	35

* Standard version.

SENSOR CONFIGURATION	ZET 7090 Generator-485	ZET 7190 Generator-CAN
Measuring module	ZET 7090	ZET 7190
Interface converter	ZET 7070	ZET 7174
ZETKEY with software	ZETLAB SENSOR Means of recording and playback of signals SCADA ZETVIEW	ZETLAB SENSOR Means of recording and playback of signals SCADA ZETVIEW

INTELLIGENT DIGITAL OUTPUT, DIGITAL GENERATOR

ZET 7060-G DigitalGenerator-485 and **ZET 7160-G DigitalGenerator-CAN** – the digital generators with possibility to change the duty cycle from 0 to 100%. Start is made either by external digital signal, or using the command received over the RS-485 network or CAN 2.0.

ZET 7160-R Regulator-CAN – digital two-position PID controller performs PID control by duty cycle or signal frequency.

To connect control modules to **ZETLAB** and **ZETVIEW** systems use interface converter **ZET 7070** (for **ZET 7060-G DigitalGenerator-485**) and **ZET 7174** (for **ZET 7160-G DigitalGenerator-CAN** and **ZET 7160-R Regulator-CAN**). Control modules can also be connected to any system that uses the Modbus Protocol.

Sensor	ZET 7060-G DigitalGenerator-485	ZET 7160-G DigitalGenerator-CAN	ZET 7160-R Regulator-CAN
Description	Digital generator	Digital generator	Two-position PID controller
Standard version			
Industrial version			

SPECIFICATIONS	ZET 7060-G DigitalGenerator-485	ZET 7160-G DigitalGenerator-CAN	ZET 7160-R Regulator-CAN
Number of outputs	2	2	2
Control algorithm	–	–	PID controller
Controlled parameter	–	–	the frequency or duty cycle
Signal level (V)	5	5	5
Sampling frequency (MHz)	5	5	5
Output power (mA)	5	5	5
Data transfer interface	RS-485	CAN 2.0	CAN 2.0
Device power supply (V)	+(7 ... 24)	+(7 ... 24)	+(9 ... 24)
Maximum output current (mA)	50	50	up to 40
Overall dimensions (mm)*	65 x 34 x 14	65 x 34 x 14	65 x 34 x 14
Weight (g)*	35	35	50

* Standard version.

"DRY" CONTACT

ZET 7061 DryContact-485 and **ZET 7161 DryContact-CAN** – two-channel control modules "dry" contact. Trigger conditions can be upon threshold exceeding, and by the command received via RS-485 or CAN interface.

To connect control modules to **ZETLAB** and **ZETVIEW** systems use interface converter **ZET 7070** (for **ZET 7061 DryContact-485**) and **ZET 7174** (for **ZET 7161 DryContact-CAN**). Control modules can also be connected to any system that uses the Modbus Protocol.

Sensor	ZET 7061 DryContact-485	ZET 7161 DryContact-CAN
Description	Two-channel control module "dry" contact	Two-channel control module "dry" contact
Standard version		
Industrial version		

SPECIFICATIONS	ZET 7061 DryContact-485	ZET 7161 DryContact-CAN
Number of channels	2	2
Insulation (V)	500	500
Maximum current (A)	1	1
Resistance in the closed state (mΩ)	20	20
Data transfer interface	RS-485	CAN 2.0
Device power supply (V)	+(9 ... 24)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 40	up to 70
Overall dimensions (mm)*	84 x 45 x 14	84 x 45 x 14
Weight (g)*	50	50

* Standard version.

Interface converters USB↔RS-485 **ZET 7070** used to form a measuring network with RS-485 interface for connecting modules ZET 70XX

STANDARD VERSION


SPECIFICATIONS	ZET 7070 (USB – RS-485)
Interface conversion	USB 1.1 (USB 2.0 Full Speed) ↔ RS-485
Maximum number of simultaneously connected intelligent sensors	60
The total frequency of streaming data on all nodes (Hz)	2500
Power supply of connected intelligent sensors	+ (up to 4 pcs)
Power supply of connected intelligent sensors	external (more than 4 pcs)
Device power supply 5V	5V (from USB bus)
Power consumption (mW)	up to 100 mW
Overall dimensions (mm)	84 x 45 x 14

Interface converters CAN to Radiochannel (**ZET 7172S**) and Radiochannel to CAN (**ZET 7172M**) designed to create a radio channel segment in a measuring network with CAN interface.

STANDARD VERSION	INDUSTRIAL VERSION
	

SPECIFICATIONS	ZET 7172S	ZET 7172M
Interface conversion	CAN 2.0 → Radiochannel	Radiochannel → CAN 2.0
Radius of action (m)	100	100
Data transfer rate (kbit/s)	250	250
Exchange protocol	ZigBee	ZigBee
Exchange rate (GHz)	2,4	2,4
Current consumption at 12 V (mA)	300	300
Overall dimensions (mm)	84 x 45 x 14	178 x 65 x 30
Output power (mW)	1	1

Interface converters USB↔CAN-485 **ZET 7174** used to form a measuring network with CAN interface for connecting modules **ZET 71XX**. Combined use of interface converters **ZET 7174** and **ZET 7172** allows to integrate wireless connection to the measurement network with CAN interface.

STANDARD VERSION


SPECIFICATIONS	ZET 7174 (USB – CAN)
Interface conversion	USB 2.0 ↔ CAN 2.0
PC connection interface	USB 2.0 HS
Number of simultaneously connected intelligent sensors	8
The total frequency of streaming data on all nodes, sample	up to 12 000 per node, up to 6 000 per 4 node
Power supply of connected intelligent sensors	external
Device power supply (V)	via USB*
Current consumption at 12 V (mA)	up to 100
Overall dimensions (mm)	84 x 45 x 14

* Power supply +(9 ... 24) V for use in autonomus mode.

ZET 7174 module can be equipped with microSD card for recording signals in autonomous mode for later processing. If there is no connection of **ZET 7174** module to the PC, data stream from CAN will be recorded on microSD card. PC connection of **ZET 7174** module is determined by the USB bus voltage.

PARAMETER NAME	ZET 7174 (USB – CAN)
Writing data to a microSD card in the absence of PC connection	optional
The capacity of data writing from each CAN-device (kB/s)	up to 10
Rate of data reading from microSD card to PC (kB/s)	at least 500
File system	FAT32
Supported microSD (GB)	SD and SDHC up to 32
Loop recording possibility	+

Interface converter Ethernet↔CAN **ZET 7176** (Ethernet – CAN) used to form a measuring network with CAN interface for connecting modules **ZET 71XX**. Combined use of interface converters **ZET 7174** and **ZET 7172** allows to integrate wireless connection to the measurement network with CAN interface.

STANDARD VERSION	INDUSTRIAL VERSION
	

SPECIFICATIONS	ZET 7176 (Ethernet – CAN)
Interface conversion	Ethernet ↔ CAN 2.0
PC connection interface (Mbit/s)	Ethernet 100
Number of simultaneously connected intelligent sensors	62
The total frequency of streaming data on all nodes (sample/s)	до 6 000
Power supply of connected intelligent sensors	external
Device power supply (V)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 100
Overall dimensions (mm)*	84 x 45 x 14

* Standard version.

ZET 7176 module can be equipped with microSD card for recording signals in autonomous mode for later processing. If there is no connection of **ZET 7176** module to the PC, data stream from CAN will be recorded on microSD card.

PARAMETER NAME	ZET 7176 (Ethernet – CAN)
Writing data to a microSD card in the absence of PC connection	optional
The capacity of data writing from each CAN-device (kB/s)	up to 10
Rate of data reading from microSD card to PC (kB/s)	at least 500
File system	FAT32
Supported microSD (GB)	SD and SDHC up to 32
Loop recording possibility	+

Interface converter Ethernet↔RS-485 **ZET 7076** used to form a measuring network with RS-485 interface for connecting modules **ZET 70XX**.

STANDARD VERSION


SPECIFICATIONS	ZET 7176 (Ethernet – CAN)
Interface conversion	Ethernet ↔ RS-485
PC connection interface (Mbit/s)	Ethernet 100
Number of simultaneously connected intelligent sensors	20
The total frequency of streaming data on all nodes (sample/s)	up to 6000
Power supply of connected intelligent sensors	external
Device power supply (V)	from 9 to 24
Current consumption at 12 V (mA)	up to 150
Overall dimensions (mm)	140 x 64 x 30

DIGITAL INDICATOR

ZET 7178 module designed to connect to the measurement networks based on intelligent sensors with CAN interface, and is used to display the values of the measured parameters. Module also allows to monitor the voltage on the power supply bus in the network using Oscillograph program from **ZETLAB** package or on the module screen.

INDUSTRIAL VERSION


Configuring indication parameters is performed from a PC via any interface converter CAN ↔ PC of **ZET 717X** series (at the moment – **ZET 7174** or **ZET 7176**).

Configurable parameters:

- the brightness of the indicator backlight;
- indicator contrast;
- factor – what you need to multiply the data to before displaying them on the screen, allows you to scale and modify the range of displayed values;
- network address of the device from which information for indication will be taken.

SPECIFICATIONS	ZET 7178
Data transfer interface	CAN 2.0
Data refresh rate on the indicator (Hz)	1/10, 1, 3, 5, 10
Contrast regulation	+
Backlight brightness regulation	+
Peak detector	+
Indicator type	graphic, monochrome
Resolution (pix)	98 x 32
Device power supply (V)	+(9 ... 24)
Current consumption at 12 V (mA)	up to 130
Overall dimensions (mm)	140 x 65 x 32
Weight (g)	300

ZETCLOUD THIN CLIENT

ZETCLOUD – client software (technology) in networks with client-server or terminal architecture transferring all or most of the data processing tasks to the server.

ZETCLOUD "thin client/server" technology – is a model where applications are deployed, managed and run entirely on the server. This model uses a multi-user operating system and technology transferring all the user interface to the user device. Specialized program, called the client and running on the terminal, connects to the server, in the case of "thin client" called "terminal server" or "application server", and receives desktop or running application image.

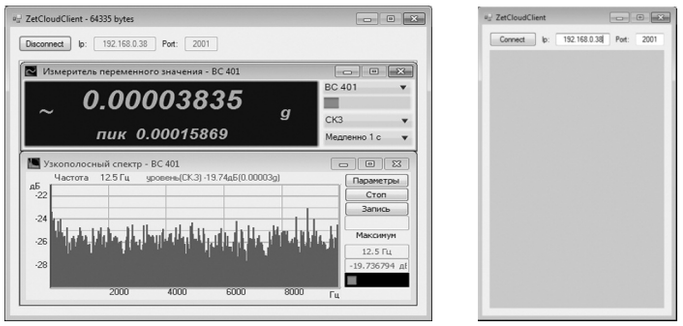
The advantages of "thin client/server" technology include easy operation, easy access, performance and security of the system. This significantly reduces the cost of its operation.

APPLICATION

- in any process requiring the use of client-server technology.
- in the energy sector
- in the oil and gas industry, etc.

Advantages:

1. Fast information access (time saving).
2. Centralization (all data is stored in one place, which simplifies backup procedure and user access control).
3. Protection against information leakage.
4. Alternative to the computer.



Appearance of "thin client/server".

Appearance of "thin client/server" on the mobile devices.

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