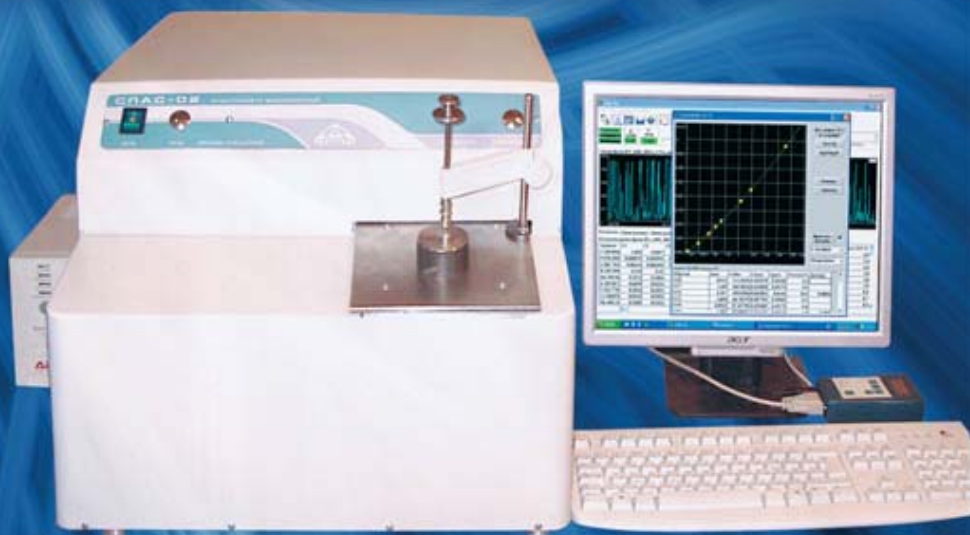


## "SPAS-02" emission spectrometer (metal analyzer)

Now spectrometers «Spas-02» are put on following enterprises (2007 – 2009):

1. Joint-Stock Company "Agrogasmontag", Penza, Russia
2. Open Co. Ltd "Evrovtorsirjo", Semipalatinsk, Republic Kazakhstan
3. "Severstal-metiz Orel plant", Orel, Russia, [www.severstalmetiz.com](http://www.severstalmetiz.com) (enterprise "Severstal" affiliated company, <http://www.severstal.com/eng/index.phtml>).
4. Open Co. Ltd «Ulyanovsk mechanical factory № 2», Ulyanovsk, Russia
5. Federal State Unitary Enterprise (FSUE) Central Research Institute of Structural Materials "PROMETHEY", St.-Petersburg, Russia, <http://www.crisp-prometey.ru/>
6. Kazakhmys PLC, Karaganda, Republic Kazakhstan, <http://ru.kazakhmys.com/>
7. Open Co. Ltd "AKOM-INVEST", Tolyatti, the Samara region, Russia
8. Open Co. Ltd «Samara steel foundry», Samara, Russia
9. Open Co. Ltd "Metallurgist", Nevinnomyssk, Russia
10. Open Co. Ltd "Sibneftemash", Tyumen, Russia, <http://www.sibneftemash.ru/>
11. Joint-stock company «Sokolovsko-Sarbayское GPO», Rudniy, Republic Kazakhstan
12. Open Co. Ltd «Megalit», Izhevsk, Russia
13. Open Co. Ltd "MSU-90", Sosnoviy Bor, the Leningrad region, Russia
14. Moscow state university of railway engineering, Moscow, Russia
15. Joint-Stock Company "Uni-leasing", St.-Petersburg, Russia
16. Open Co. Ltd "Tyumenniigiprogaz", Tyumen, Russia, [www.tngg.ru](http://www.tngg.ru) (subsidiary company of "Gazprom", [www.gazprom.com](http://www.gazprom.com)).
17. Open Co. Ltd "StalLit-JuK", Perm, Russia
18. Open Co. Ltd "Livgidromash", Livny, the Orel region, Russia
19. Open Co. Ltd «Kukmorsky factory Metalloposudy», Tatarstan
20. Open Co. Ltd "Litmashpro", Perm, Russia
21. Open Co. Ltd «Semipalatinsk litejno-mechanical factory», Kazakhstan
22. Open Company "Spetstehsnab", St.-Petersburg, Russia
23. FSUE «Admiralty shipyards», St.-Petersburg, Russia, <http://www.admship.ru/>
24. Open Co. Ltd "Factory AKS", St.-Petersburg, Russia
25. NPF "AVEK", Yekaterinburg, Russia, <http://eng.avek.ru/>
26. Open Co. Ltd "Titan", Tula
27. Open Co. Ltd "OmskTransmash", Omsk, Russia
28. "St. Petersburg Railway University", St.-Petersburg, Russia, [www.pgups.ru](http://www.pgups.ru)
29. Federal State Unitary Enterprise (FSUE) «Research Machine-Building Institute», Moscow, Russia





## "SPAS-02" emission spectrometer (metal analyzer)

The quantity of measured elements, and also the top and bottom borders of ranges of concentration can change on the instructions of the Customer.

### 1. The analytical program for the analysis of low- and medium-alloyed steels

	min %	max %		min %	max %
Fe	Alloy basis		C	0.001	2.00
Si	0.005	3.00	Mn	0.002	3.00
P	0.002	0.10	S	0.001	0.10
Ni	0.005	8.00	Cr	0.002	4.00
Mo	0.001	2.00	Cu	0.002	5.00
V	0.003	2.00	Ti	0.001	1.00
W	0.003	4.00	Al	0.001	2.00

### 2. The analytical program for the analysis of iron

	min %	max %		min %	max %
Fe	Alloy basis		C	1.00	4.50
Si	0.002	4.00	Mn	0.001	2.00
Ni	0.005	6.00	Cr	0.005	4.00
Cu	0.005	2.00	P	0.002	0.50
S	0.001	0.15	V	0.001	0.50
Ti	0.001	0.20	Mg	0.001	0.10
Al	0.001	0.50	Mo	0.001	0.50

### 3. The analytical program for the analysis of high-alloyed steels

	min %	max %		min %	max %
Fe	Alloy basis		Co	0.002	35.0
Si	0.005	3.0	Cu	0.002	4.0
Mn	0.010	12.0	V	0.005	2.0
Ni	0.005	45.0	Ti	0.005	5.0
Cr	0.005	50.0	W	0.01	20.0
Mo	0.005	12.0	Al	0.002	12.0
C	0.001	1.0	S	0.002	0.1
Nb	0.005	2.0	P	0.002	0.1

### 4. The analytical program for the analysis of copper alloys

	min %	max %		min %	max %
Cu	Alloy basis		Zn	0.010	50.00
Pb	0.001	20.00	Sn	0.001	12.00
Al	0.002	20.00	Fe	0.005	8.00
Mn	0.001	15.00	Bi	0.001	0.05
Sb	0.001	1.00	As	0.001	0.30
P	0.001	5.00	Be	0.001	3.00
Ni	0.001	8.00	Si	0.003	5.00
Ti	0.005	0.50	Mg	0.001	0.30

### 5. The analytical program for the analysis of aluminium alloys

	min %	max %		min %	max %
Al	Alloy basis		Mg	0.0050	10.00
Si	0.0050	15.00	Cu	0.0050	10.00
Zn	0.0010	10.00	Fe	0.0050	4.00
Mn	0.0100	2.00	Ni	0.0050	2.00
Ti	0.0010	0.50	Sn	0.0100	1.50
Pb	0.0100	1.50	Cr	0.0050	0.50
Be	0.0001	0.10	Ca	0.0001	0.10
Zr	0.0050	0.40	V	0.0100	0.20

### 6. The analytical program for the analysis of nickel alloys

	min %	max %		min %	max %
Ni	Alloy basis		Nb	0.1	3.0
C	0.01	0.2	Mn	0.01	1.0
Si	0.01	1.5	Cr	0.1	30.0
Fe	0.1	25.0	Al	0.01	7.0
Mo	0.1	15.0	Ti	0.01	4.0
Cu	0.01	0.5	Mg	0.01	0.2
W	0.1	20.0	Co	0.1	17.0

### 7. The analytical program for the analysis of titanitic alloys

	min %	max %		min %	max %
Ti	Alloy basis		Al	0.1	10.0
Mo	0.1	14.0	V	0.1	6.0
Mn	0.01	4.0	Cr	0.01	5.0
Fe	0.01	2.0	Si	0.01	1.0
Zr	0.01	10.0	Sn	0.1	4.0
B	0.001	0.05	Cu	0.01	0.5
Nb	0.01	5.0			

### 8. The analytical program for the analysis of lead alloys

	min %	max %		min %	max %
Pb	Alloy basis		Sb	0.00010	10.0
Sn	0.00005	1.0	Bi	0.00005	0.1
As	0.00050	0.3	Cd	0.00020	0.3
Cu	0.00020	0.3	Ag	0.00001	0.1
Ca	0.00010	0.1	Fe	0.00100	0.1
Mg	0.00010	0.1	Zn	0.00010	0.1
Te	0.0010	0.2			

### 9. The analytical program for the analysis of zinc alloys

	min %	max %		min %	max %
Zn	Alloy basis		Cd	0.001	0.10
Al	0.010	17.0	Sn	0.001	0.10
Cu	0.001	8.0	Fe	0.001	0.20
Mg	0.002	0.3	Si	0.010	0.50
Pb	0.002	0.5			

**The quantity of analytical programs – is not limited and defined by the Customer.**

# "SPAS-02" emission spectrometer (metal analyzer)

## Brief technical characteristics:

### Optical circuit:

- ☒ Paschen-Runge circuit;
- ☒ Rowland circle diameter: 330 mm;
- ☒ Reverse dispersion: 1.4 nm/mm;
- ☒ Diffraction grating: 2100 line marks/mm;
- ☒ System of 7 multi-element CCD detectors with a total number of channels over 25 000 and channel size about 8 μm;
- ☒ Spectral range: 176-457 nm (non-vacuum option: 190-457 nm);
- ☒ Automatic profiling and drift recording.

### Vacuum system:

- ☒ Dry type pre-evacuation pump (Germany);
- ☒ Computer-aided control;
- ☒ Computer-aided vacuum control.

### Spectrum excitation system:

- ☒ Low-voltage-unipolar spark in argon atmosphere;
- ☒ Computer-aided control of discharge frequency, pulse voltage and energy;
- ☒ Automatic change of discharge parameters during transition from sparking to analysis;
- ☒ Opened desk design;
- ☒ Tungsten electrode;
- ☒ Accessories for analysis of wire and bar chemistry

### Control & processing system:

- ☒ Built-in PC;
- ☒ Windows XP operating system;
- ☒ Output to monitor and printer;
- ☒ Optional connection to in-company network and Internet;
- ☒ Transfer of analysis results using USB-drive.

### Software:

- ☒ Graphical spectrum presentation;
- ☒ Database of spectrum lines for quality analysis;
- ☒ Automatic profiling and drift recording;
- ☒ Control of sparking process;
- ☒ Individual recording of spectrum background for each line;
- ☒ Using of several spectrum lines and lines of comparison for each element;
- ☒ Automatic selection of the best comparison lines;
- ☒ Unique algorithm of result processing based on application of correlation analysis methods to reduce random and systematic errors;
- ☒ Automatic recording of inter-element additive and multiplication effects;
- ☒ Recording of base material dilution;
- ☒ One- and two-point recalibration.

### Spectrometer overall dimensions, weight:

- ☒ Length x Width x Height, max. mm  
**670x500x400;**
- ☒ Weight, max. Kg **65**

### Spectrometer operating environment:

Spectrometer operates in premises satisfying requirements to laboratory conditions:

- ☒ Ambient air temperature: 10–35° C;
- ☒ Atmospheric pressure: 84–106,7 кПа (630–800 мм рт. ст.);
- ☒ Relative humidity (at T=25° C):  
max. 80%;
- ☒ Electricity supply: (220+22-33) В, (50±2) Hz

For normal spectrometer performance, the desk with spectrometer has to be mounted on a rigid floor inside premises with low vibration levels.

Avoid direct sun rays on spectrometer surface.

Do not place electric heaters nearby and avoid draught.



## "SPAS-02" emission spectrometer (metal analyzer)

"SPAS-02" desktop emission spectrometer is designed for industrial analytical laboratories of mechanical engineering, metallurgical and metalworking facilities.

Spectrometer is capable to replace a whole laboratory for identification of metal and alloy chemistry, having drastic effects on final product quality.

"SPAS-02" represents the best solution for our clients striving for express results, high technical characteristics, reliability and high precision of complete element composition of metal products versus minimum costs for procurement, introduction and performance of the instrument.

"SPAS-02" emission spectrometer embodies a number of advanced technical solutions having certain advantages versus known analogs:

1. Spark-gap oscillator is a new development, which maximum power and stability of discharge parameters exceed other arc oscillators. This feature allows determining concentration of higher number of chemical elements with high sensitivity and lower value of root-mean-square deviation.

2. Applicable dry vacuum pump provides for rarefaction to a value below 1 mbar, which allows improving convergence and sensitivity drastically during determination of sulfur and phosphorus.

3. Algorithm of random measurement error automatic minimization is used within one "spot" of sparking, which drastically improves convergence of analysis results.

4. Optical unit implements layout of CCD matrix strips produced by TOSHIBA (Japan), guarantying complete absence of "dead zones" in received spectrum.

5. Software is perfectly suitable for both manual and automatic selection of analytical couples, as well as automatic adjustment of drift directly during investigation process, thus excluding "human factor" during analysis of results.

6. Instrument design implements a unique technical solution, which allows achieving high temperature stability of spectrometer without application of active thermal stabilization system.

