INFRASONIC SYSTEM FOR PIPELINE MONITORING

ISPM

Purpose

The equipment provides continuous automatic control of technical condition of pipelines.

The equipment operated on oil pipelines, product pipelines, condensate pipelines, gas pipelines.

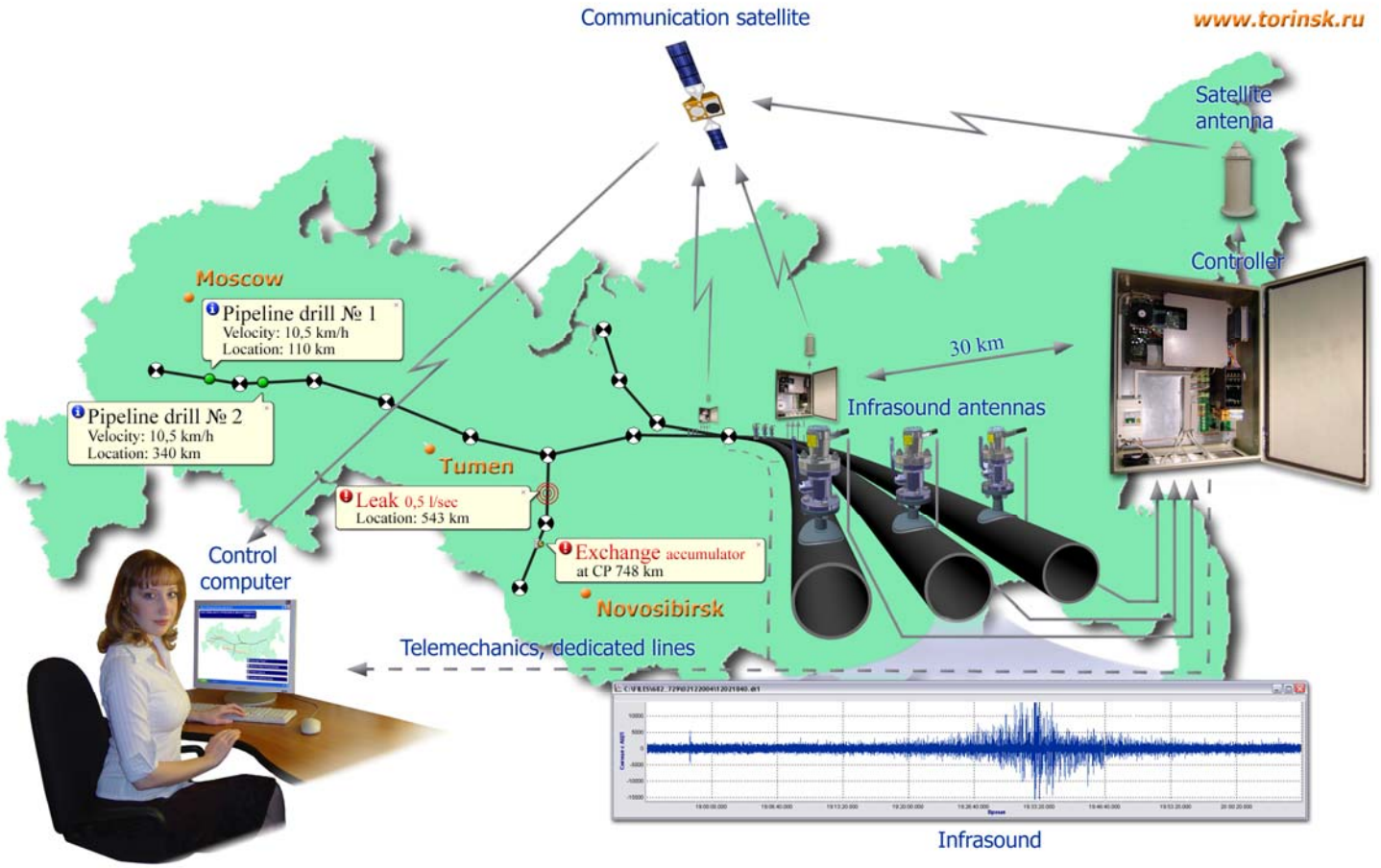
Functions

1. Leak detection
2. Detection of mechanical stress in the pipeline
3. Location monitoring devices in pipeline
4. Detection of pipeline defects
5. Video recording
6. Pressure measurement
7. Flow measurement
8. Control valves
9. Protection and self-diagnostics

Types of equipment: stationary, mobile, infrasonic scanner.

The principle of operation is to record infrasound signals propagating in the pipeline, generated by leaks, mechanical impacts on the pipeline, moving in pipeline devices, mechanical defects. Infrasound signals are recorded on the background noise of the pumping stations and other sources. The system implements a new infrasonic method of registration of signals in high noise level. This method has high sensitivity for leaks with ultra-low intensity. As a result, the system provides several functions of monitoring the technical state of the pipeline, as well as several tens of times higher sensitivity to leaks in comparison with traditional leak detection systems (LDS).

Technical support includes remote monitoring of equipment by developer.



Equipment for stationary type: infrasonic hydro-aerials (sensors), controllers, software, communication channel, server for data processing, computers for control the ISPM.

Continued on the reverse side

The main advantages in numbers

- **9** functions for monitoring the technical state of the pipeline listed on page 1.
- Sensitivity and accuracy of leak detection is **50** times higher compared to traditional systems.
- **3** independent registration methods provide a high efficiency of leak detection with ultra-low intensity.
- **3** types of equipment: fixed, mobile and infrasonic scanner allows using the system under various operating conditions and to obtain comprehensive information about the pipeline.
- Operated on pipelines: condensate pipelines, oil pipelines, products pipelines, NGL pipelines, gas pipelines since **2007**.
- Low power modules (**40 W**) on the linear part of the pipeline allows use of autonomous sources of power supply.
- Typical time to replace a failed node is **30** minutes, which is ensured by the self-diagnostics and by modular architecture of the equipment.
- The battery life of the equipment from a built-in uninterruptible power supply is up to **2 days** and may be more. This time is determined by the capacity of the connected battery.
- Controller. Small size (600x600x220мм) convenient for installation in KP TM. Function "microclimate" (heating, cooling) supports operating temperature from **–20^{0}C** to **+55^{0}C**. The modularity of the Assembly in the standard PC-104 is used for difficult operating conditions. Connects up to 4 pipelines), which reduces the cost of the system per 100 km of motorway.
- Sensor. Diameter 105mm, height 105mm, weight 1.5 kg waterproof IP 67 in accordance with GOST 14254, temperature of operation from **–55^{0}C** to **+55^{0}C**.
- High system reliability is provided by **20%** redundancy with diagnostics of defective equipment and automatic switching.
- The distance between the sensors with controllers at pipeline varies from **15 km** to **30 km**, which reduces the cost of installation and maintenance.
- All the parameters characterizing the system are continuously monitored remotely by operator and developer.

Assembly of electronics in standard PC-104 for demanding use

Controller

Sensor

Reviews

- Positive reviews and test results in the companies: JSC «Gazprom», JSC «Transnefteproduct», JSC «SIBUR», JSC «Transneft».
- Gold medal at the international exhibition.

Documents

- Certificate of conformity to Technical regulations of the Customs Union TR CU 012/2011 "On safety of equipment for work in explosive environments".
- The patent of the Russian Federation dated 27.05.2013.

Economic efficiency ensures by performance and versatility: 9 functions.

Commercial offer

- Start on the pipeline: development of the detailed design, installation and commissioning, testing, warranty and post-warranty service. Technical support during the entire period of its operation with the use of remote monitoring equipment. Infrasound in-line inspection for the purpose of registration of geometrical defects in the pipeline wall, detection of unauthorized taps.
- To order the system please send the completed form (app.1) to the following address: **tori@torinsk.ru**

Scientific and production company "TORI" *(founded in 1994)*

Russia 630090 Novosibirsk, Akademika Rzanova st., 2, fax, tel: +7 (383) 3305006 tori@torinsk.ru www.torinsk.ru

INFRASONIC SYSTEM FOR PIPELINE MONITORING

Technical specifications for the equipment: № 4389-001-39145393-2001

Certificate of the customs Union: № ТС RU C-RU.МГ07.В.00318

The form for ordering equipment

(for prepare techno-commercial proposal for development of technical documentation, delivery and starting the system)

ISPM.00.00.FOE

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№	Characteristics	Value
1	The name of the pipeline, and geographical location: _____	
2	Length, km	
3	Diameter, mm	
4	Pressure range for different modes of operation, MPa	
5	Difference of altitude, m	
6	Location of pumping stations	
7	Power of pumps, KW	
8	Pump capacity (min, max), tone/hour	
9	Presence of gas tubes and gravity stations (for pumping products in liquid state)	
10	Presence and the coordinates of the existing laterals from the pipeline	
11	Product characteristics (including gas contents for liquid state)	
12	Triggering frequency treatment devices	
13	Performance of the communication channel *	
14	The availability of space for placement of equipment. The presence of power supply (requires 0.5 KW or 0.05 KW for special energy-saving tipe equipment). Location, km:	
15	The length of promising pipeline sections to connect the system	
16	The number and location of automatic design of jobs for control of the pipeline, the location of the data processing server	
17	The availability of data to improve the accuracy: the piping technological scheme with indicating the lengths and orientations of longitudinal seams	
18	The availability of data to improve accuracy: map of pipeline with linear and geographic coordinates	
19	The required functions (yes, no):	
19.1	Leak detection	*yes*
19.2	Detection of mechanical stress in the pipeline	
19.3	Location monitoring devices in pipeline	
19.4	Detection of pipeline defects	
19.5	Video recording	
19.6	Pressure measurement	
19.7	Flow measurement	
19.8	Control valves	
19.9	Protection and self-diagnostics	

* For all functions except "Video recording " requires: 19,2 Kbit/s*Ncontr, where Ncontr is the number of controllers, installed on the linear part. For the "Video recording" with frame resolution 720x576 with a frame size 368 Kb required additional capacity of the communication channel at the transmission rate of frames 1 frame/10s: 36,86*(Ncontr+Ncomp) Kbit/s, where Ncomp is the number of computers for control the ISPM.

Customer: _____

Name, signed «____» _____ 201__ г.