



Limited liability company «ISTA»
Pneumatic systems of Saint - Petersburg

Quick-time opening valves KBTM series

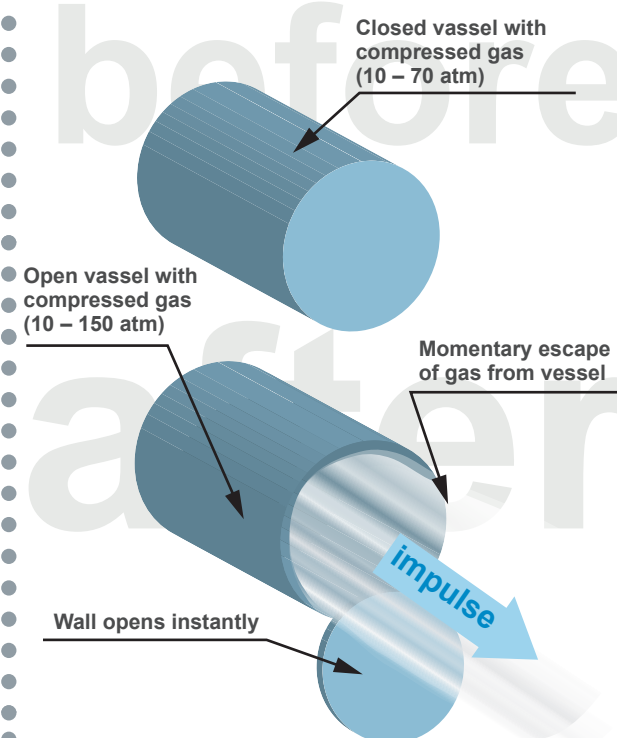




LLC ISTA developed a line of pneumatic high-speed (quick-time opening) valves KB-20, KB-40 and KB-80 for the first time. The main characteristics (flow area and opening times) of the valves are not conceding to breakable diaphragms in shock tubes, but it provides multiple controlled operations. It is important that the labor productivity of shock tube grows many times after installing of the valve.

LLC ISTA managed to create a number of market products based on the valves under the general name SVT[®] echnology for 25 years. The name comes from the abbreviation of Speed Valve Technology.

Introduction. Process description.



Imagine that the wall hermetically filled compressed vessel gas, will disappear (or will open instantly). Such examples are widely presented on the Internet.

For example, speed camera fixes formation of impulse in case of the bubble bursting, even the pressure drop is very low.

Now imagine vessel compressed to a high pressure gas (for example, several tens of atmospheres) whose wall suddenly disappears completely.

Outflow of gas occurs in the surrounding space at a supersonic velocity.

The internal energy of the gas will be converted into kinetic energy as efficiently as possible. .

If we consider that the potential energy is determined by the pressure of the compressed gas and the volume of the vessel, when the final efficiency energy conversion can generate a significant boost without the use of any fireworks.

Obviously, on the basis of this phenomenon can create many useful products.

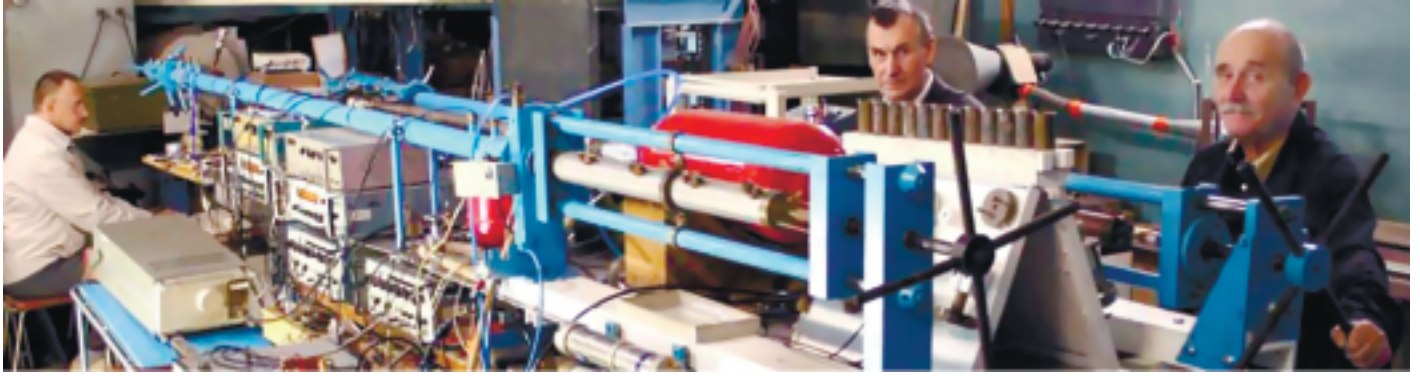
Diaphragmless control impulse



Until now, there were no commercially suitable means for instantaneous "disappearance" of the shell of the vessel.

One can only recall that for decades a practical tool of the energy conversion of compressed gas were breakable diaphragm in shock tubes. Main disadvantage is the inability to re-use and instability.

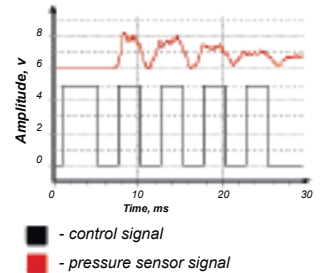
Its have served the study of high-speed gas flows in university laboratories, but are not allowed to create commonly used products on the market due to the fact that after each cycle of the diaphragm must be replaced destroyed.



Valve KB series is clocked at up to 200 Hz

The figure on the left shows the characteristics of multiple valve KB Series actuation. The lower curve is the control signal, the upper is pressure at the valve outlet

Quick-acting KB Series valve, in particular, allows to produce several complete cycles of opening / closing at filling the airbag in a car accident during development (30-100ms) that allows us to create an adaptive airbag inflator.

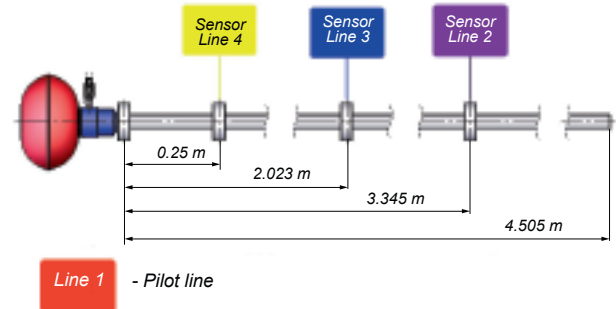


ISTA-3 aircannon with valve KB series is widely marketed device that generates a powerful shock wave

Arrangement of the experiment

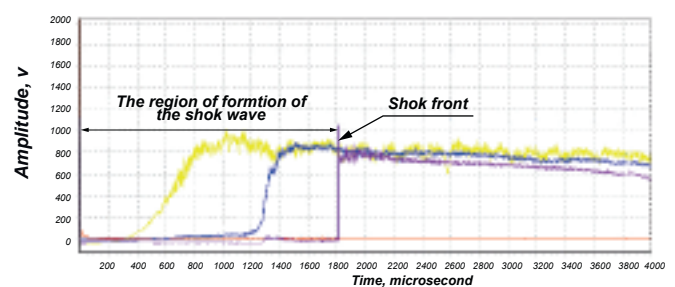
The right figure shows the standard ISTA-3 aircannon with the barrel, exactly the devices operate almost 1000 enterprises.

When aircannon triggered high-speed valve series KB opens and the compressed gas from the receiver flows into the tube at a supersonic speed. Pressure sensors are placed along the pipe at different distances from the valve.



The result of the experiment

The results of the formation of a shock wave are presented on the right. As it moves through the pipe compression wave front becomes sharp (curves yellow and blue). Downstream front converted into a shock wave (curve violet). It is known that the shock wave is characterized by sharp pressure jump on the length of a few angstroms.



KB series valve provides increased resources as compared with prototypes.

Mathematical modeling of the gas flow in the KB series valve show high resistance to shock wave reflection, which is reflected on the obstruction in the barrel, and travels back through the valve without changing direction.

Factor pin reflected wave in the valve assembly is a major cause rapid failure of the quick-acting valves analogs in which the flow turns through 90° or 180°.



KB™ series pneumatic Valves by SVT® technology, possess a number of unique properties.

- The operating time (opening / closing) of any high-speed valve KB™ series in the range of 1,0-3,0 ms. Currently there is no commercially produced pneumatic valve with a diameter of 20mm and over flow cross section and with a similar quick-action on the market.
- Construction of KB™ series valve does not contain changes of direction of gas (all prototypes contain changes of flow direction 90/180°).
- Shutoff device is designed as a durable shell that provides increased lifespan.



All KB™ series valves are controlled by unified standard electro pneumatic valves of the well-known companies, which facilitates the process automation capabilities based on our long-term partners.



Full cycle. Invention. Design. Production.

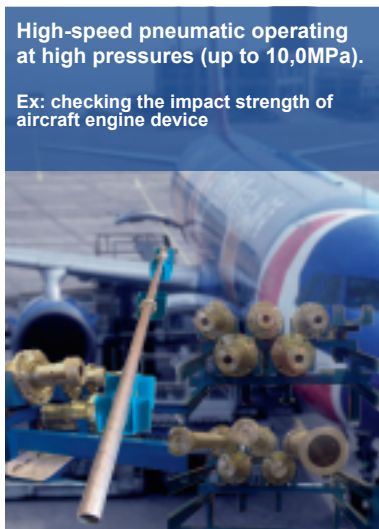
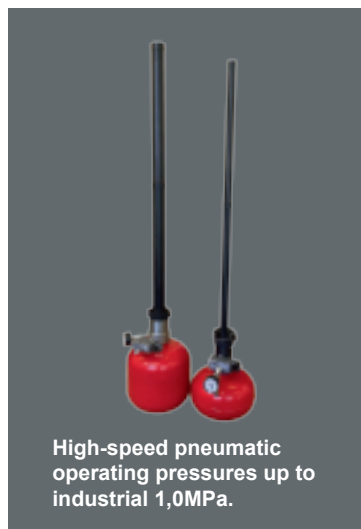


The oldest company in the market of Russia. "ISTA" LLC has won a high reputation. During this time, our products have repeatedly tried to copy, but nobody was able to repeat our individual approach to each customer and quality of our products, so we occupy a leading position in Russia in all our manufactured and services

Full-service company. We develop, produce on its own modern production, patenting, carry out projects, conduct installation and maintenance of our equipment, which allows an individual approach to each client.

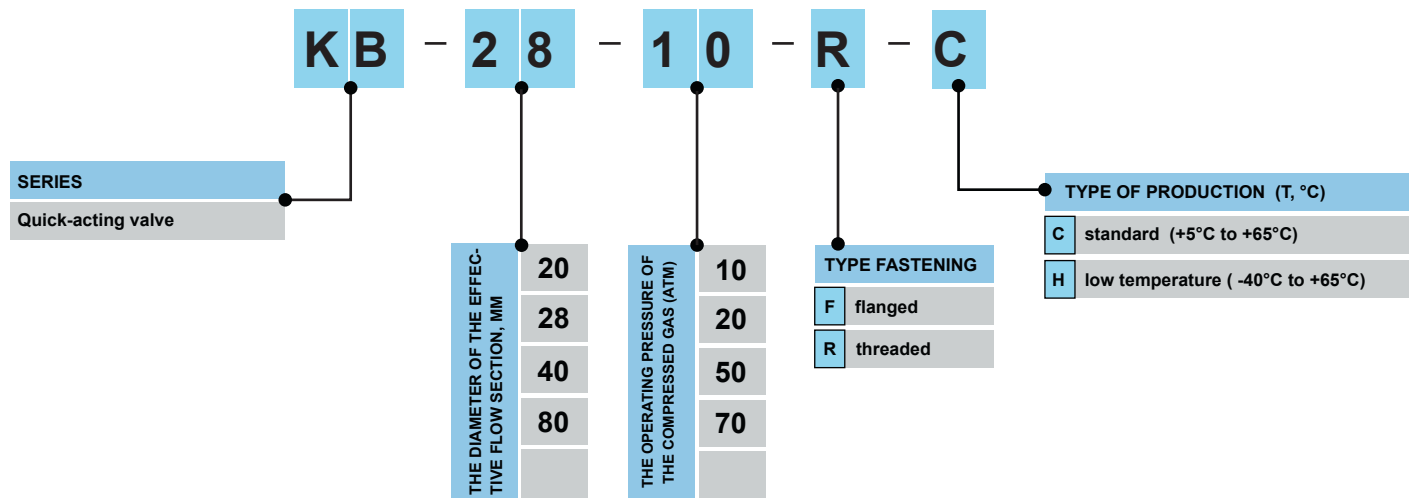
"ISTA" LLC is based in Saint Petersburg State Polytechnic University, which creates a unique opportunity to solve complex technical problems in cooperation with scientists and students.

The above properties of KB series valves helped to



Marking

Marking of KB series valves is: KB is a series of valves; 20, 28, 40 or 80 is the diameter of the effective flow cross section in millimeters; 10, 50, 70, 100 - working pressure of the compressed gas in the atmosphere; "R" (threaded) or "F" (flanged) describes the type fastening; "C" (normal) or "N" (low) - temperature performance standard between + 5 °C or low temperature - from - 40 °C



Basic definitions and characteristics of the KB series valves

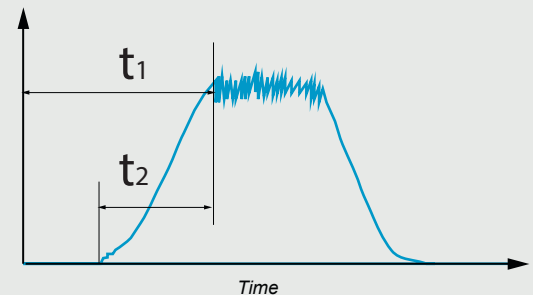
Valve opening time t_1 is the time from the start of the electric control signal to the valve opening. Valve opening time t_2 is the formation of the pressure wave front.

Enviromental Requirements

Work ambient temperture of the valve is: temperature performance standard between +5 °C to +65 °C, or low temperature from - 40 °C to + 65 °C

Requirements to the working fluid - compressed air or inert gas: air handling standard GOST R ISO 8573-1-2005 and according to the international standard ISO 8573-1: 2010 - 7: 2: 4.

Air handling system must ensure the absence of solid particles with diameters greater than 40 micrometers, the dew point of the compressed air should be 10° lower than the ambient temperature.



create the following product lines:

Pneumatic launchers. In particular portable pneumatic rescue linethrowers providing communication during rescue operations, which more than once saved the life of the people.

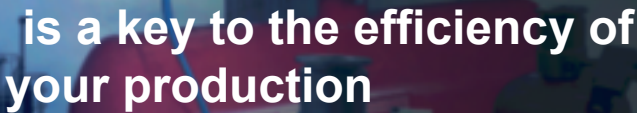


The diaphragmless shock tube for the study of high-speed flows. KB series valves provide experiments with high productivity and repeatability.

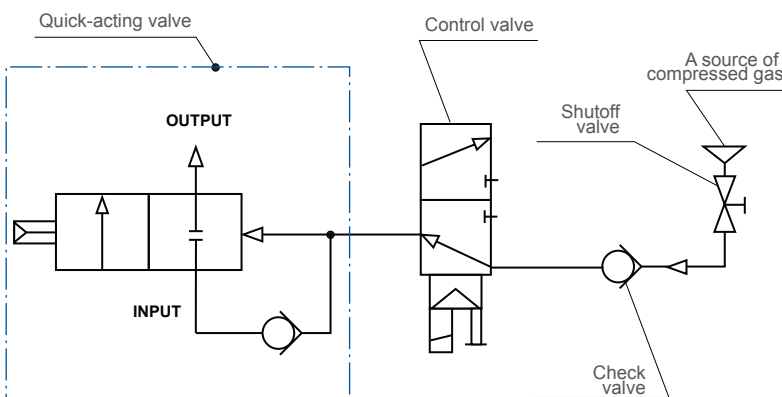
Declogging pneumatic systems for bulk material, hovering in the industrial facilities of storage and transport (bunker silos, viaducts, hoppers).



Vehicles airbag adaptive inflators (cool-smart-airbag). This technology is protected by patents of the Russian Federation, the United States and Germany.



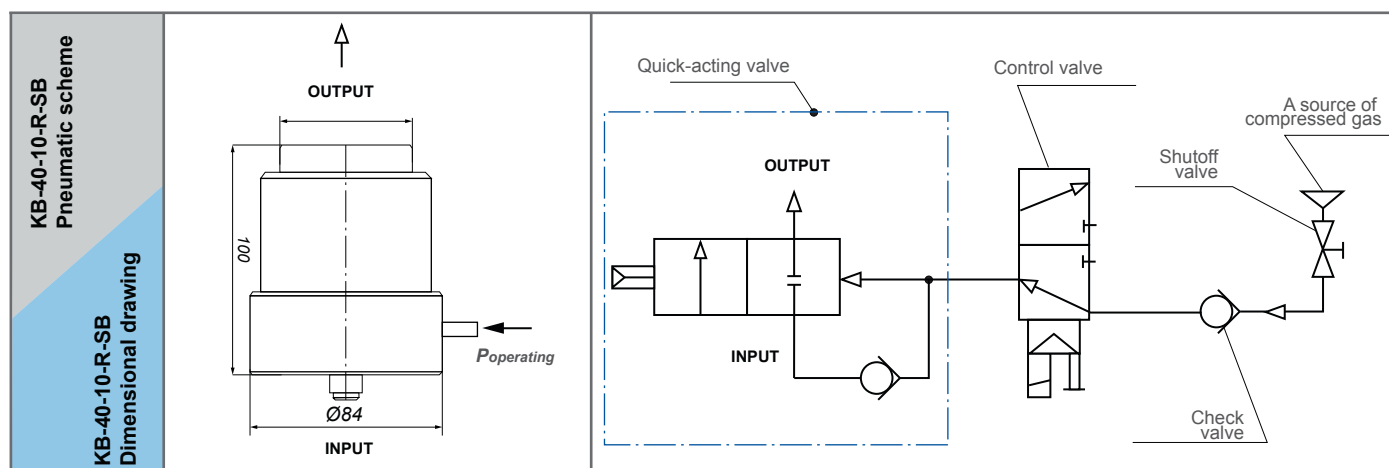
Quick-acting valve KB-28-10-R (Article KB-28-10-R-SB)



KB-28-10 (threaded)
Article KB-28-10-R-SB

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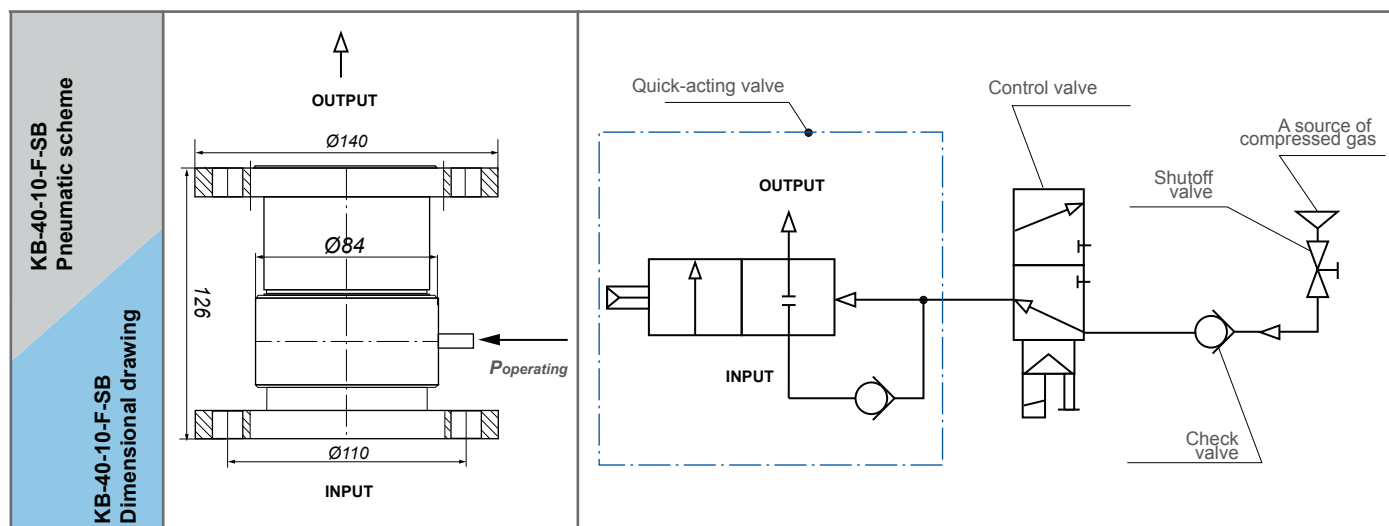
Quick-acting valve KB-40-10-R (Article KB-40-10-R-SB)




Working enviroment	Compressed air, inert gas	Appearance
Diameter of the flow section, mm	40	 KB-40-10 (threaded) Article KB-40-10-R-SB
Opening time of the quick-acting valve, sec	no more than 0.003	
Full opening time of the valve, sec	no more than 0.03	
Operating pressure range, MPa	0.4-1.0	
Control pressure range, MPa	0.4-1.0	
Ambient temperature range, °C	+5C - +65 °C *	
Dimensions without control valve, mm	100X84	
Weight without control valve, kg	~ 1.7	
Parameters of the electric control signal	24VDC; 0.2A/220V	
Minimum pulse width of the control signl, sec	0.2	
Type of mountings	threaded	
Input thread	76X1,5	
Outputt hread	1 1/2	
The thread of control port, inch	1/4"	
Control valve	N.O., 3/2, Q=1000 l/min (ANR)	

(*) – There is KB-40-10-R-N valve (low-temperature construction), with a range of ambient temperaturea from -40 °C to +65 °C.

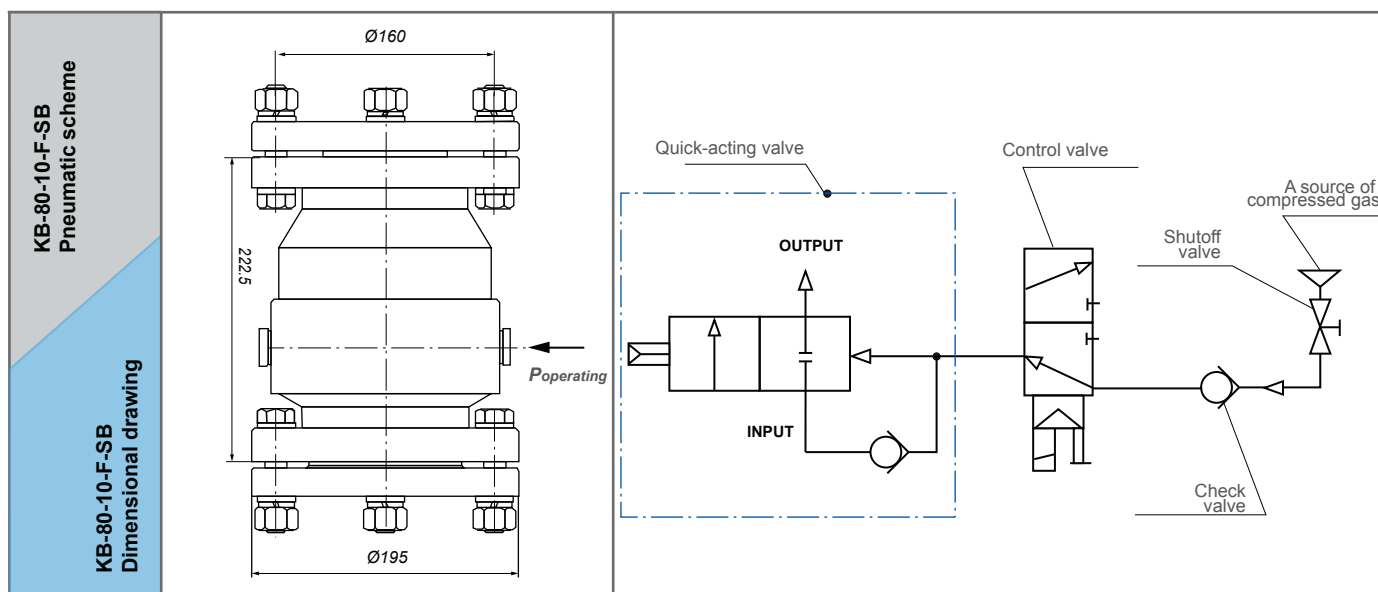
Quick-acting valve KB-40-10-F (Article KB-40-10-F-SB)




Working enviroment	Compressed air, inert gas	Appearance
Diameter of the flow section, mm	40	
Opening time of the quick-acting valve, sec	no more than 0.003	
Full opening time of the valve, sec	no more than 0.03	
Operating pressure range, MPa	0.4-1.0	
Control pressure range, MPa	0.4-1.0	
Ambient temperature range, °C	+5C - +65 °C *	
Dimensions without control valve, mm	126X110	
Weight without control valve, kg	~ 4.3	
Parameters of the electric control signal	24VDC; 0.2A/220V	
Minimum pulse width of the control signl, sec	0.2	
Type of mountings	flanged	
The thread of control port, inch	1-50-6 GOST12820	
Control valve	N.O., 3/2, Q=1000 l/min (ANR)	
		KB-40-10 (Flanged) Article KB-40-10-F-SB

(*) – There is KB-40-10-F-N valve (low-temperature construction), with a range of ambient temperaturea from -40 °C to +65 °C.

Quick-acting valve KB-80-10-F (Article KB-80-10-F-SB)



Working enviroment	Compressed air, inert gas	Appearance
Diameter of the flow section, mm	80	
Opening time of the quick-acting valve, sec	no more than 0.007	
Full opening time of the valve, sec	no more than 0.12	
Operating pressure range, MPa	0.4-1.0	
Control pressure range, MPa	0.4-1.0	
Ambient temperature range, °C	+5C - +65 °C*	
Dimensions without control valve, mm	222,5X195	
Weight without control valve, kg	~ 14.5	
Parameters of the electric control signal	24VDC; 0.2A/220V	
Minimum pulse width of the control signl, sec	0.20	
Type of mountings	flanged	
The thread of control port, inch	1-80-10 GOST12820	
Control valve	N.O., 3/2, Q=3700 l/min (ANR)	
		KB-80-10 (Flanged) Article KB-80-10-F-SB

(*) – There is KB-80-10-F-N valve (low-temperature construction), with a range of ambient temperaturea from -40 °C to +65 °C.



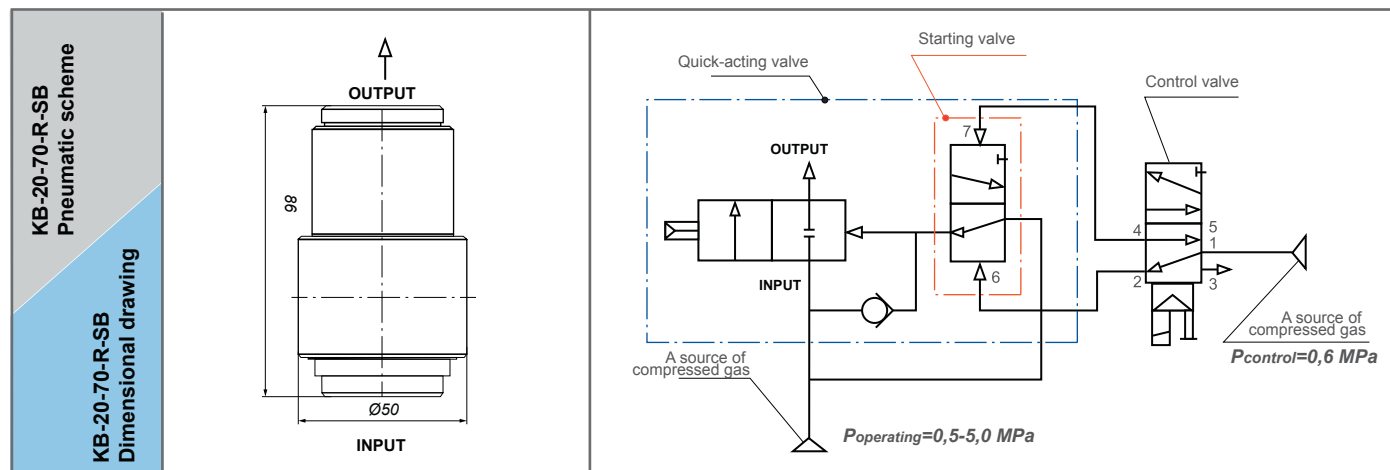
Quick-acting KB series valves

is the exclusive solution for laboratories in the world

The rapidly growing need for fast switching of the compressed stream to a **high pressure gas** in recent years. The new line of valves KB-20-70, KB-40-70, KB-80-50 for a working pressure up to 7,0MPa have almost the same time (opening / closing), as their counterparts KB-28-10, KB-40-10, KB-80-10, designed for industrial pressure up to 1,0MPa.

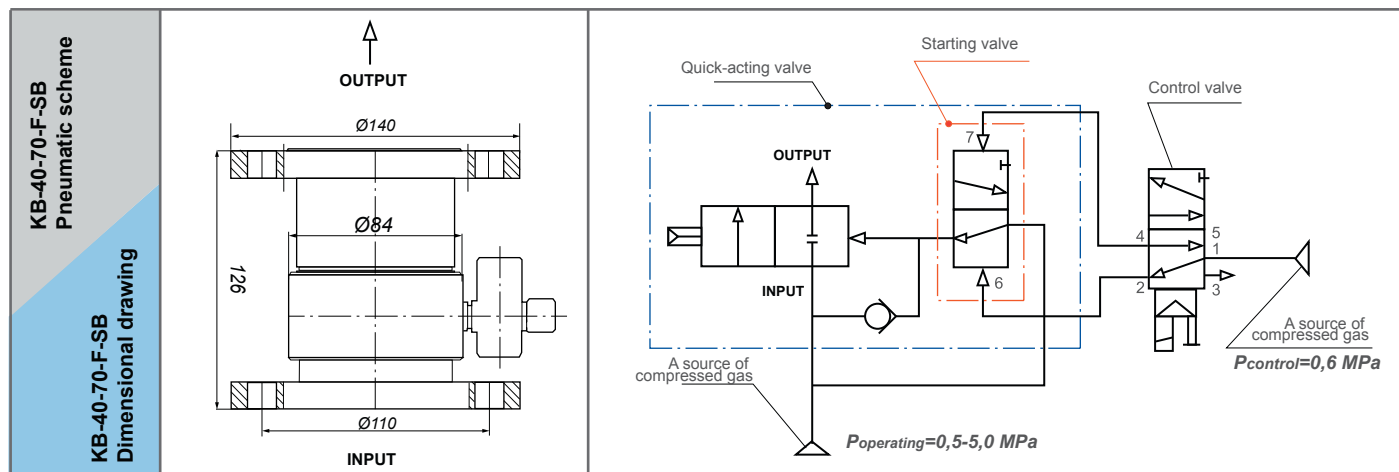
Pneumatic scheme of such valves are shown below. Each of these forms a quick-acting and starting valve (see. diagram below), which is controlled by a standard unified control valve designed to work under pressure to 1,0MPa.

Quick-acting valve KB-20-70-R (Article KB-20-70-R-SB)



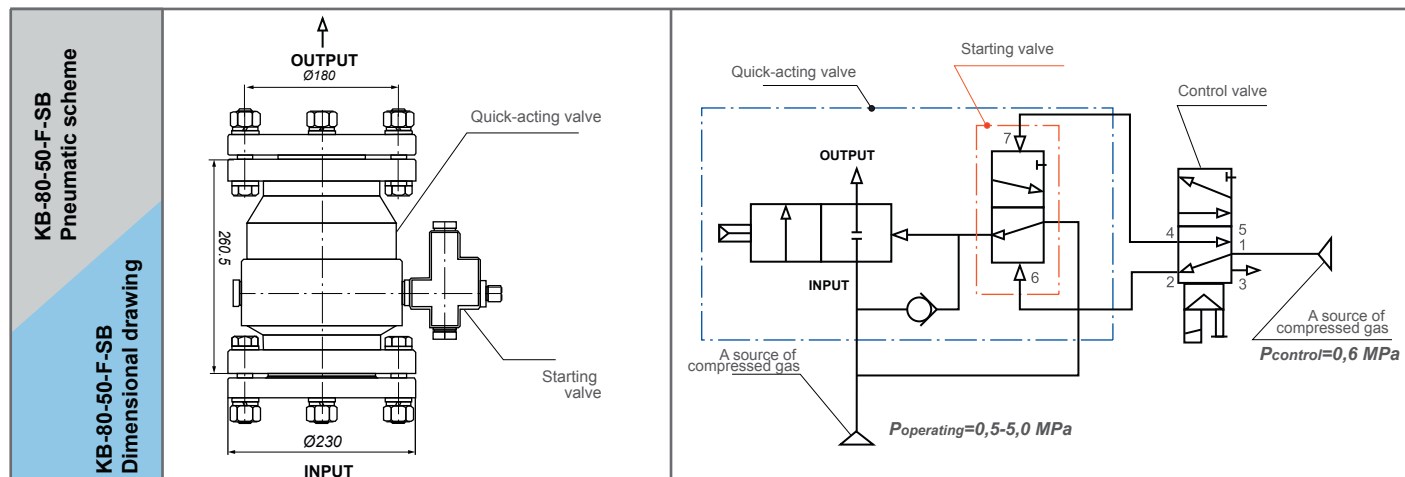
Working enviroment	Compressed air, inert gas	Appearance
Diameter of the flow section, mm	20	
Opening time of the quick-acting valve, sec	no more than 0.001	
Full opening time of the valve, sec	no more than 0.013	
Operating pressure range, MPa	0.4-7.0	
Control pressure range, MPa	0.4-1.0	
Ambient temperature range, °C	+5C - +65 °C	
Dimensions without control valve, mm	86X50	
Weight without control valve, kg	~ 0.3	
Parameters of the electric control signal	24VDC; 0.2A/220B	
Minimum pulse width of the control signl, sec	0.005	
Type of mountings	threaded	
Input thread	M60X1,5	
Output hread	7/8"	
The thread of control port, inch	1/8" 1/8"	
Control valve	N.O., 5/2, Q=100 l/min (ANR)	
		KB-20-70-R (threaded) Article KB-20-70-R-SB

Quick-acting valve KB-40-70-F (Article KB-40-70-F-SB)



Working enviroment	Compressed air, inert gas	Appearance
Diameter of the flow section, mm	40	 KB-40-70 (Flanged) Article KB-40-70-F-SB
Opening time of the quick-acting valve, sec	no more than 0.0025	
Full opening time of the valve, sec	no more than 0.05	
Operating pressure range, MPa	0.4-7.0	
Control pressure range, MPa	0.5-0.8	
Ambient temperature range, °C	+5C - +65 °C	
Dimensions without control valve, mm	126X110	
Weight without control valve, kg	~ 4,7	
Parameters of the electric control signal	24VDC; 0.2A/220V	
Minimum pulse width of the control signl, sec	0.05	
Type of mountings	flanged	
Flange type	1-50-6 GOST 12820	
Port thread: working pressure control ports	M16x1,5 1/4" 1/4"	
Control valve	N.O., 5/2, Q=1300 l/min (ANR)	

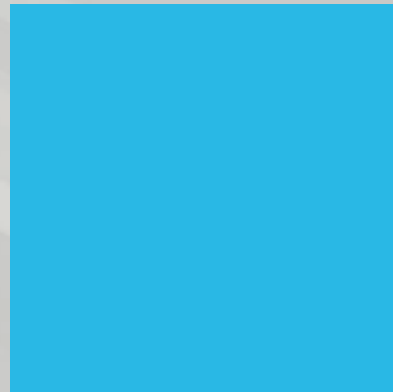
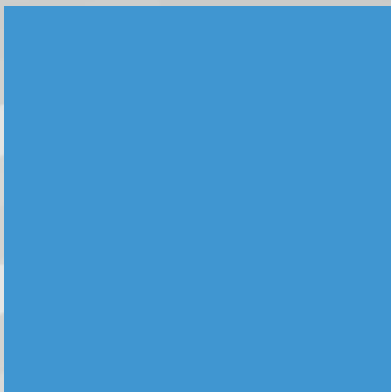
Quick-acting valve KB-80-50 (Article KB-80-50-F-SB)



Working enviroment	Compressed air, inert gas	Appearance
Diameter of the flow section, mm	80	 KB-80-50 (Flanged) Article KB-80-50-F-SB
Opening time of the quick-acting valve, sec	no more than 0.007	
Full opening time of the valve, sec	no more than 0.1	
Operating pressure range, MPa	0.4-5.0	
Control pressure range, MPa	0.5-0.8	
Ambient temperature range, °C	+5C - +65 °C	
Dimensions without control valve, mm	222,5X195	
Weight without control valve, kg	~ 19,3	
Parameters of the electric control signal	24VDC; 0.2A/220V	
Minimum pulse width of the control signl, sec	0.2	
Type of mounting	flanged	
Flange type	1-80-160 GOST12820	
Port thread: working pressure control ports	M16x1,5 1/4" 1/4"	
Control valve	N.O., 5/2, Q=1300 l/min (ANR)	

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