REVALVE
BY PKTBA SINCE 1962

TEST UNIT FOR PSV

Model: PKTBA-S-1-400/40
DN 10 – 400 (NPS 3/8 – 16)
Pmax – 400 bar
Clamping force 40 tons

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Test unit for PSV

Test unit is designed for liquid and gas testing of PSV DN 10 – 400 (NPS 3/8 – 16) according to common international standards:

- Set pressure test of PSVs according to **API 526** and **ISO 4126-1**
- Seat tightness test of PSVs according to **API 527**

Due to modern engineering solutions our equipment meets the requirements of the following standards:

- **API RP 576**
- **ASME BPVC Section VIII**
- **ASME PTC 25**

Parts of the unit are based on the rigid carbon steel platform for easy transportation within the facility or in-field operation by a workshop forklift.

Test unit for PSV

List of proposed equipment

Item	Name	Quantity
1	**Clamping system PKTBA-S-1-400/40** Designed for testing of pressure safety valves with DN 10 – 400 (NPS 3/8 – 16) with clamping force 40 tones	1 ea.
2	**Control station PKTBA-PGS-122ZB-PSV** Provides control of clamping system, LP and HP test medium supply and accurate parameters readings	1 ea.
Optional units		
3	**Computer registration system PKTBA-CRS-M** Designed for on-line recording of the testing parameters and test reports creating	1 ea.
4	**High-pressure compressor PKTBA-UK-3M** Provides a constant supply of high pressure air up to 400 bar for feeding of HP testing systems of control station	1 ea.

Test unit for PSV

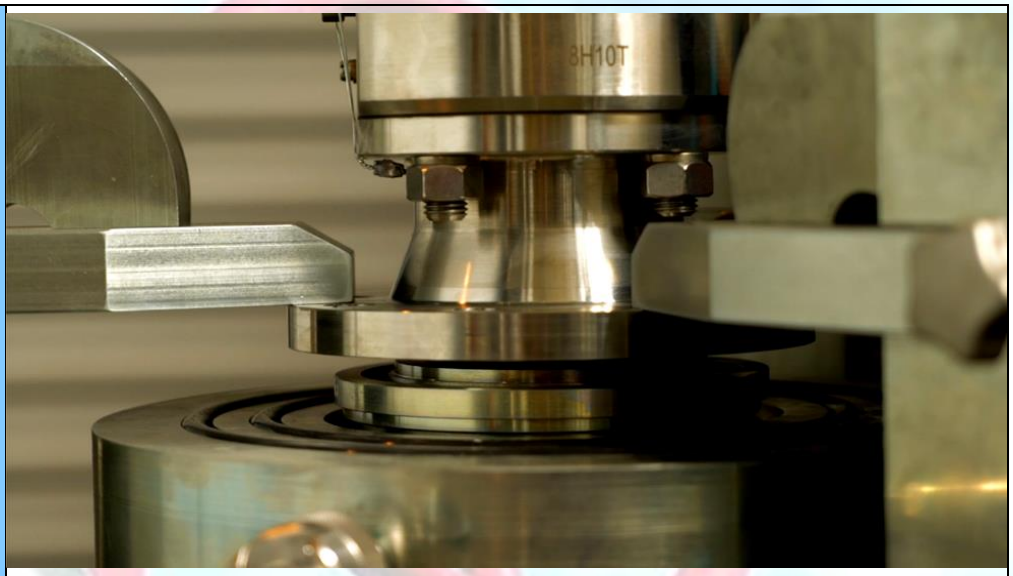
1. Clamping system PKTBA-S-1-400/40-PSV

1	Name	Clamping system **PKTBA-S-1-400/40-PSV**

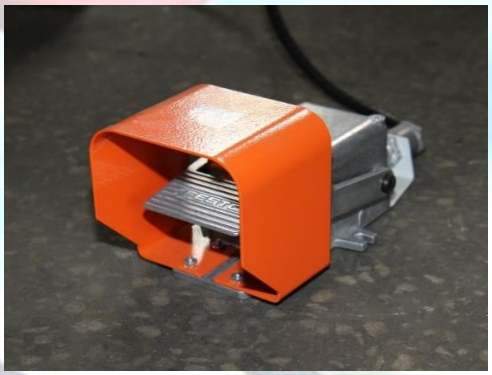
Clamping system general view

2	Description	Clamping system is designed for fast mounting, clamping and testing of pressure safety valves according to common international standards. To fix the tested valve on the system operator should turn the control handle for simultaneous moving of **three claws** towards the valve body.

Test unit for PSV

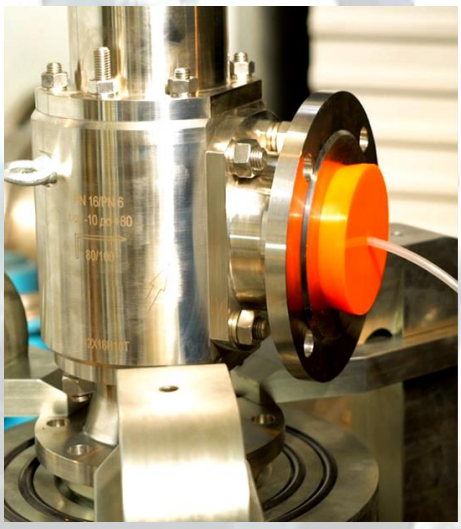


For fast and easy clamping and sealing of the tested valve, test bench is equipped with hydraulic cylinder that is operated from control station or by using foot pedal, located directly besides the bench.



Multi-table installed on the hydraulic cylinder rod allows to test most of standards pressure safety valves with **RF & RTJ** types of flange.

Clamping system has enlarged inner bore of pipes (20 mm) and high pressure hoses to increase air amount released during PSV opening

		for accurate set point determination and smooth spool reseating without any damage to sealing surfaces. Special coating and elements of **stainless steel** are used to provide stable operation both in moderate and tropical types of climate.
3	Types of tested valves	• **RF** flanged pressure safety valves DN 10 – 400 (NPS 3/8 – 16) as per ASME B16.5 • **RTJ** flanged pressure safety valves DN 10 – 400 (NPS 3/8 – 16) as per ASME B16.5
4	Sealing adapters	Set of sealing adapter consists of: • **Stainless steel** multi-tables (Ø340 mm and Ø500 mm) with O-rings for the face sealing of flanged pressure safety valves DN 10 – 400 (NPS 3/8 – 16) suitable for RF and RTJ.  • Rubber adapters DN 25 – 250 (1 – 10") and aluminum DN 15, 300, 350, 400 and 500 (NPS ½, 12, 14, 16 and 18) for flanged outlets for seat leakage test with quick-release couplings for an air/water pipe connection to the leakage detection units for seat leakage test  

Test unit for PSV

5	Leakage detection units	To measure **small seat leakages** of tested valve the clamping system is provided with **bubble and drop counters**. Bubble and drop counters both are provided with spare nozzles as per international standard API 527  
6	Thin claw extenders	To clamp small PSVs, test unit is provided with thin claw extenders that fits between the flange and body of the valves.
	Technical parameters	
7	Maximum test pressure	Maximum test pressure available at the test bench depending on the tested valve size:

Valve inlet size	Maximum test pressure, bar	
DN (NPS)	Liquid test	Gas test
10 (3/8)	400	400
15 (½)	400	400
20 (¾)	400	400
25 (1)	400	400
32 (1 ¼)	400	400
40 (1 ½)	400	400
50 (2)	400	400
65 (2 ½)	400	400
80 (3)	400	400
100 (4)	400	400
125 (5)	250	250
150 (6)	190	190
200 (8)	105	105
250 (10)	70	70
300 (12)	45	45
350 (14)	35	35
400 (16)	25	25

8	Test medium	For gas test – air / nitrogen

Test unit for PSV		
9	Maximum clamping force, tons	40
10	Diameter of the clamped flange (min-max), mm	90 – 580
11	Clamped flange thick-ness (min-max), mm	14 – 115
12	Built-in tank volume, l	155
13	Power supply	Not required
14	Dimensions (LxWxH), mm, not exceeding	1214 x 1123 x 990
15	Weight, kg, not exceed-ing	604

2. Control station PKTBA-PGS-122ZB-PSV		
1	Name	Control station **PKTBA-PGS-122ZB-PSV**

Control station general view with computer registration system CRS-M
Please, note, that diode lighting and glass was made for exhibition purposes, the panel will be white and blank

2	Purpose of the Station	The station is designed for test and control medium high pressure creating, as well as for test process control during clamping system operation. “Gas over water” system is especially designed for PSV testing and accurate set pressure adjustment with increased test volume. For safe shell testing of shut-off valves the station is equipped with air-free HP liquid test system. **Note:** *It is possible to connect a second clamping device to the control station using special commutation box (available upon request)*
3	Description and design features	The control station for both smooth testing and precise adjusting of PSV and safe testing of shut-off valves. The station has module construction and equipped with the following systems:

- **Hydraulic clamping control system**

The pressure up to 250 bar is adjusted manually. Working medium – oil from the control station tank.

- **Liquid and gas “Gas over water” PSV test system up to 400 bar**

The test system up to 400 bar is equipped with **additional test vessels** with volume 4 and 1 L for increasing of test line volume and a DN20 supply hose. Additional test medium volume provides dynamic PSV disc lifting and precise determination of PSV set point, reseat point, provides an accurate re-seating point determination, protecting PSV sealing surfaces from damages while disc re-seating.

System operates using HP gas received from external source (**optional unit 8**) or another gas source, i.e. HP gas vessels or workshop HP gas line. The pressure in the system is limited to the supplied gas pressure.

Equipment complies with following standards: **ISO4126-1, API RP 576, ASME BPVC Section VIII,** which are establishing the requirements for the accuracy of safety valve adjustment, and the **ASME PTC 25-2014** standard, which regulates the speed of the pressure gaining when **90%** of the set pressure is reached.

- **LP air test line up to 7 bar**

Separate test line used for LP testing of PSV/shut-off valves. Uses workshop air as a pressure source.

Manual adjusting by means of LP regulator on the control panel.

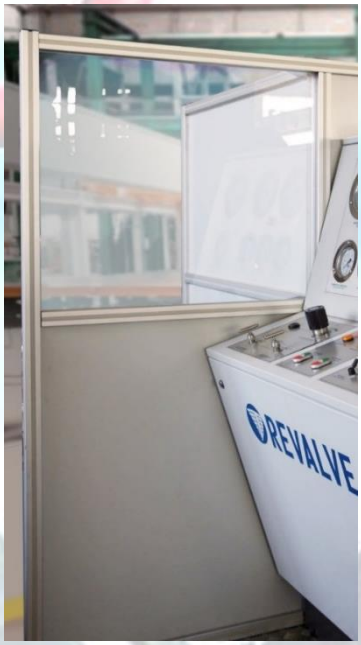
- **Filling line**

This station is also equipped with high-capacity filling pump to fill the valves tested with water. Filling hose is connected to the test table by the special tee.

		All supplied test mediums come through filtration units installed at the station for long term and safe operation of test system and its control elements. Clamping system tank or SOV-0,5 tank are used as a water source.
5	Safety interlock system	Unclamping automatically becomes impossible when a test pressure at the clamping station above **3 Bar** so that yellow warning lamp indicates the presence of test pressure. Also safety interlock system keeps the valve clamped in case of emergency power shutdown.
6	Light signalization	Light signal on the control station automatically indicates that the valve is under pressure and respectively being deactivated when the pressure below 3 Bar. It provides an increased safety level showing an operator and involved personnel being within the testing area that the testing in under process with potential risk applied. 
7	Two hand safety operation	To exclude the risk of unintended pressure increase during pneumatic and hydraulic testing and ensure the safety operation the station is equipped with a safety button. This option ensures HP testing will not be conducted without operator being in unsafe zone. **Principle:** To supply the pressurized medium to the valve an operator is required to push the safety button and hold during HP supply. To limit the air being released at the pop-up point an operator just needs to take off the finger from the button. 

Test unit for PSV

8	Emergency button	The station is also equipped with **emergency stop button** located on the main panel. Pressing “Emergency stop” button stops test medium supply, release it and keeps valve clamped until the button is unpressed. Such buttons are mandatory for many industrial companies. In case of any hazardous situation operator could simply press a button to be sure that no accident appears. 
9	Testing process control	Manual – using the control elements at the main panel of the station
10	Test pressure ranges	**Hydraulic clamping:** 10 – 250 bar, manual adjusting **Liquid and gas “gas over water” testing of PSV:** 0,5 – 400 bar using needle valves and 1L and 4L test vessels **LP air test line:** 0,5 – 7 bar **Filling line:** 3,5 bar
11	Filling pump capacity	Up to 25 nl/min
12	Measuring devices and features	**Liquid and gas “gas over water” testing of PSV**:1x600 bar and 1x160 bar; both Ø 160 (150) mm, accuracy class 0,5; liquid filled **LP air test line:** 1x10 Bar, Ø 160 mm, accuracy class 1, double scale bar/psi, liquid filled
13	Test medium	Compressed air / nitrogen Water / Water with corrosion inhibitor
14	Power supply, V/Hz/kW	230 / 50 / 0,5
15	Installation site	On the concrete foundation
16	Dimensions (LxWxH), mm, not exceeding	1200 x 950 x 2000
17	Weight, kg, not exceed-ing	500
19	Master gauge/sensor sockets	Top panel of the station is equipped with sockets for smart and quick mounting of master gauges (during calibration period) or additional pressure sensors for better accuracy.

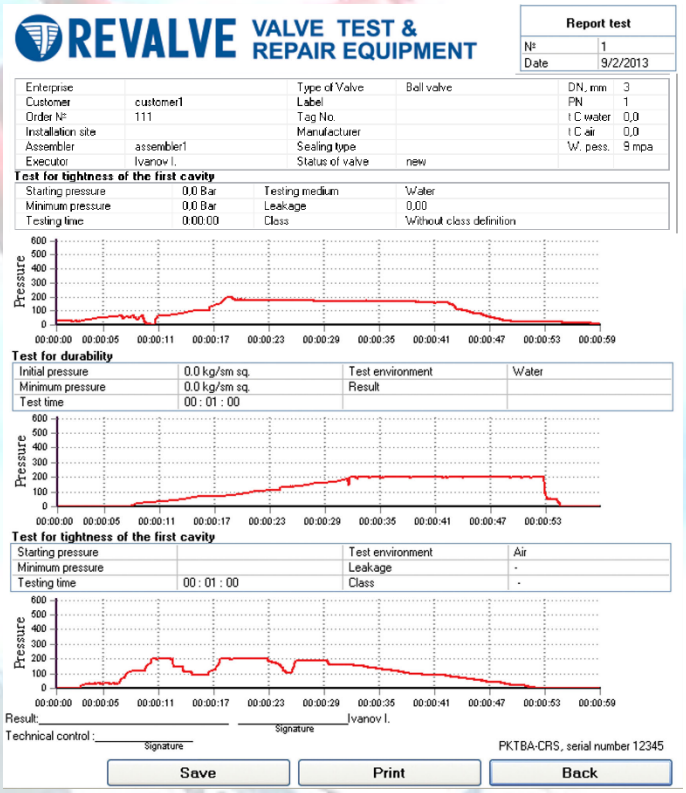
		All sockets has quick release connections to improve switching time and for reliability purposes. If additional pressure sensors are ordered (see CRS options), each sensor is provided with quick release plugs. 
	Options available up on request	
1	**Safety screen**	To increase safety and comfort level the station can be equipped with rigid **safety screen** made of protective transparent 10mm thick material. Especially required if the clamping system is located near the control station and the operator can be affected by splashes during the pressure testing. 
2	**Additional pressure gauges**	To improve accuracy for LP testing, station is equipped with spare gauges. Each ordered gauge is provided with a quick connector. Upon request, option may include with pressure gauges with diffetent nominals: **25, 40, 100, 160, 400 bar** etc. depending on request, 160 (150) mm diameter and accuracy class 0,5.

Test unit for PSV

Optional units

3. Computer registration system PKTBA-CRS-M

1		Computer registration system **PKTBA-CRS-M**

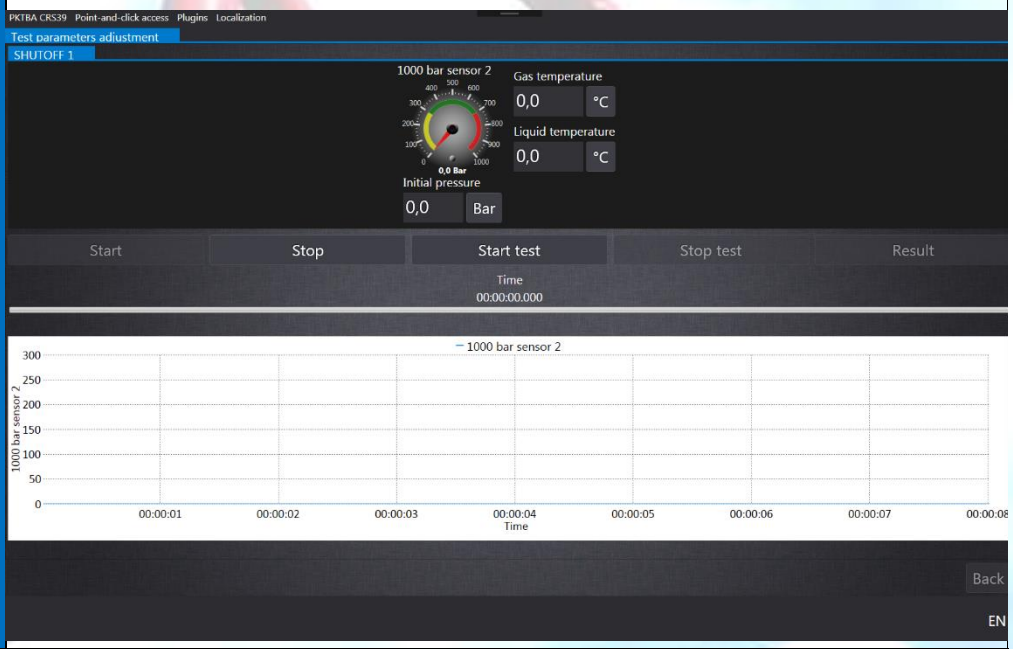


General view of computer registration system and test report

2	Purpose	The unit allows: • to record and store the results of pipeline valve testing, to store the results in the form of protocols at internal memory or company server • to measure leakages through the valve gate • to control test medium pressure during pneumatic and hydraulic tests with error no more than 0,6% • to register shell test pressure and seat test pressure during shut-off and control valves testing
3	Description	Mobile swinging CRS on a rigid bar is designed for continuous test process data measure and monitor, resulting in final test protocol review with immediate test report printing from workshop printing device via Wi-Fi quick connection. (Wi-Fi printer can be supplied is included in the CRS arrangement. CRS serves as automatic data processing unit, displaying test process key parameters as **pressure, leakage rate and temperature** on real-time bases through data and curves being displayed on a 12" **Multi Touch screen** with edge to edge design. Software is provided by integrated **industrial PC** running on

Test unit for PSV

		Microsoft 10 operating system that doesn't require special skills to launch and operate the system. The package can be translated into the required language upon request. The test report fields and protocol head can be customized and easily accompanied by Company logo upon request. The system can be updated and serviced from Revalve IT Department remotely when required.
4	Composition	The unit consists of: • mobile metal frame • 12 inch Multi Touch screen • industrial PC with IP67 ingress protection level and fanless design • peripheral devices (mouse, keyboard) • pressure sensors (2 pcs) • analog/digital converter • optical bubble counter • optical drop counter • communication cables • flash card Micro SD 1 Gb • accessory kit
5	Test pressure measure-ment range	• Sensor 100 bar: 0 – 100 • Sensor 400 bar: 0 – 400
6	Optical bubble and drop counters	• Air optical counter (1 pcs.**): 0-15,0 cm3/min** • Water optical counter (1 pcs.**): 0-12 cm3/min** 
7	Whole unit protection level	IP 40
8	Test protocol	Automatically generated final report with immediate printing feature includes the following lines and could be customized complying with required international codes and internal procedures: • Manufacturer • Company name • Report № • Testing Date • Installation site/location • Valve type • DN / PN • Test medium, time • Leakage

		• Result, and others
9	Test menu example	
10	Power supply, V/Hz	
11	Dimensions (LxWxH), mm, not exceeding	950 x 200 x 650
12	Weight, kg, not exceeding	30

4. High pressure compressor PKTBA-UK-3M (optional)		
1	Name	High pressure compressor **PKTBA-UK-3M**

High-pressure compressor general view

2	Short description	Compressor unit PKTBA-UK-3M is designed to create and provide a constant supply of high pneumatic pressure up to 400 bar for its consumers. Compressor unit can work in manual and automatic mode. 400 Bar pressure is required for proper operation of the high pressure test systems.
3	Compressor station composition	The compressor unit consists of the compressor, placed in the acoustic cabinet and mounted on the unit frame. The receiver is placed on the frame. On the body frame manifold, pressure reducer, gauge panel and control panel are located.
4	Compressor station description	Receiver - consists of two cylinders for high pressure air, which are mounted on a frame welded from steel rectangular pipes. Each cylinder neck is provided with a ball valve for condensate draining. A

Test unit for PSV

		condensate collection unit is installed at the bottom of the cylinder. Cylinders are combined and filled with compressed air up to 400 Bar. Gauge - represents the collector with a pressure gauge installed on it and a safety valve. High-pressure hose - serves to connect the compressor to the receiver through the manometer unit. Adapter - used to connect external air consumers.
5	Initial air pressure	Atmospheric
6	Final air pressure, bar	400
7	Compressor capacity, normalized to standard conditions, nl/min	300
8	Compressor unit cooling	air
9	Receivers volume, l, at least	100
10	Unit supply voltage, V/Hz	400 / 50
11	Unit power consumption, not more than, kW	10
12	Overall dimensions (LxWxH), mm, not exceeding	Compressor – 1350 x 600 x 770 Cylinders – 850 x 345 x 2076
13	Weight, kg, not exceeding	620

Test unit for PSV

GENERAL REQUIREMENTS		
1	Requirements for ergonomics	The design of the equipment should ensure free access to equipment for maintenance and repair. Where necessary, the design of the equipment must be capable of performing the convenience of the labor action with means of individual protection. The design of the equipment should provide the optimum distribution of functions between man and production equipment to ensure the safety and to limit severity and intensity of labor.
2	Safety requirements	The equipment complies with European union technical regulation “On safety of machines and equipment” Directive 2006/42 CE; The equipment complies with European union technical regulation “On safety of low voltage equipment” Directive 2014/35 CE.
3	Reliability requirements	The warranty period of equipment - 12 months from the date of commissioning or 18 months from the date of dispatch whatever is earlier. The total period of operation, taking into account proper service and the replacement of worn units - at least 8 years.
4	Information plate language	Russian / English
5	Operating conditions	Temperature: +5-40 °C Humidity (at + 25ºC): up to 80% (non condensing). Indoor use under the following conditions: • work site should be equipped with a ventilation system; • height above the mean sea level – not exceeding 1000 m; • no shock allowed. The use in conditions of the explosive and electric current conducting mediums or mediums, containing caustic vapors and gases is not allowed.
DOCUMENTATION		
1	Each unit	Passport / Technical certificate (including test and calibration certificates for all installed test pressure gauges and sensors) Operation / Maintenance Manuals CE Declaration

Attention! Dimensions are provided for the reference and can be a subject for amendment during the design phase without changes in the complex performance parameters.
Attention! This is a preliminary version. The set of equipment or it's specification can be altered upon request to meet customer's requirements.

Spare parts, consumables, additional services:

1. Set of spare parts and consumables for 2 years of operation.

Set of spare parts includes all necessary consumables for two years of normal operation of the equipment. Spare parts kit is included to the scope of supply and will be supplied along with equipment.

2. Factory acceptance, testing and supervision during installation and start-up. Training on customer site. Warranty and after sales service.

In accordance with internal QMS system (certified and based on ISO 9001-2015 requirements), our Quality Department will provide FAT program and corresponding agenda upon customer's request for participation in factory acceptance testing of the manufactured equipment before it's dispatch.

All the equipment stated above is certified in accordance with EN 60204-1, EN ISO12100:2010, EN 2006/42/EC, EN 2014/35/EC requirements, supplied with the EU Declaration of Conformity and has the CE Marking.

Upon request, qualified and experienced engineers of REVALVE can perform control over the installation and commissioning of the equipment.

Installation period should begin only after receiving the following confirmation:

- All the equipment is received at the installation site;
- All the installation requirements (procedures, equipment, accessories, qualified personnel etc.) are fulfilled (the list of requirements will be prepared in advance by REVALVE service team).

Under request, our qualified engineers can:

- Supervise the installation of the equipment and its launch;
- Perform the final preparation of the equipment assisting customer personnel.

Personnel training on customer's site:

We assign the utmost value to appropriate customer personnel user-training to ensure safe and efficient running and maintenance of the equipment. We consider that personnel user-training is sufficiently required, especially in cases where the personnel have no experience operating our precise equipment.

The proper study of equipment design features, safe operation requirements and maintenance methods increases the performance of the equipment, and prolongs its service life.

Training can be conducted both in Russian and in English languages.

The expected time period required for start-up supervision, commissioning and training will be determined in a due time upon request.

Warranty and after sales service.

REVALVE provides 18-month warranty after the equipment dispatch and 12-month warranty after the launch date of the equipment at customer site or 18 months since the date of dispatch. The assumed service life of our equipment is 8 years, at least.

REVALVE is a customer-centric company and our assistance policy is based on a long-term partnership with our customers.

We have a full-cycle in-house manufacturing:

- Designing.
- Raw materials preparation treatment;
- All types of machining procedures using high-duty CNC centers (our production facilities;
- account more than 200 machining units);

Test unit for PSV

- Spare parts supplied by the approved world-famous manufacturers;
- Full-cycle paint coating;
- Assembling and testing of manufactured equipment with load 1,5 times exceeding nominal;
- Installation and start-up supervision;
- Comprehensive user-training.

Our customer-centric approach to the support policy ensures a due time spare parts supply and support through all service life of the products.