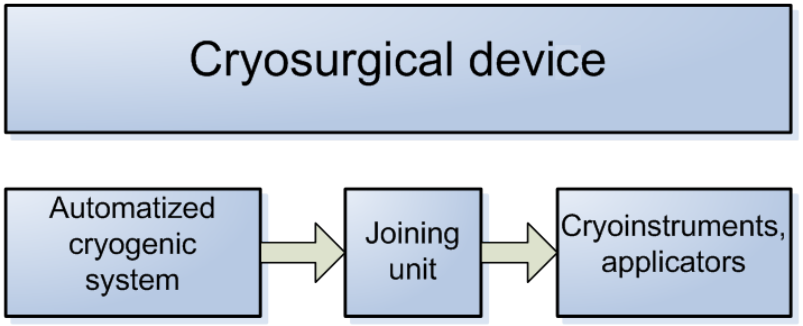
Scientific & Production Firm PULSE

Kiev, Ukraine

Requirements of principle to cryosurgical equipment

Cryosurgical equipment should provide:

- the highest capacity of cooling
- exact measurement of temperature in the contact of applicator and tissue
- full control of cooling and thawing cycle
- wide range of exchangeable probes and applicators of different shapes
- compatibility with modern minimal invasive surgical technique
- simple and safe in use



Structure of standard cryosurgical system

•Cryosurgical system consists of three mainframes: cryogenic system, joints and instruments

•A unique and distinguished feature of Cryo-Pulse cryosurgical system is a universality of the block of joining which allows having an unlimited set of cryosurgical instruments and applicators that can be freely changed during operation

Liquid nitrogen versus compressed gas

The choice of liquid nitrogen as a cryoagent was dictated by the main demand to cryosurgical equipment – to ensure a high capacity of cooling. Possible heat removal from freezing surface.

Comparative data

Liquid Nitrogen	Compressed Argon
17 Watt/cm^2	1-3 Watt/cm^2

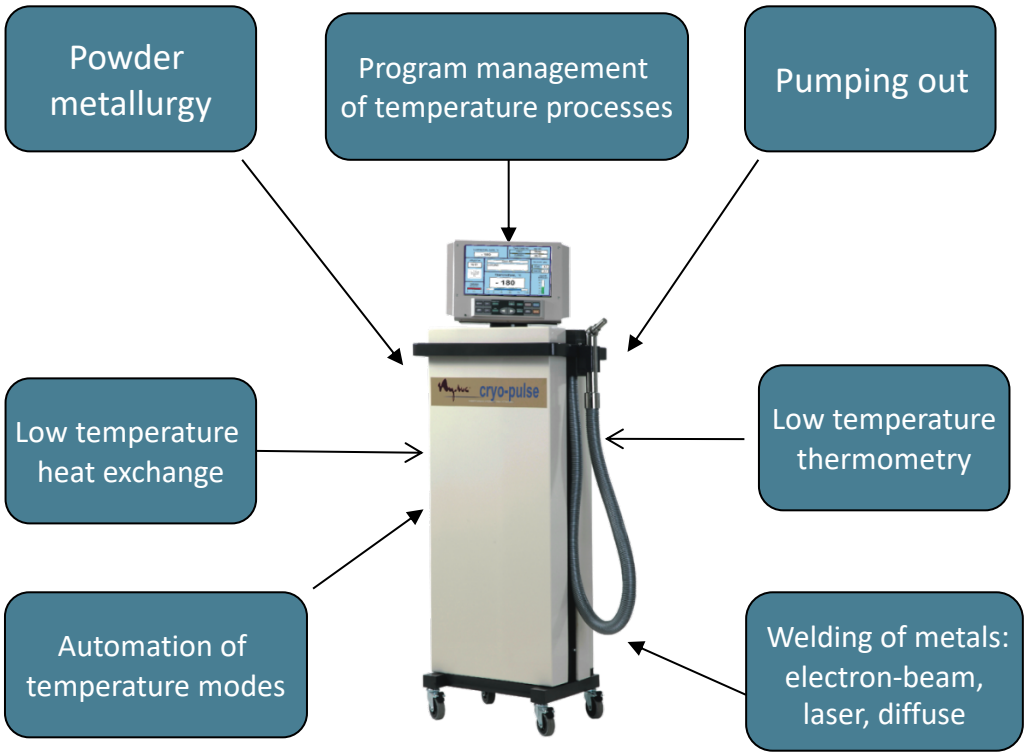
Main difficulties in handling of liquid nitrogen

•A special thermal exchange chamber with optimal liquid-gas phase transition is required to provide a maximum absorption of heat of freezing objects

•The ultra low temperature of liquid nitrogen (–196 oC) requires use of special materials and the constructive elements capable to work in this special environment trouble-free

•Pipelines must be flexible and thermally insulated at the same time
•Connections of cryopipes must be perfect and reliable

Science and Technologies

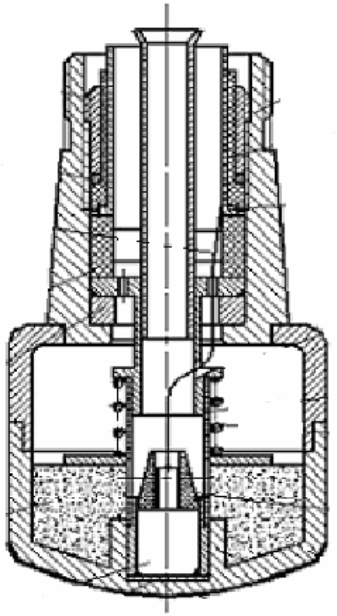


The design of cryosurgical system Cryo-Pulse is based on advanced achievements in the following areas of a science and technology:

- Welding of metals: electron-beam, laser, diffuse
- Powder metallurgy
- Pumping out of the closed volumes for high vacuum
- Ultralow temperature heat exchange
- Ultralow thermometry
- Computing control of temperature in the range from + 20 to -196 °C

Unique developments

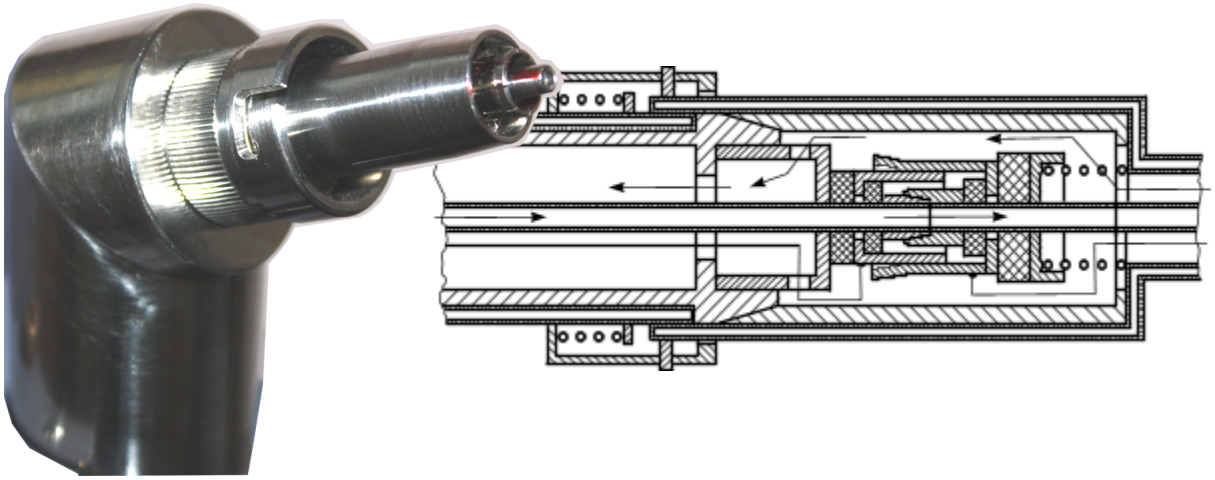
- Superefficient heat-exchange chambers with use of filling structure of a special configuration and variable porosity

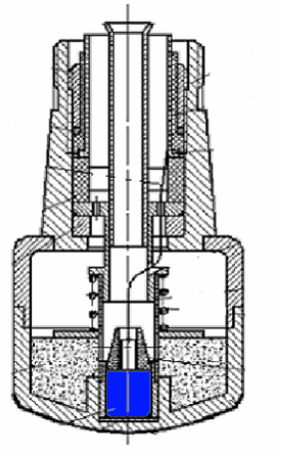


Unique developments

- Unique docking units of cryogenic pipelines with a direct and return stream of liquid nitrogen.
- It allows changing cryo-instruments in few seconds without halting the cryogenic system.

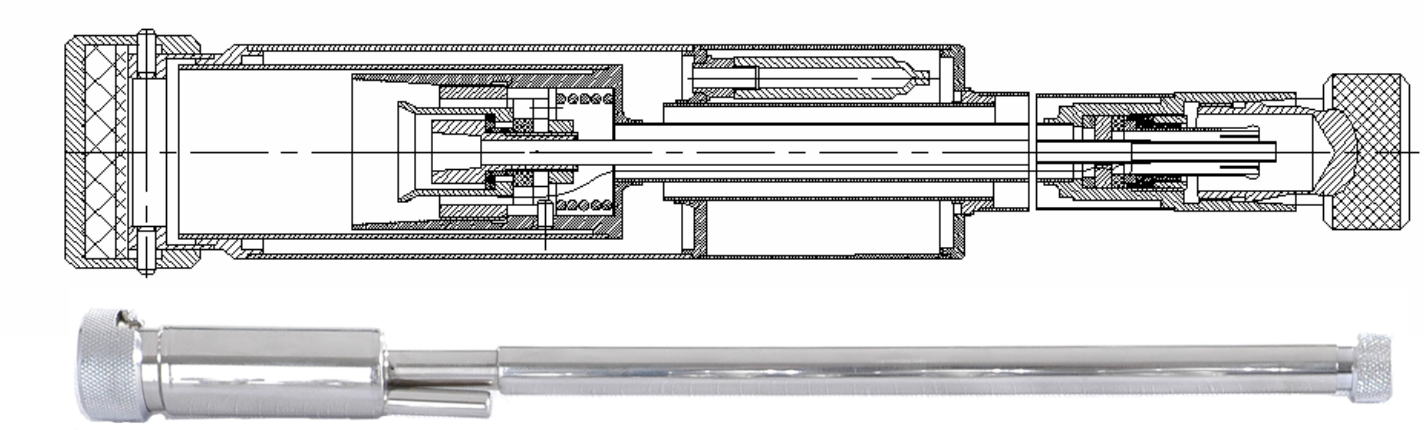
- Low temperature thermos probe directly in a working surface of applicator.
- It allows constant monitoring of a working surface temperature in a contact to freezing tissue with high accuracy



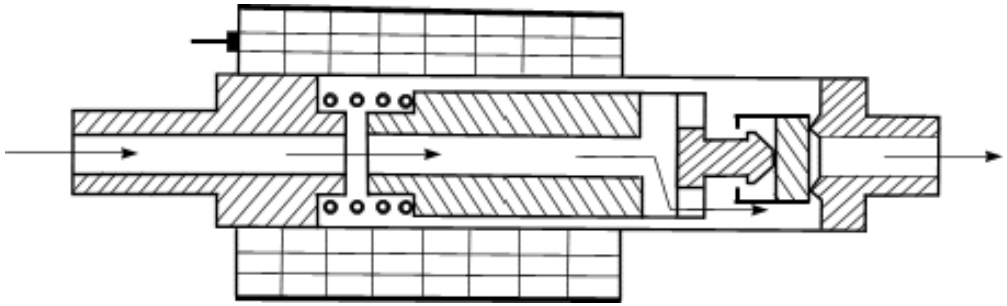


Unique developments

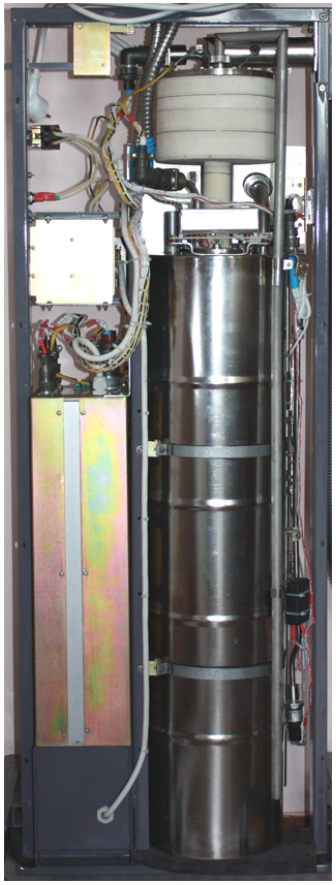
- Vacuum insulated cryo-instruments with ultralow temperature valves and joints



•The unique direct - flow electromagnetic valve works in a range of temperatures +200 – minus 200 oC that does not have analogues in the world



Unique developments



- Cryogenic unit with vacuum insulated cryostat, equipped with measurement system of a liquid nitrogen level and with pressure stabilization in a range from 0,8 to 3,0 Atm.

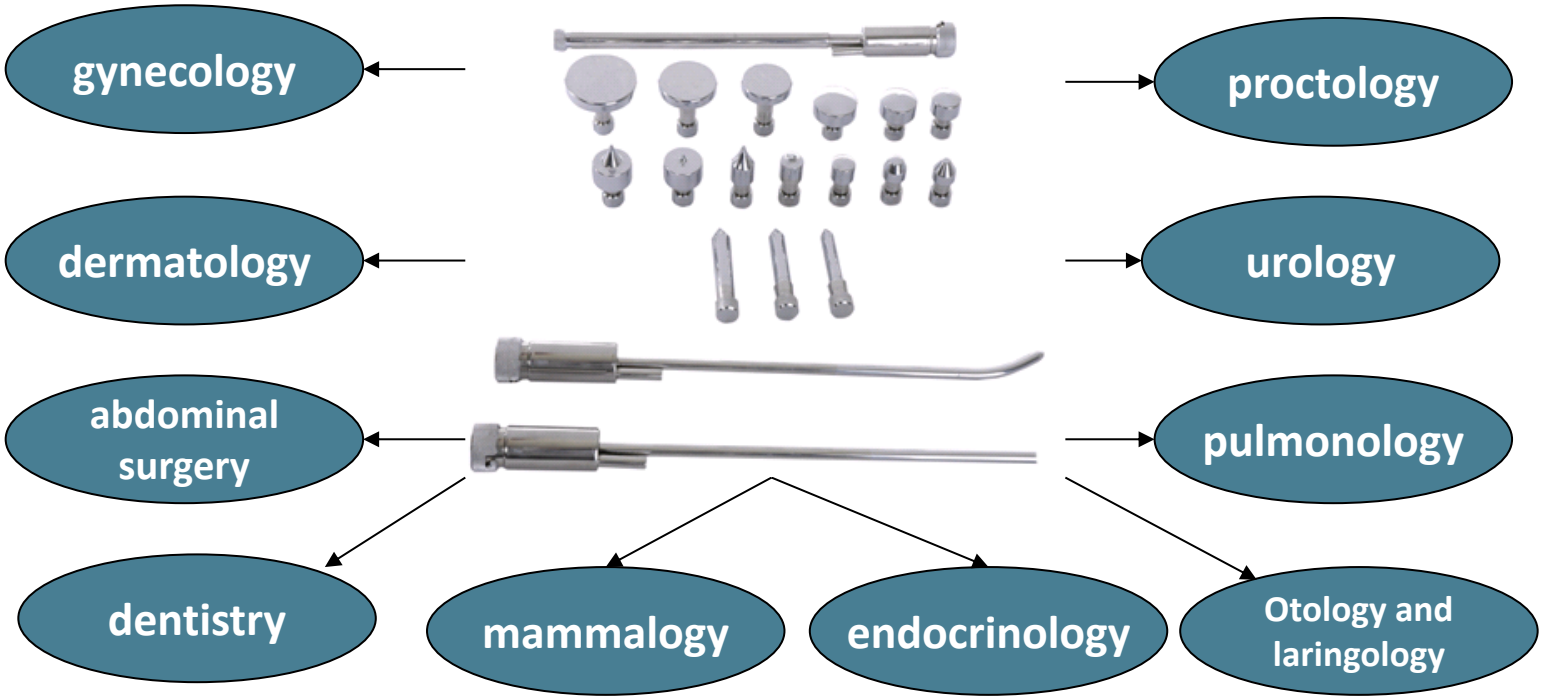
- Flexible insulated cryo-pipe A super-thin basalt fibers are used as an insulation material.

Unique developments

- Automatic loading device for refilling liquid Nitrogen from transport vessel into internal Dewar for 10 minutes

Fields of clinical application

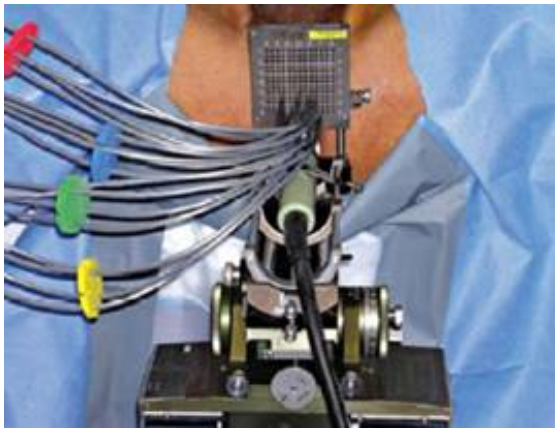
An unlimited set of replaceable cryoinstruments provides a wide range of effective clinical application of cryosurgery in treatment of malignant neoplasm



Advantages of Principle of the Mobile Cryosurgical System CRYO-PULSE

Cryo-Pulse

Cryo 6



Endocare, SeedNet

High capacity of freezing ensures effective destruction of a big and extended lesions using only one probe or applicator that is equivalent to several cryoprobes in other similar devices.

Comparing of characteristics of the cryosurgical units produced by different companies

N	Characteristics	"Cryo-Pulse" Ukraine	"CRYO-, Germany	"CRYOcare CS System", USA, "SeedNet" Israel
1	Cryo-exposure temperature range,^{0}C	0 - minus 180 (in contacts with freezing tissue)	no information	0 - minus 180
2	Applied cryoagent	Liquid Nitrogen	Liquid Nitrogen	Pressurized Argon
3	Frozen zone volume,	**Up to 180 cm3**	diameter	diameter
4	Time of emergency heating, minute	2,0	no information	no information
5	Accuracy of temperature stabilization under cryoexposure,	**± 5**	no information	no information
6	Time needed to be ready for use , minute	no more than 2	2 - 3	1
7	Time of continuous operation under condition of one filling of cryostat, minute	no less than 120 (cryoagent volume- 9 lit.), 0.1 lit/min	30 (cryoagent volume- 47 lit.), 1.5 lit/min	no information
8	Working pressure, atm	**2.5**	15	400
9	Consumed power, W	600	no information	700
10	Size, mm	400x600x1400	550x550x1300	483x635x1245
11	Weight, kg	90	90	52.6
12	Quantity of cryoinstruments and cryoapplicators	**3+16 + on demand**	6	14
13	Fields of application	Oncology (liver, pancreas, gallbladder, rectum, mammary gland, skin, head and neck, cavity; prostate, etc.); abdominal surgery; gynecology; proctology; urology; dermatology and cosmetology; veterinary	urology, liver cancer	urology, liver cancer
14	Attending personnel	paramedical personnel	technical personnel, possessing special knowledget	technical personnel, possessing special knowledge

Economic dimension of modern cryosurgery in comparison with surgery

(International Institute for Cryosurgery, Vienna, Austria)

Oncology	Criteria	Usual surgery	Cryosurgery
Tumor of head of pancreas	Total expenditure on insured accident	7.575	**1.876**
	• Hospital stay duration (on average, solar day)	19,4	**7**
	• Blood transfusion	Several (from 6 to 12 times)	**No**
	• Anaesthesia	General	**General**
	Reanimation stay duration	3 – 7 solar day	**No**
	• Costs • The savings on 1 patient amounted to Euros (low limit)	9.800,-	**3.900,-** **(-5.900,-)**
Breast cancer	Total expenditure on insured accident	5.051	**891**
	• Hospital stay duration (on average, solar day)	12,5	**3**
	Blood transfusion	Several (from3 to 6 times)	**No**
	• Anaesthesia	General	**LA**
	Reanimation stay duration	1- 2 solar day	**No**
	Costs The savings on 1 patient amounted to Euros (low limit)	6.500, -	**2.100,-** **(- 4.400,-)**
Skin cancer	• Total expenditure on insured accident	5.527	**1.605**
	• Hospital stay duration (on average, solar day)	14,7	**5**
	Blood transfusion	Several (from 3 to 6 times)	**No**
	• Anaesthesia	General	**LA**
	• Reanimation stay duration	From 2 to 3 solar day	**No**
	Costs The savings on 1 patient amounted to Euros (low limit)	7.500,-	**3.000,-** **(-4.500,-)**

Cryosurgical Complex

- We designed a concept of Universal Automated Cryosurgical complex to apply cryosurgery almost in all branches of medicine

Mobile
cryosurgical **system**

Portable
cryosurgical **system**

Stationary
cryosurgical **system**

GET IN TOUCH

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