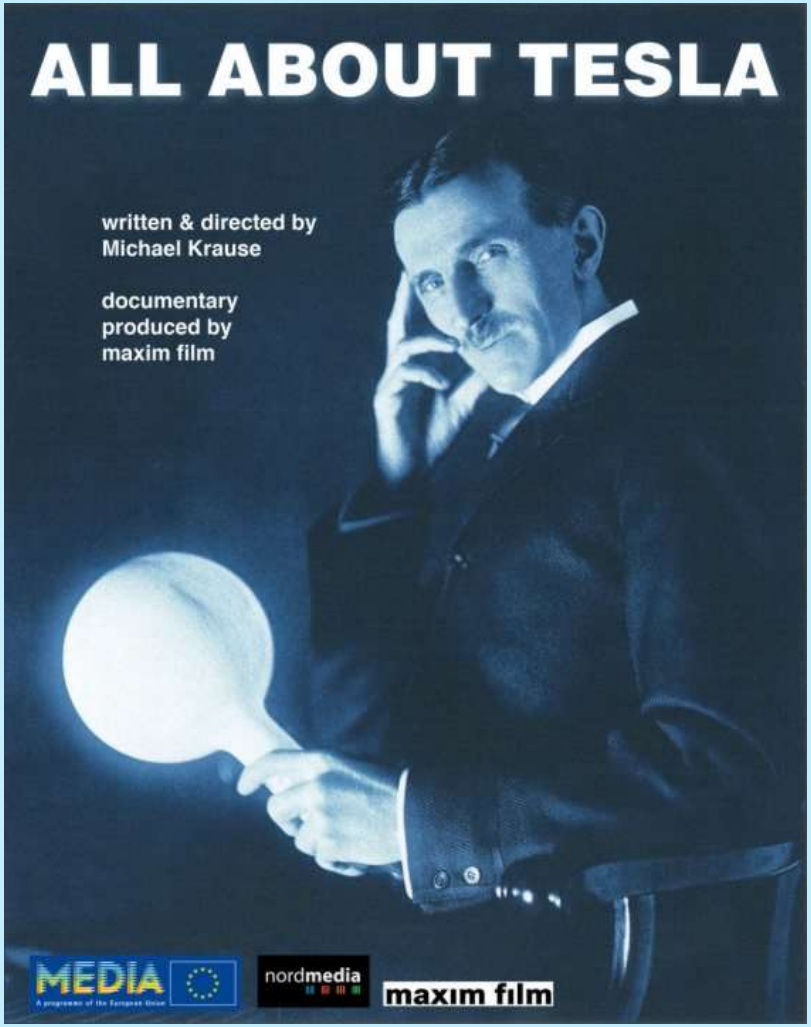
Undamped Hydraulic Energy Generators HEG

Energy conversion with oscillating fluid columns based on ramp pump technology without water losses

Historical reports

Nikola Tesla reported in 1931 that he had realized a drive system which used a new kind of energy taken directly from space.



On July 10th, 1932, Tesla announced in *The Brooklyn Eagle* „I have harnessed the cosmic rays and caused them to operate a motive device."

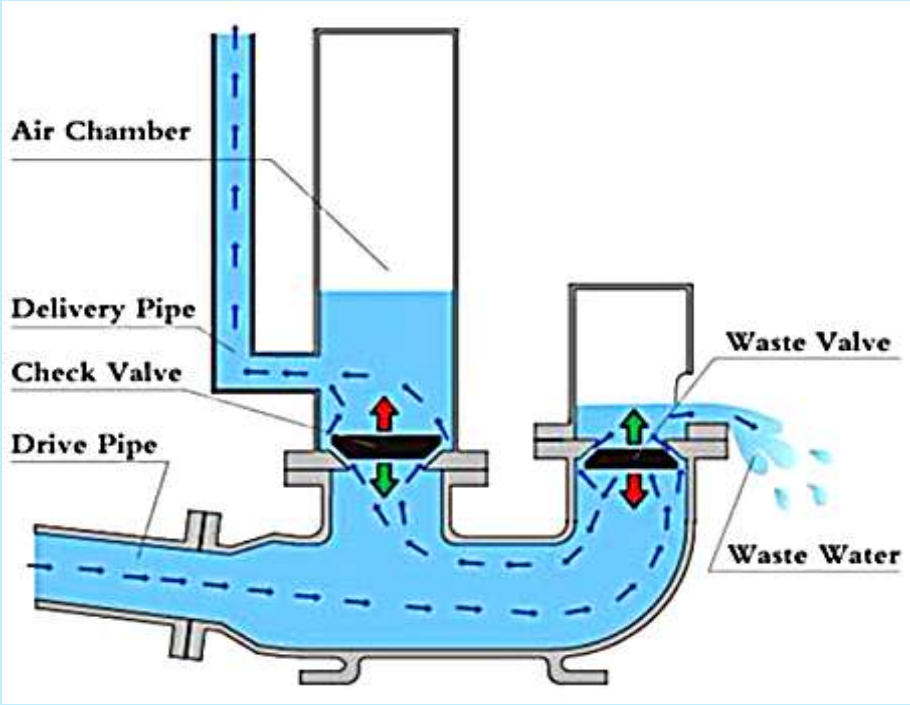
In 1933, he made the same assertion for the *New York American*, November 1st: „This new power for the driving of the world's machinery will be derived from the energy which operates the universe, the cosmic energy ... which is present everywhere in unlimited quantities."

Energy from hydraulic oscillations

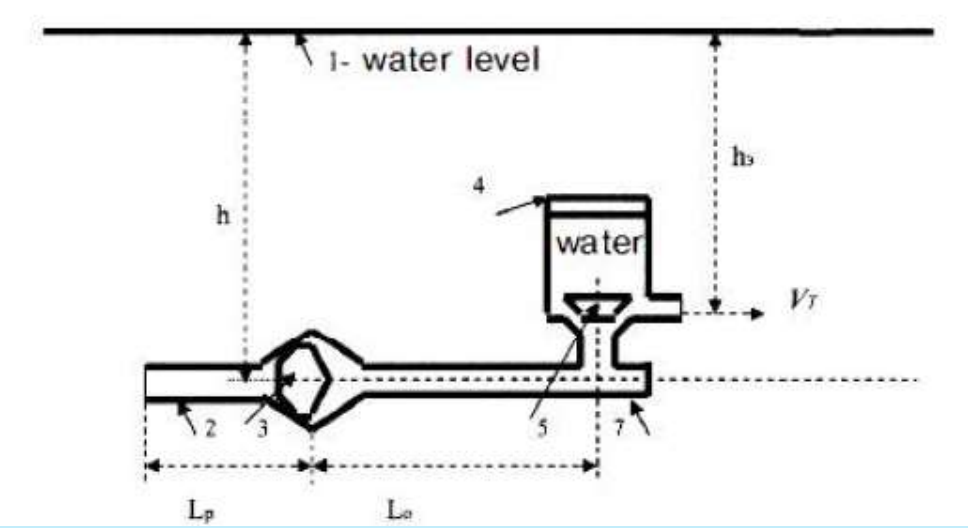
- **The russian inventors** Dr. V. V. Marukhin and V. A. Koutienkov **developed a theory** with 500 formulas **which allowed the design of a new kind of ram pump** with no water losses.
- **The system works autonomously when all** geometrical and dynamic **parameters are** exactly **controlled.**
- The **internal oscillating valve can be** compared to the shutter valve in pulse jet engines, but such engines have a unidirectional gas flow as opposed to bidirectional fluid oscillation in the new undamped hydraulic-pneumatic design.
- The fact that **no waste water is produced** makes it possible that the pumped-up water can be used to generate energy (via turbine and generator) and that the system can operate in a closed cycle.

Comparison with classical ram pump

- **In the classical** hydraulic ram pump pictured at right **there is an inherent water loss** at the waste valve.
- **The** waste water **amount is 10 to 15 times the** amount of **water pumped** into the air chamber.

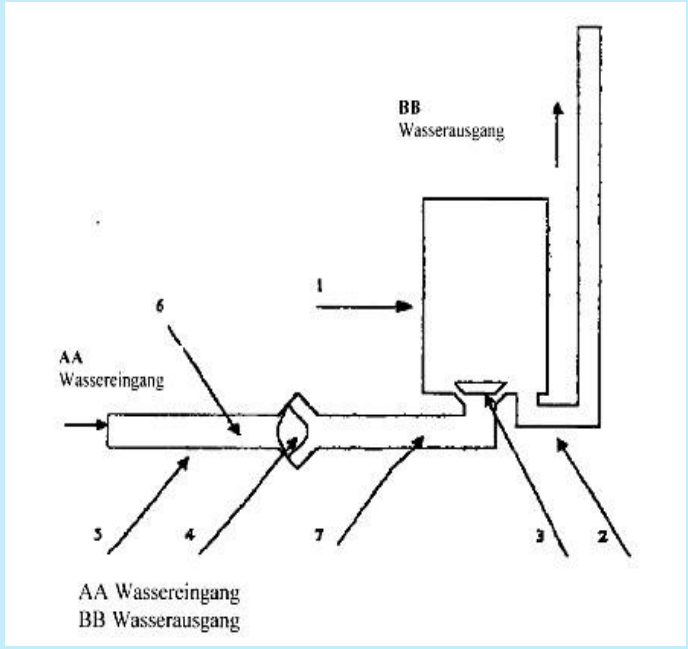


- **In the new** Russian **design** there is **only an internal oscillating valve** between the acceleration and high pressure zone, and **no outlet**.
- Like in the conventional ram pump there is a delivery valve (named ‚Check Valve' in the picture above) at the entrance of the pressure tank/air chamber.



Undamped oscillating ram pump

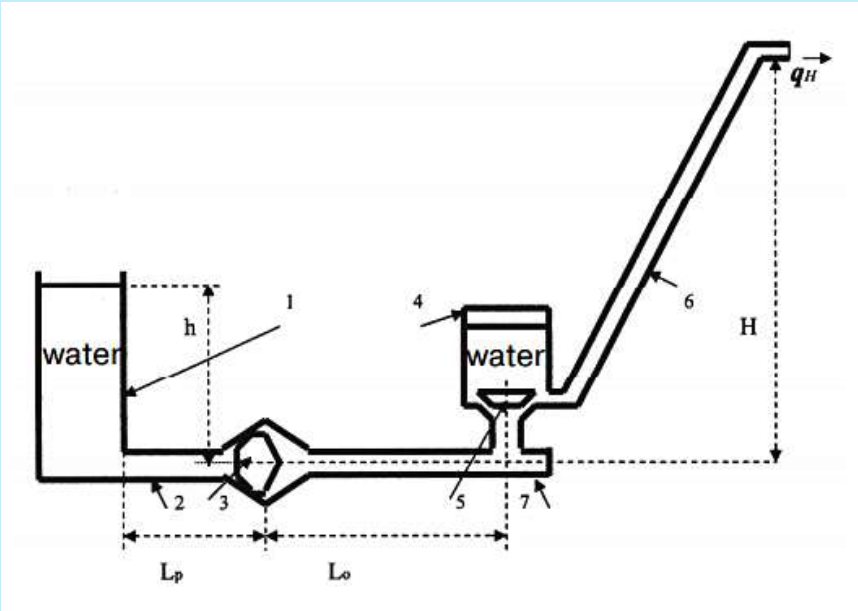
- A non-return valve (4) located at around midpoint of the inflow pipe (5) divides the pipe into **an acceleration section** (6) **and a pressure section** (7).
- When water flows in under pressure from the left, the **blockage from the** closed **delivery valve** (3) **creates** a hydraulic **surge that propagates** backwards from the end of the pipe against the flow of the water.

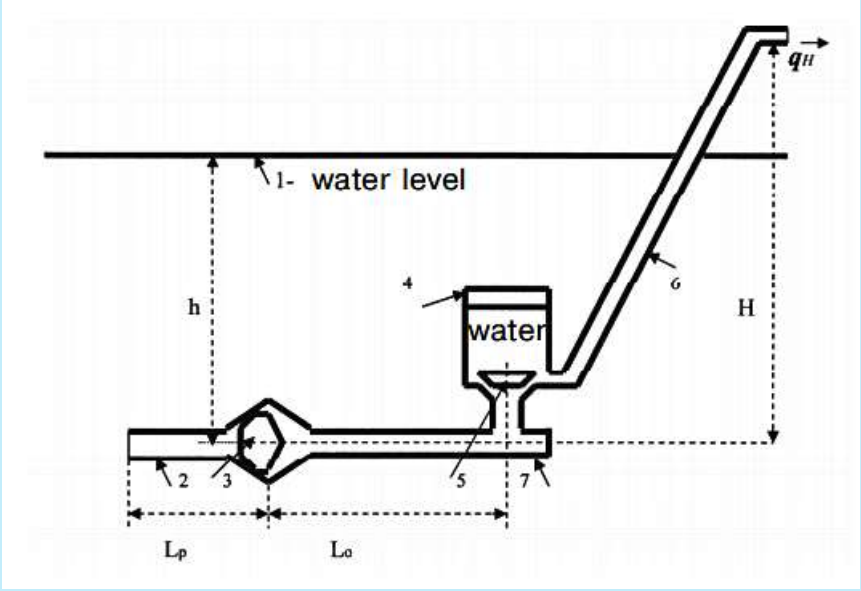


- **On reaching the non-return valve, the compression wave closes it.** After being reflected at the closed non-return valve, the **wave** now **propagates forward** towards the pressure tank/air chamber and **opens the delivery valve, allowing the water to enter the tank**.
- There, the water compresses the present air, and the overpressure the water is subjected to closes the delivery valve. Finally, due to the overpressure in the pressure tank, the **water escapes through the outlet into the delivery pipe** (2)**.**

Autonomously oscillating ram pump

- It follows from theoretical calculations that the **maximum pressure in the pressure tank** is **double the pressure in the inlet** pipe.
- Therefore, the **maximum** accessible **height H** corresponds to 2 h which **is double the height of the water reservoir**.
- The system can also be immersed into an open water reservoir.
- For autonomous operation the depth h must be large enough to provide the initial pressure required for starting the system.
- If that condition is met, **the system starts by itself** and continues to operate **autonomously.**





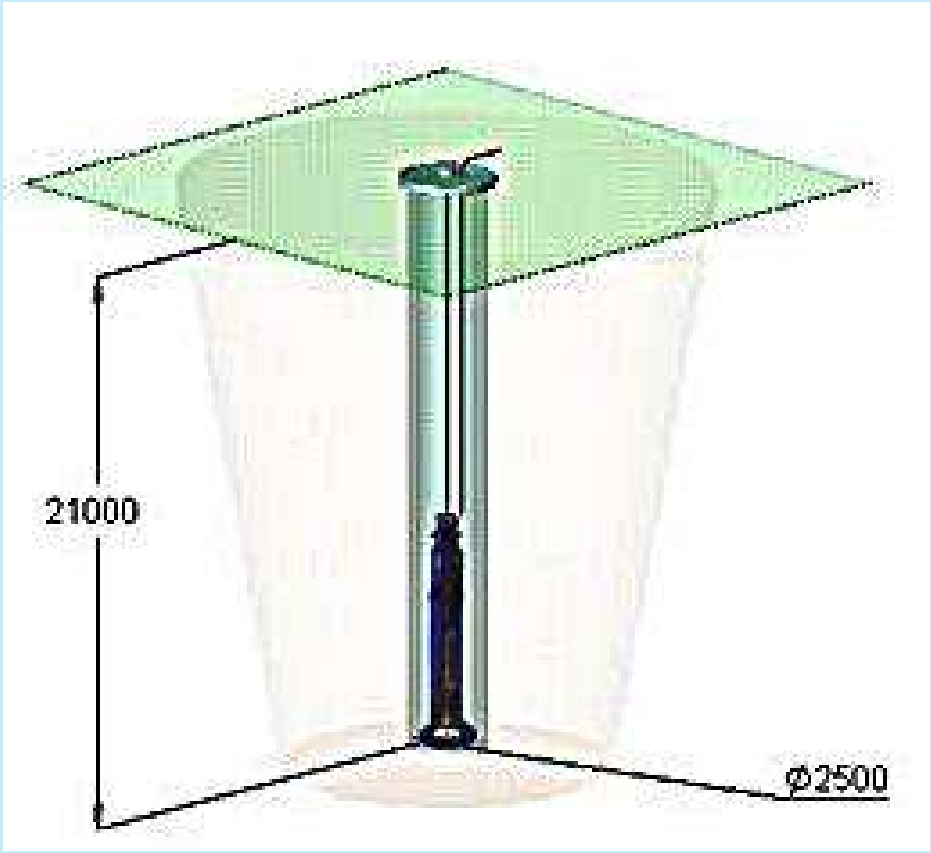
First test of a power system

- In **2003**, a group around V.V. Marukhin built an **autonomous ram pump** system, loaded the system onto a cargo ship and **lowered it by crane to a working depth of 33 m**.
- The measured **power of 93+/ 8 kW** was almost at the calculated nominal power of 97 kW (at 6 kV voltage).

- **The weight** of the system **was 4,840 kg** including turbine and generator. **The system operated day and night, as predicted**.
- borderlands.de/Links/Marukhin-Kutienkov-Ivanov-9-2005-S39-46.pdf

Vertical construction version

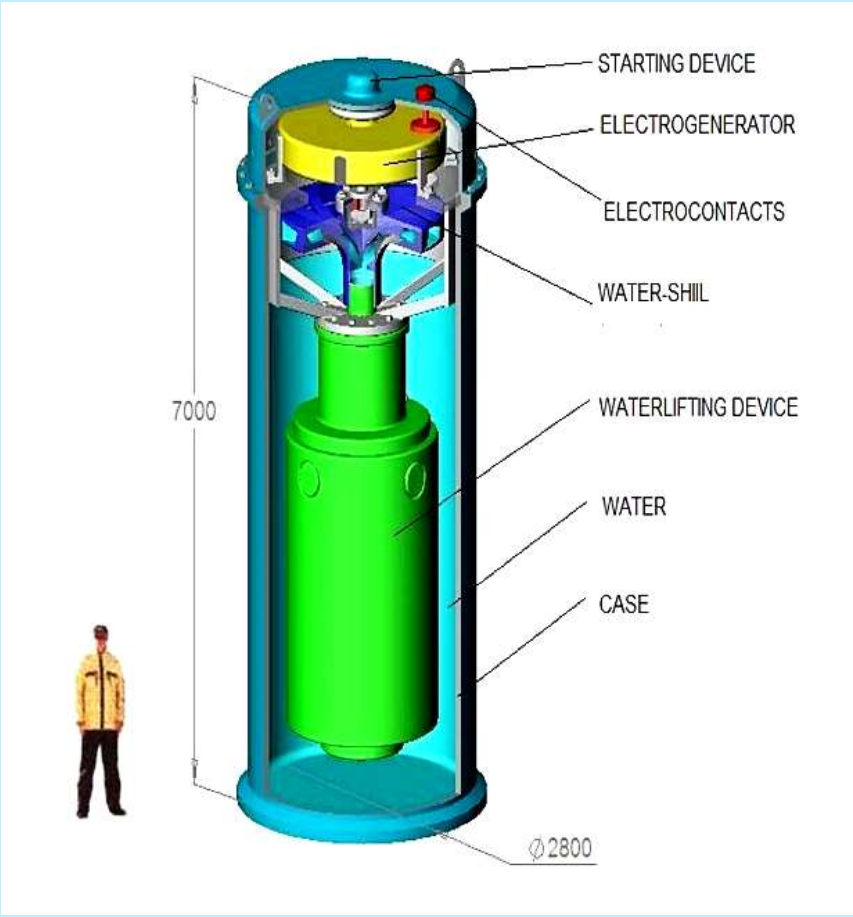
- **Autonomous ram pumps** also **work in a vertical position**.
- The 500 kW systems have a height of 7.5 m with 2.5 m shaft diameter.
- A **well shaft** needs a **depth of 21 m** to provide the water pressure **required** for starting and operating the system.
- **By 2009**, several autonomous ram **pumps from 500 kW to 1000 kW** were **sold in Europe**.



- **The weight** of each module is **6.2 t** including the **electric generator** type IFC4 **from Siemens**.
- The rated voltage of the two-phase current is 6.3 kV.
- The **hydroturbine** PHP-500P from Spain employing the Segner principle **was specially developed** for this application.

Systems for 1000 kW

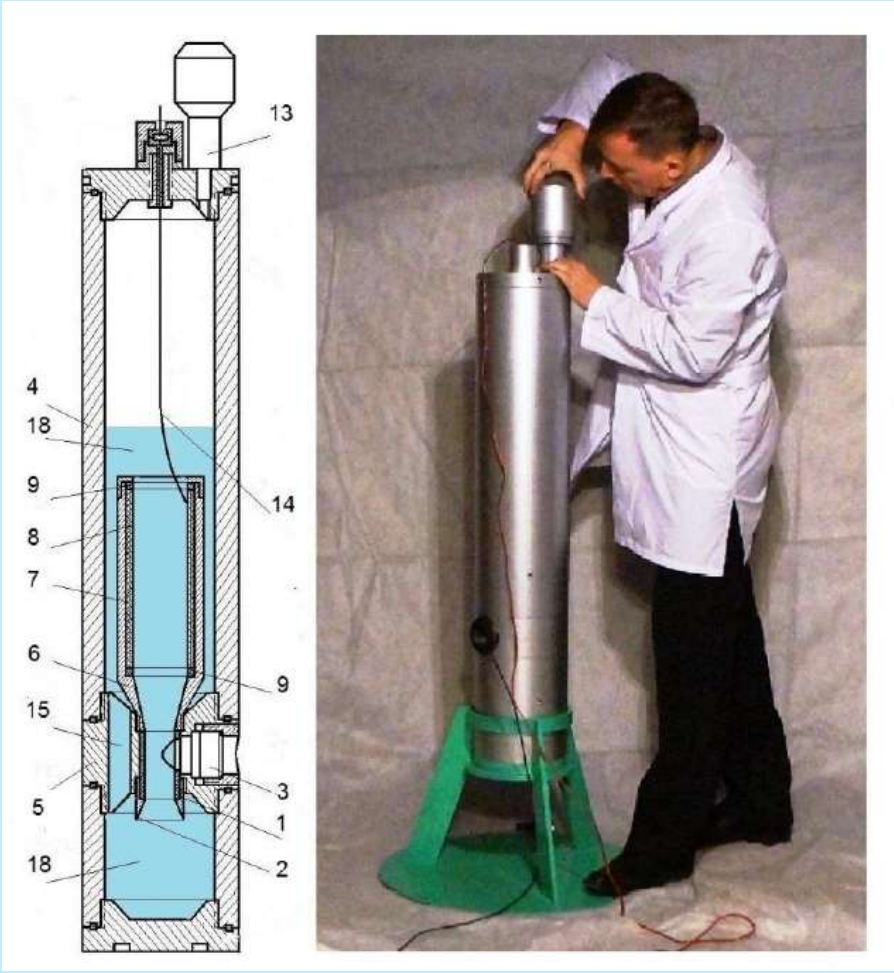
- 1 MW ram pump systems are relatively large.
- They operate with a **pulsation rate of some 15 Hz** and are acoustically well-shielded.
- **They need special turbines (so-called Segner turbines)** to convert the pressure oscillations of the water surges into slow rotation.
- Such turbines are delivered from Russia and have a maintenance-free operation time of 10 years.



- The electric **generators with PM rotors** are sourced **from Israel.**
- **Voltage output:** 380 V+/-19 V**, Frequency:** 50 Hz/+/-2 Hz
- **Mass:** 34 t, **Diameter:** 2.8 m, **Height:** 7.9 m, **Lifetime:** 10 years
- **EU Standard**: ISO9001, **DIN EN 60034-18-42 VDE 0530-18-42**

New developments since 2009

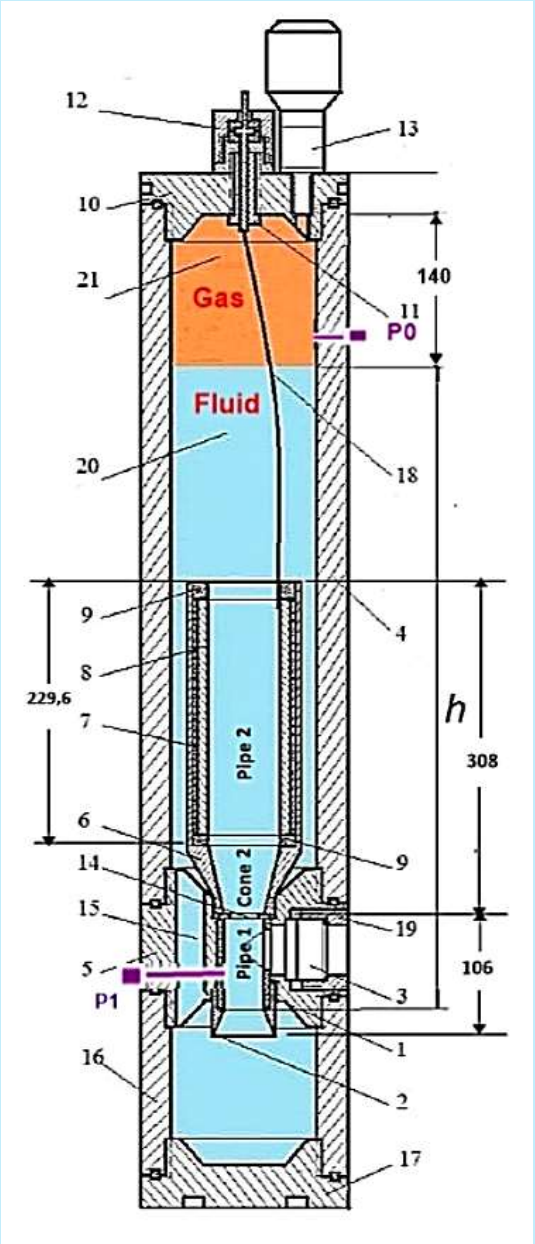
- In a special implementation of the **hydraulic oscillating generator principle** it was possible to **omit any mechanical non-return valve,** incorporating steel tubes of different diameters and lengths in a closed vessel.
- **Such systems operate under high pressure** (3000 bar = 300 MPa) and **with high repetition rates** (3000 Hz).
- The **mechanical energy** of the vibrating hydraulic columns is **converted into electricity by means of the piezoelectric effect.**
- This design of the **Hydraulic Energy Generator** provides up to **1 MW of power** in a steel cylinder of 80 cm in height and 20 cm in diameter.



Function of an autonomous ram pump

- As can be seen from the sectional view, most of the tube is filled with (distilled) water or glycerol, with an air or nitrogen cushion in the upper part.

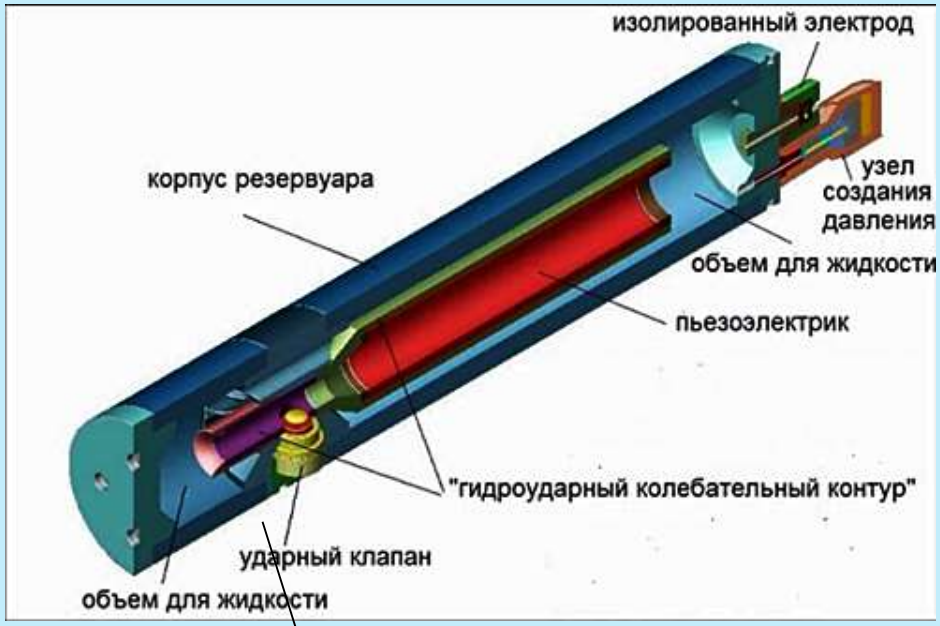
- During operation, **water/air particles oscillate** or vibrate in the inner pipes 1 and 2 with different cross-sections, similar to the classic hydraulic ram.
- **The following process** in the device pictured **takes the role of the valves in the earlier versions: When** dynamically variable **high-pressure and low-pressure zones continuously meet**, cyclic oscillations of the fluid pressure waves are triggered and supported.



http://www.borderlands.de/Links/Marukhin-Ivanov231115.pdf

Autonomously working ram pump

- **The theory** of the «undamped fluid oscillator circuit» **has been published** in several **scientific journals.**
- The fast pressure oscillations are not audible (0.2 dB).
- Their amplitudes are in the sub-mm range.
- The **vibration** process is adiabatic **with no heat losses.**
- **The oscillations** are **triggered** with a «Dirac shock pulse» **in a special percussion valve.**
- http://www.borderlands.de/Links/science_and_world_no_6_34_june_vol_iS1%2B2%2B52-61.pdf.



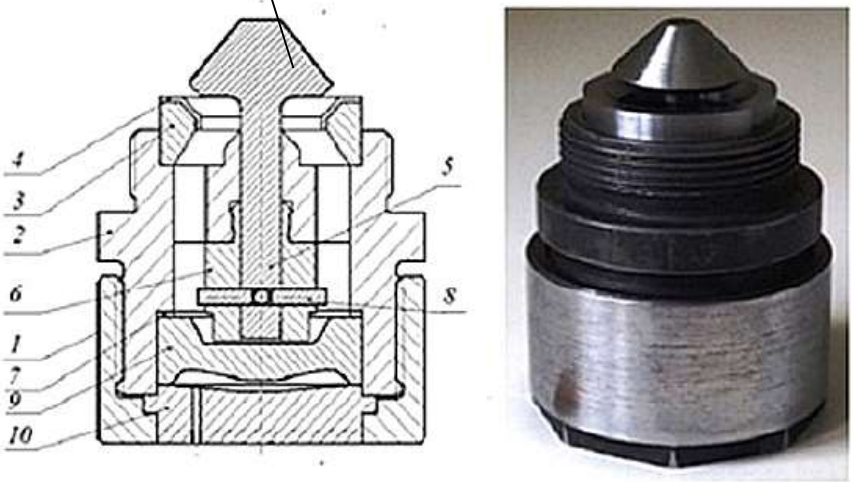
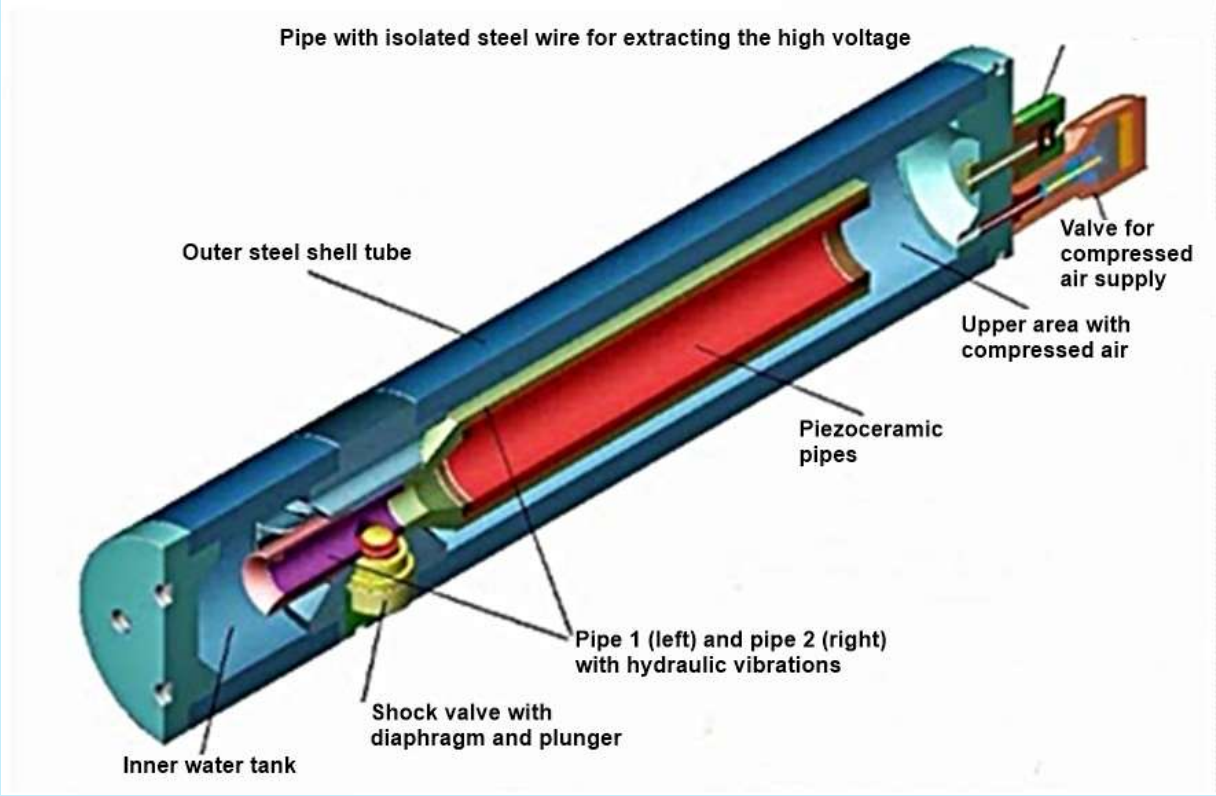


Рис.20. Конструктивная схема и внешний вид ударного клапана

Production licences for this technology

- On 30 January, 2014, V. V. Marukhin received Eurasian patent EA019159 (B1).
- The theoretical power lies between 65 kW and 65 MW.
- The maximum **power depends** on the size **and internal pressure** of the systems.



- V. V. Marukhin has reported that several **dozen systems of different sizes and power** have been **licensed in Russia and Europe** (as per 2016). The **name and location of the companies** which already use his technology in the industry **cannot be disclosed** for understandable reasons of secrecy.

Meeting with Dr. V. V. Marukhin in Moscow

- **In** a conference room of **the Marriott Courtyard Hotel in Moscow, Dr. V. V. Marukhin,** accompanied by an engineer from the Moscow company, Future Energy, **explained the theory of his highly advanced energy technology** with help from a professional interpreter (Russian into German and vice versa).
- **Numerous technical questions were clarified** during the intensive discussions (July 2016).

20 kW device EGM-YPHP20SP-B

- V. V. Marukhin developed also a small 20 kW device in the size of a Coca-Cola can.
- The license was sold in Feb-ruary, 2016 to a non-civilian group in Europe.
- This very expensive device is not commerically available.

Presentation of the components

Link to demos: www.borderlands.de/Links/Cola-Device.pdf

Visit to a test laboratory of the RAS

- The **1 MW device** shown **at** the Russian Academy of Sciences **RAS** is used **for training purposes**, but was not in operation.
- For a 1 MW unit to go into operation, the **hydraulic oscillations must be triggered by shock** from an explosion.
- Beforehand, the steel vessel is put under the **required mean operating pressure.**

- This is **carried out through an upper valve** in several steps by means of small explosions of powder or a high-pressure vacuum pump. Depending on the desired maximum output, the average pressure is **2,000 – 3,500 bar**.

Visit to a test laboratory of the RAS

- **The impulse shock** required to trigger the undamped hydraulic high-pressure oscillation **is initiated by a small** circular, electrically ignited **powder charge** (1–2 g of gunpowder).
- **A special** laterally screwed-in **percussion valve was designed** for this purpose. The "shot" takes place in an explosion chamber.

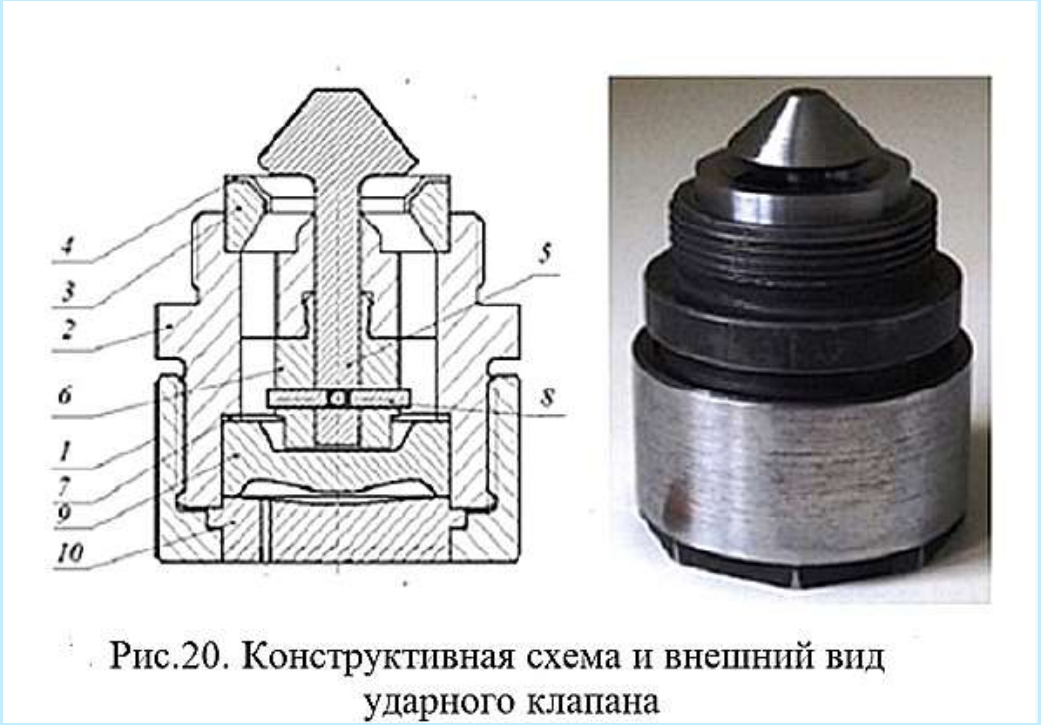


Рис.20. Конструктивная схема и внешний вид ударного клапана

Video showing the starting process

Preparations for launching a 144 kW generator in the test room of the RAS, Moscow. **Explanations** given **by Dr. V. V. Marukhin.**
The generator has a percussion valve in which a diaphragm is blown by a powder charge, and the pressure pulse from the explosion triggers the hydraulic oscillations.

https://disk.yandex.ru/d/2IkSf910hVeiG (russian)
https://disk.yandex.ru/d/9CN509gHhoWgq (english)

Gunpowder into the percussion valve

Gunpowder filling on the diaphragm of the percussion valve.
Video sequence: 40:55/51:52

Screwing the end cap with ignition wires and the lock nut onto the percussion valve. Video sequence: 41:04/51:52, 41:30/51:52

Screwing the upper to the lower cylinder

Placing and screwing the upper part of the tube onto the lower part. Video sequence: 41:46/51:52

Lashing of the upper part to the lower part with a specially-made tool.
Video sequence: 42:01/51:52

Valve for gas injection under pressure

View of the upper part with valve through which the gas is injected to create the required pressure by means of successive electrically

triggered powder explosions.
Video sequence: 41:42/51:52 and 42:38/51.52

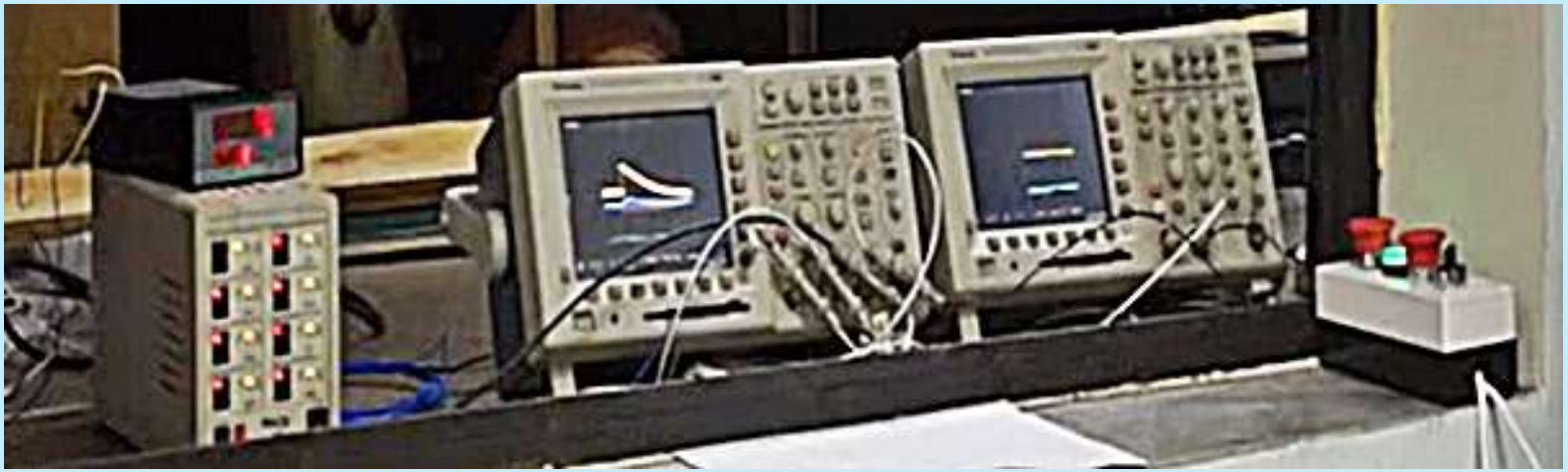
Preparation of the tube for the starting process

Marukhin screwing in the side-mounted percussion valve. 42:45/51:52

Tightening the upper valve with a large wrench. 43:36/51:52

Digital recording of the start explosion pulse

Electric remote triggering of the hydraulic pressure surge to initiate the starting process. Asymptotically decaying voltage pulse as recorded by the pressure measuring probe in the upper gas-filled part of the Hydraulic Energy Generator HEG. Video sequence: 050:/2:04

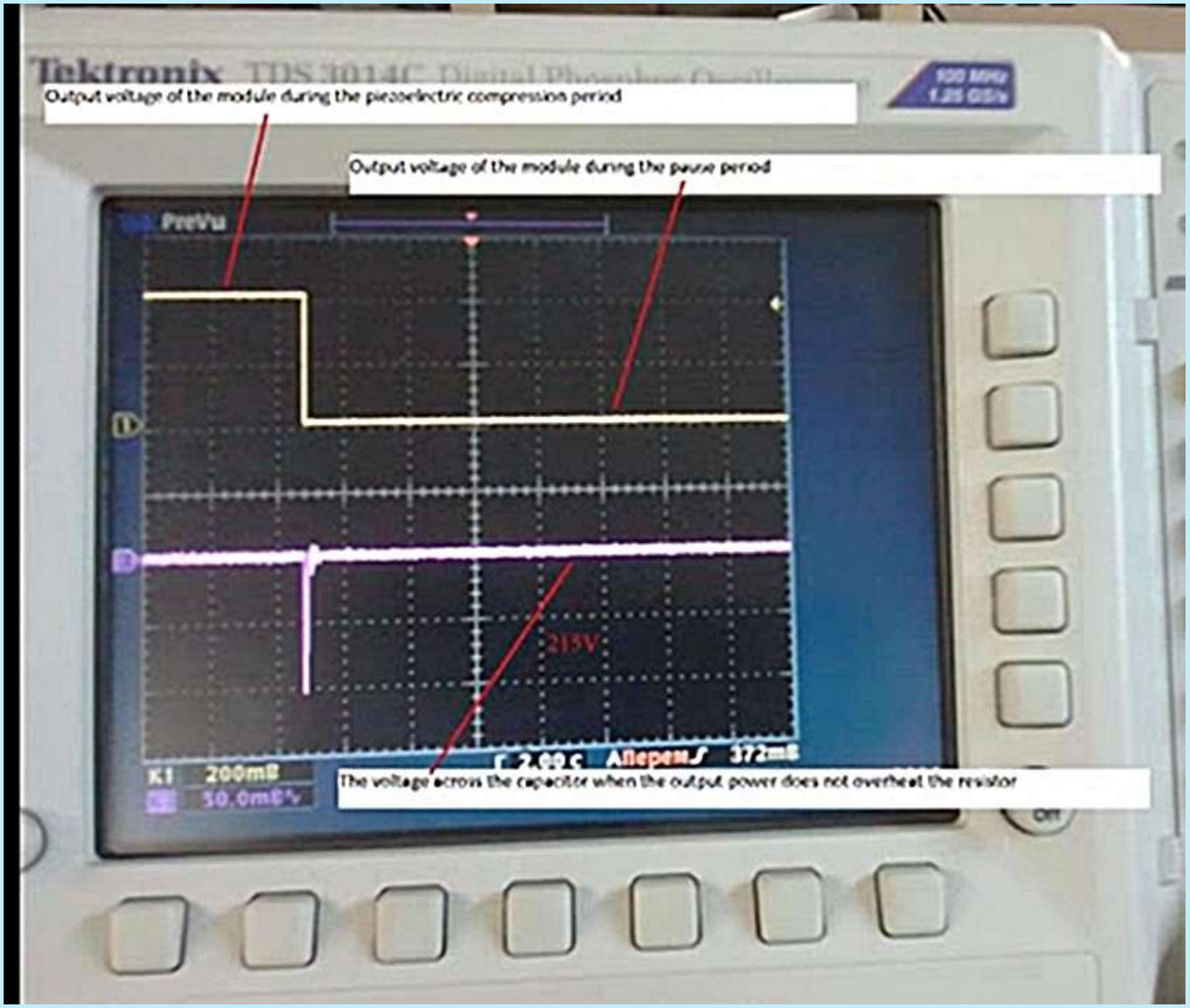


Technical-scientific assistant evaluating the electronic signal response

At the start, the pressure oscillations are recorded in the laboratory

https://yadi.sk/i/kXB4ir2CcKrmuQ Video of the starting sequence

Interpretation of scope signals



Time slot: 1:58/2:04

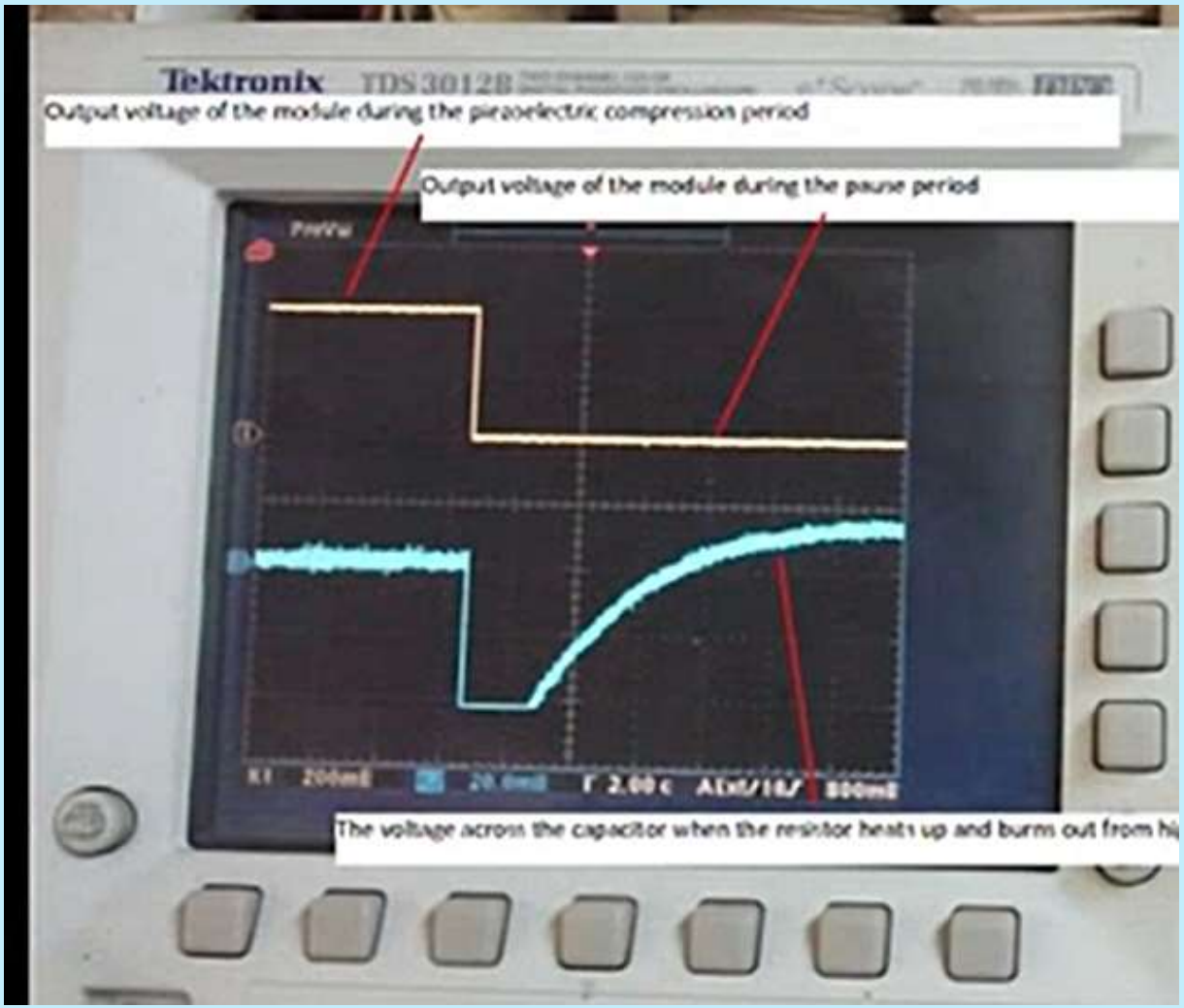
Upper scope channel

Upper pulse edge: Output voltage of the module during the piezoelectric compression period.

Lower pulse edge: Output voltage of the module during the pause period.

Lower scope channel: Voltage across the capacitor when the output power does not overheat the resistor (load simulation).

Interpretation of scope signals



Upper scope channel

Upper pulse edge: Output voltage of the module during the piezoelectric compression period.

Lower pulse edge: Output voltage of the module during the pause period.

Lower scope channel: The voltage across the capacitor when resistor load heats up and burns out from high power.

Stable oscillation fluid pressure pulses

- In the stable state, the **oscillations** occur **between a maximum and a minimum pressure level.**
- **The energy** required to maintain the pressure oscillations **is** directly **supplied from the atomic crystal lattice** of the metal tubes.

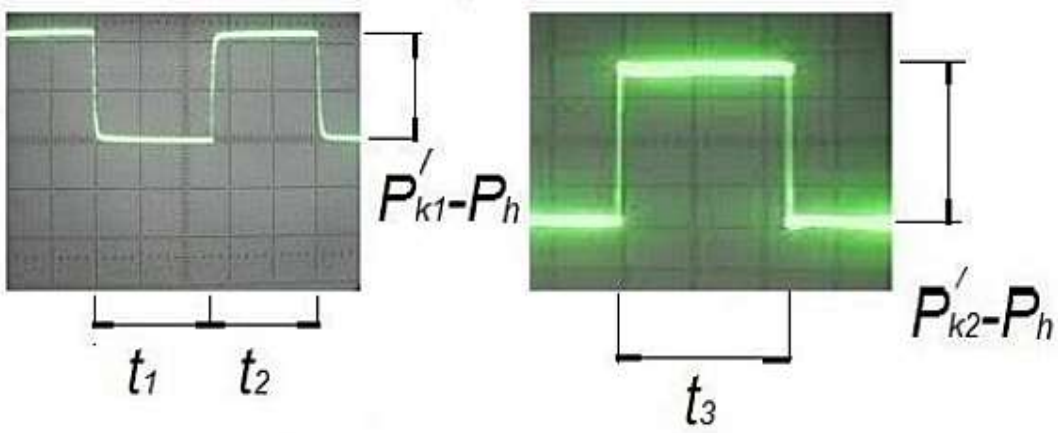


Fig.22. Flow pressure in the pipe 1 and the pipe 2

- In this respect, one could speak of a kind of "nuclear" energy. However, this is **not a fusion, fission or electron/neutron exchange**, **but** a coupling to **nuclear oscillation energy**.
- This coupling **happens via subharmonics**, because the actual vibronic oscillations of the nucleons are located in a much higher frequency range.

Increasing pressure oscillations in the inert gas

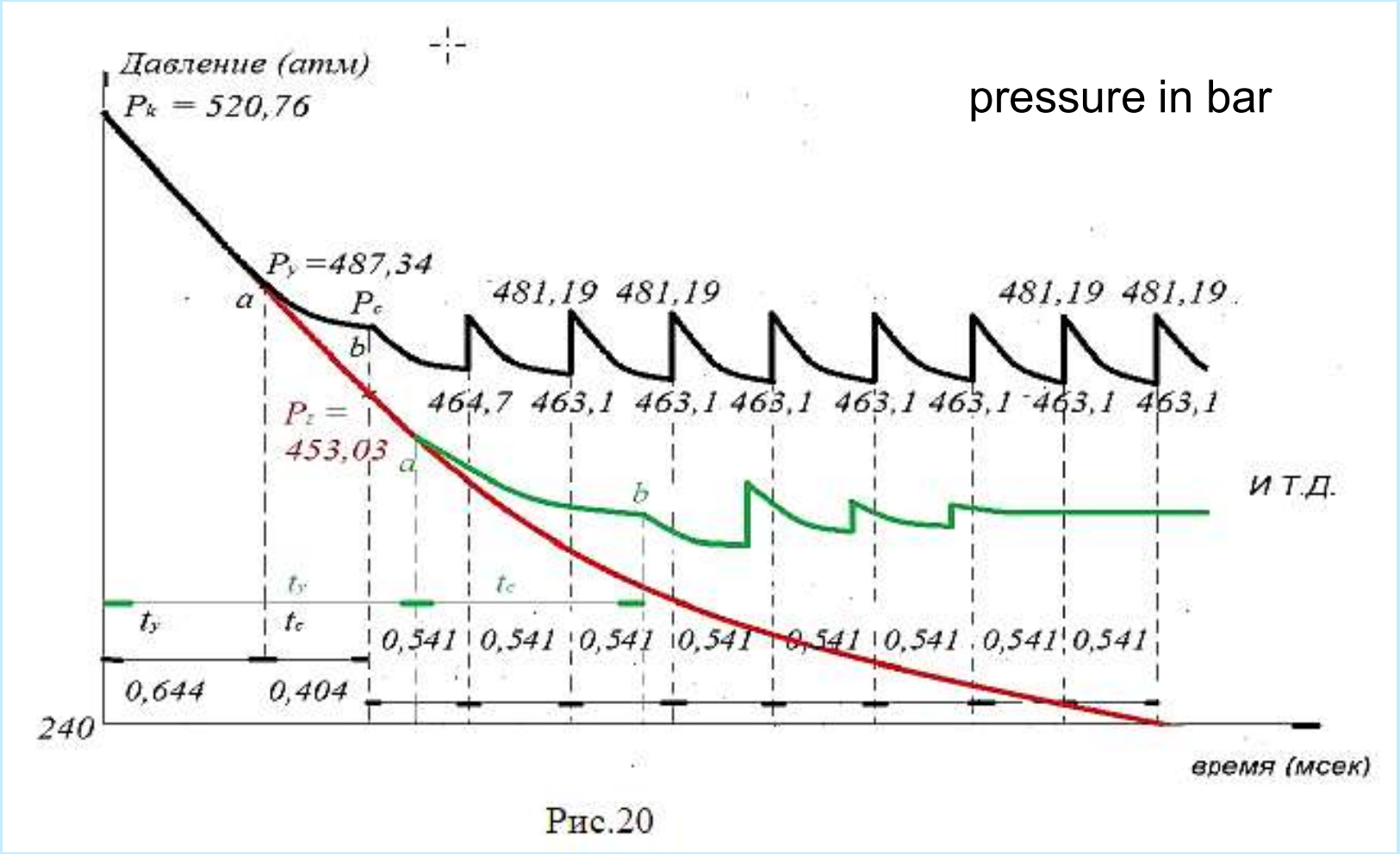


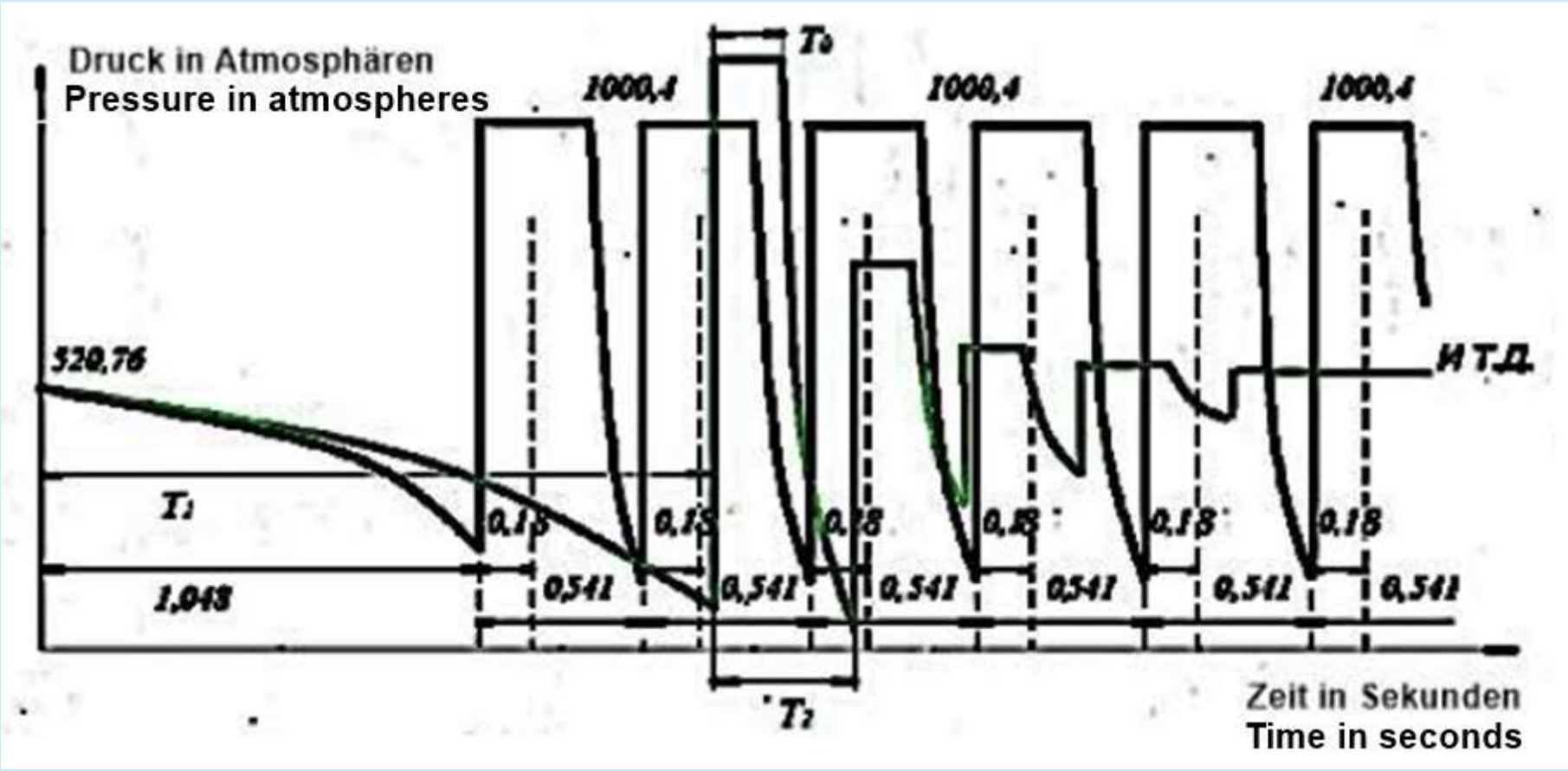
Рис.20

Red curve: Decaying pressure after shock wave without vibration buildup

Green curve: Starting of the oscillations with decaying amplitude

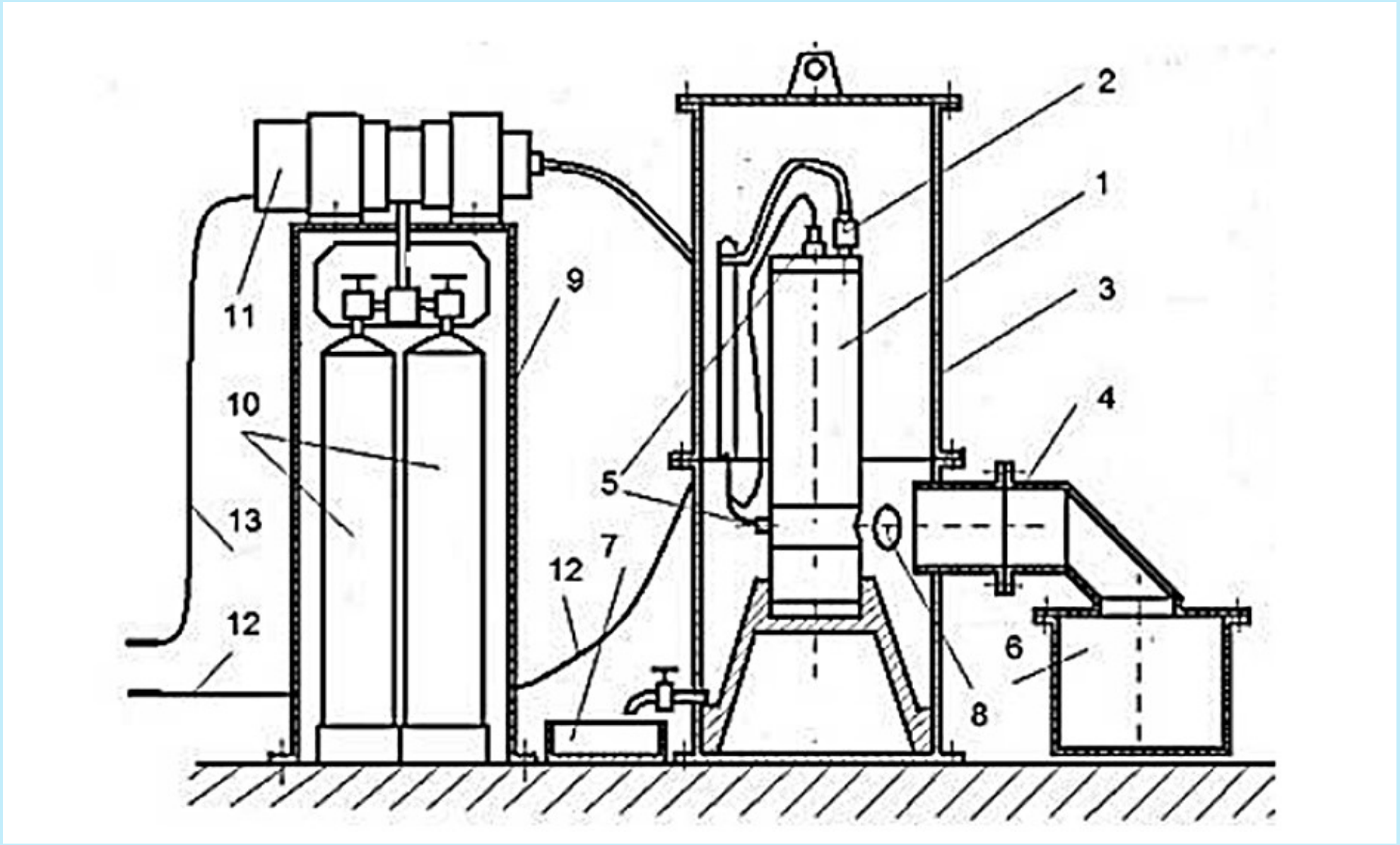
Black curve: Correct formation of a permanent pressure oscillation

Formation of pressure oscillations in the fluid



This diagram shows the almost rectangular curves of the pressure fluctuations of the liquid medium. These pulsations also have steep starting edges, but have much higher pressure changes, e.g. between 1000 bar and 200 bar.

Step by step filling of the vessel (1) by high-pressure pump (11) from gas cylinders (10)

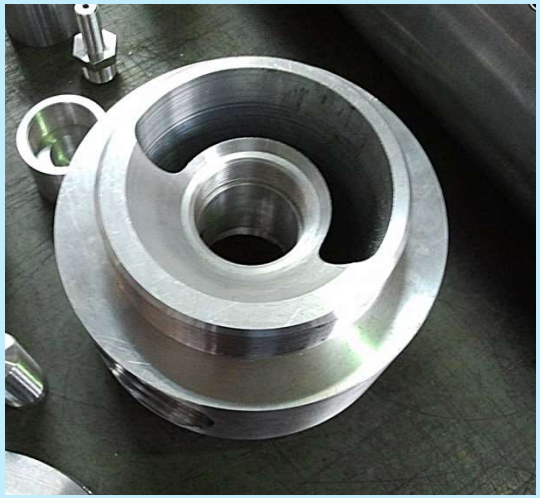


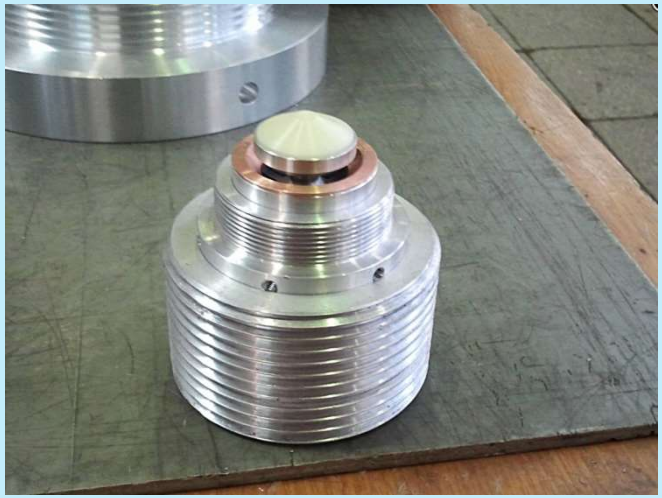
Components of a HEG – photos from 2014

- The components of a 1 MW system are steel tubes, cylindrical parts and different valves.
- A piecoelectric ceramic tube converts the pressure oscillations into voltage oscillations.
- The high-voltage square wave is rectified and inverted with IGBT transistors into low AC three-phase voltage with 50 Hz or 60 Hz.

https://cleanenergy.ucoz.ru/photo/

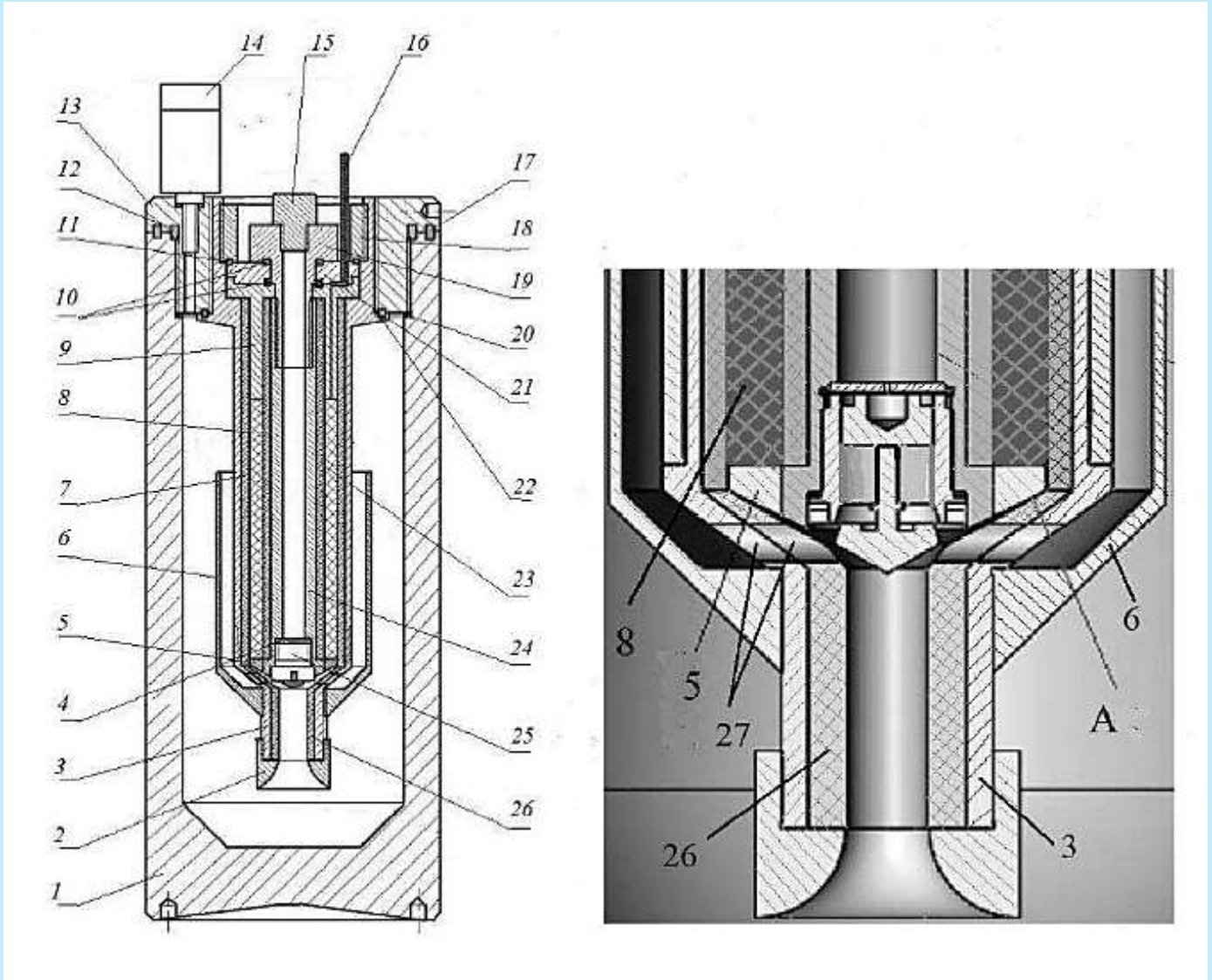
Components of a HEG – photos from 2014





Version 2017 with 1000 kW (H1000VS)

- In this design versions of the HEG (since 2017) the percussion valve is installed directly inside the lower tube.
- This version is also more compact (reduced height, lower weight, faster starting process).
- Piezoceramic material consists of 60 disks of 3 mm thickness with an outer diameter of 60 mm and an inner diameter of 40 mm (APC855).



HEG devices in different sizes

AR-500 (EGM-H-P-500-20)

Dimensions:
Height: 300 mm, Diameter: 140 mm
Weight: 20 kg
Voltage at output: 6 kV
Output power: 500 kW
Max. Angle of inclination: +/- 60 degrees

AR-1000 (EGM-H-P-1000-21)

Dimensions:
Height: 420 mm, Diameter: 150 mm
Weight: 40 kg
Voltage at output: 12 kV
Output power: 1000 kW
Max. Angle of inclination: +/- 60 degrees

Conversion of DC high voltage into low voltage AC voltage

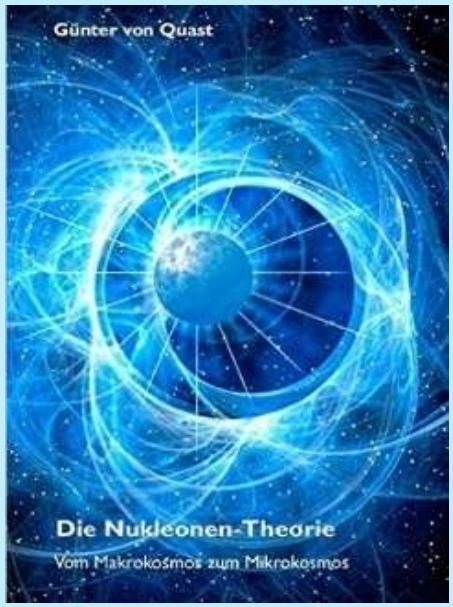
- The electrical **power is decoupled by central inverters,** such as those used in the solar industry.
- **For example**, there is the PVS-980-5 **inverter from ABB** which can convert DC voltages of up to 1,500 V at the input into three-phase current of up to 690 V/50 Hz with a total output of of up to 2 MW.

- **If the output** of the DC-voltage **coming from the HEG has a higher voltage value** with reduced current – e.g. 6 kV or 12 kV – **then it is necessary to connect a DC-DC converter** in between.

Theoretical background of oscillating systems

- In the "**Thermodynamics of the isolated particle**", the physicist **Louis de Broglie** had already explicitly **pointed out that the fluctuations of** the mass of individual **particles are to be interpreted as a consequence** of the constant **energy exchange with the subquantum environment.**
- Mathematically, the **stability of the stationary oscillations** of a self-excited parametrical system **is governed by** a function called **the Liapunov function**. This has the remarkable property that it tends towards a maximum or minimum value for the stable states.
- Thus, **every matter particle is in** constant **contact with the** heat reservoir of **the subquantum environment**.
- Therefore, a **vibrating hydraulic ram tube permanently exchanges energy with the quantum vacuum** via the metal lattice.

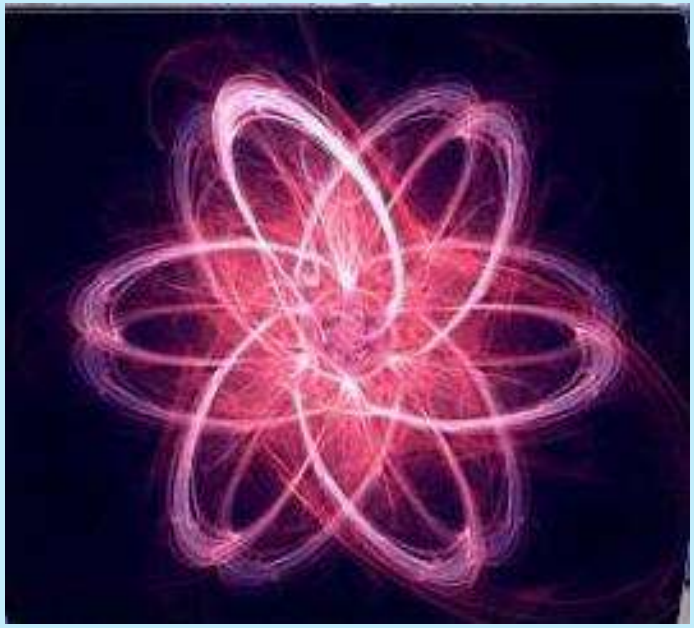
Future aspects of space energy conversion



- **According to «The Nucleon Theory» of Guenther Quast**, **all atoms are communicating with** the field of **space energy if they are excited by pressure oscillations**.
- That means that **it is possible to convert space energy directly** from the surrounding space energy and sustain mechanical oscillations.
- **We have learned** from our discussions with V. V. Marukhin **that** responsible **people in the governments are aware of the potential of such new** uses of **nuclear energy to trigger an energy revolution**.
- **In the long term** it is evident that **such revolution cannot be stopped and that such** a kind of **energy is** badly **needed.**
- But **in the interim it is likely that the big energy industry will keep focusing on classical energies** because current industrial, financial, and state economy depends on the sales in the conventional energy market.
- https://shop.falter.at/detail/9783732227518

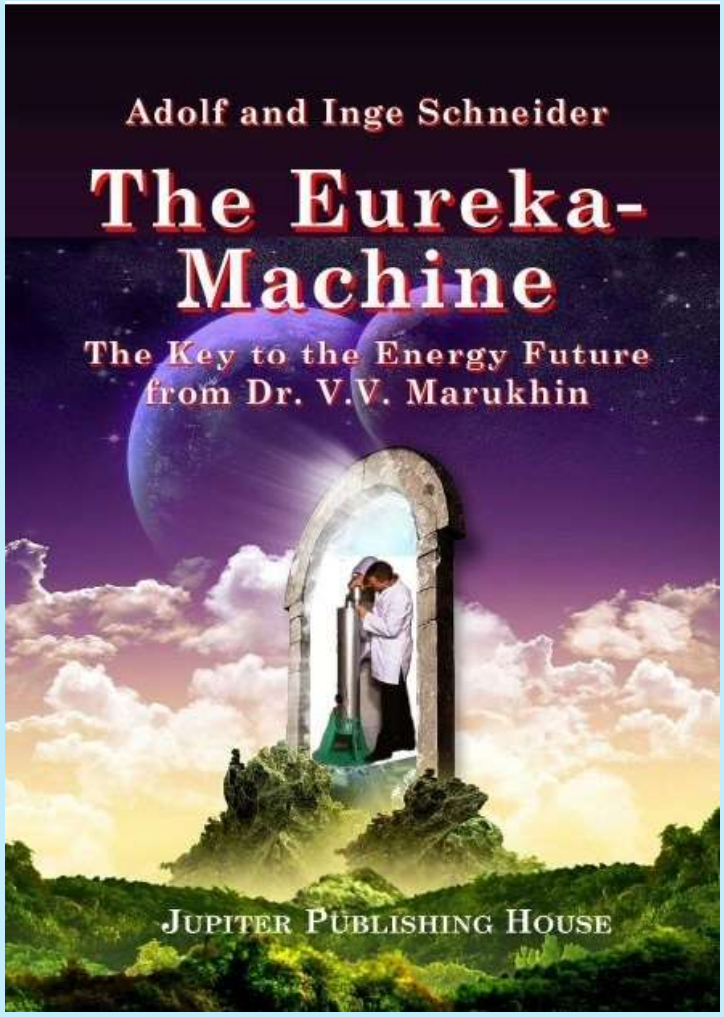
Conversion of space energy

- **It can be summarized that in both mainstream and alternative physics there are new concepts which explain the continous energy flow from and to the vacuum energy field.**
- **Space energy can be tapped and converted in conventional energy via dynamic resonant fields in linearly oscillating and rotary devices.**



- Bestselling author and sought-after speaker, **Gerald Celente,** stated some years ago: "**We need** a **productive capacity** - and the best way that we see it is **with alternative energy** – **not wind, solar, geothermal, biofuel** – **but something much bigger**".

Books on Hydraulic Energy Generator



E-Book version: **https://www.amazon.com/dp/B07DQRXLPC**

Newest scientific paper by Dr. V. V. Marukhin in SCIENCE AND WORLD, International Scientific Journal, № 8 (84), 2020, Vol. I

http://scienceph.ru/f/science_and_world_no_8_84_august_vol_i.pdf pp 33-70

Novel Energies

"This new power for the driving of the world's machinery will be derived from the energy which operates the universe, the cosmic energy, whose central source for the earth is the sun and which is even present in unlimited quantities."

New York American, 1 Nov.,1933

Nikola Tesla (1856-1943)

"I have harnessed the cosmic rays and caused them to operate a motive device."

The Brooklyn Eagle, July 10th, 1932,

www.borderlands.de/Links/NovelEnergyTechnologies.pdf
www.borderlands.de/Links/WCEC031116.pdf