



July 1, 2025

№20250701en

## Commercial proposal

We hereby offer thermal **cavitation** units for the extraction of humic substances (e.g. potassium HA-K or sodium humate HA-Na, fulvates FA-K FA-Na of fulvic acids) from humic-containing raw materials (e.g. peat, leonardite, brown coal, sapropel, biohumus, pulp and paper mill wastes - lignosulfonates and lignin) by complex moisture-thermal **cavitation hydrodynamic treatment** of a mixture of water, raw materials and alkali.

**Reagent-free** bioactive preparations can also be produced.

**Cavitation equipment** allows in a short time and with relatively low costs to start production of humic substances or modernize the existing one in order to improve the quality and reduce the cost of the product. This equipment of various capacities is successfully operating in Belarus, Great Britain, Kazakhstan, Lithuania, Poland, Russia, Serbia, Turkmenistan, Ukraine, Montenegro.

On the basis of cavitation units, production lines for separation of humic substances were created, including also a mixer-separator for mixing raw materials with water, preliminary cavitation treatment (grinding) of the mixture, separation of abrasive particles (sand) and a unit for receiving finished humate and cavitation mixing it with additional components, trace elements. Duration of the working cycle of the line (loading, cavitation processing, unloading) is 1 hour.

Model of humic substances extraction line	Average capacity, l/h
Heat Plant UT90-1000	1000
Heat Plant UT37-500	400
Heat Plant UT22-200	200

Materials used: working tanks, pressure and suction pipes, cavitators - stainless steel, impellers and pump casing - cast iron. The units are equipped with power control panels containing microprocessor-based devices for humate temperature regulation in the unit and electric motor protection.

Production time is 90 working days. The payment currency and payment schedule are discussed during the signing of the contract. This commercial proposal is valid until a new commercial proposal is posted on jurle.com.

The equipment pays off in less than a month, because even at a dumping price of 1 USD per 1 liter of finished product the annual production volume will be, for example, for UT90-1000, 2.5 - 7.5 million USD.

If you need a different performance of equipment, configuration, finished product, we can design and manufacture equipment adapted to the requirements of your project.

Application: Scheme and description of the equipment

Director

Vladimir Milun

Mob. +375-44-743-22-71; Viber, WhatsApp, Telegram +375-44-743-22-71  
Teams: jurle.com E-mail: [jurle@jurle.com](mailto:jurle@jurle.com)

## **Technical description**

### **of UT90-1000, UT37-500, and UT22-200 heat plants**

#### **(technological lines for the extraction of humic substances)**

The UT90-1000, UT37-500, and UT22-200 heat plants are designed for **cavitation** mixing, preliminary separation, moisture-thermal **cavitation** hydrodynamic treatment of an aqueous mixture of humic raw materials, receiving ready-made humate, **cavitation** mixing of humate with microelements, and represent technological lines for the extraction of humic substances from humic-containing raw materials (e.g., peat, sapropel, biohumus, brown coal, leonardite, waste from pulp and paper mills, etc.) with an average capacity of 1000 l/h for UT90-1000, 400 l/h for UT37-500, 200 l/h for UT22-200. Productivity depends on the processing temperature of the mixture, the properties of the raw materials, and the product being produced.

The main technological solution in the line is comprehensive moisture-thermal cavitation hydrodynamic treatment of a mixture of water, raw materials, and alkali when the temperature rises to 50-90 °C. The use of hydrodynamic cavitation in the production of humates significantly reduces the energy intensity of the process compared to traditional methods of obtaining plant growth regulators and increases the yield of humic acids.

Lines with a capacity of 1000, 400, and 200 l/h (UT90-1000, UT37-500, UT22-200) consist of three main units (see Figures 1.1, 1.2, 2.1, 2.2): cavitation heat plant 1, mixer-separator 2; receiving and mixing unit 3. The units are connected to each other by flexible hoses included in the delivery set.

Mixer-separator 2 (UT-S1000 for UT90-1000, UT-S500 for UT37-500, UT-S200 for UT22-200) is designed for mixing peat with water, preliminary cavitation treatment (grinding) of the mixture and separation of abrasive particles (sand) from the peat-water mixture, feeding the peat-water mixture to the thermal unit 1 (UT90SM for UT90-1000, UT37SM for UT37-500, UT22SM for UT22-200). The power of the mixer-separator is 5.5 kW for UT-S1000 and UT-S500, 2.2 kW for UT-S200. The working volume of the mixer-separator is 1000 l for UT-S1000, 500 l for UT-S500, and 200 l for UT-S200. Materials used: working tank, pressure and suction pipes, cavitator – stainless steel, impeller and pump volute – cast iron or steel. The mixer-separator is equipped with a power control panel containing thermal protection for the electric motor.

Heat plant 1 (UT90SM for UT90-1000, UT37SM for UT37-500, UT22SM for UT22-200) is designed to extract humic substances (e.g., potassium humate or sodium humate) from humic-containing raw materials by means of complex moisture-thermal cavitation hydrodynamic treatment of a mixture of water, raw materials, and alkali. For UT90SM, the unit has a capacity of 90 kW and a working volume of 1000 l, for UT37SM – 37 kW and 500 l, for UT22SM – 22 kW and 200 l, respectively. Materials used: working tank, pressure and suction pipes, cavitator – stainless steel, impeller and pump volute – cast iron. The unit is equipped with a power control panel containing microprocessor devices for regulating the temperature in the unit and protecting the electric motor.

The receiving and mixing unit 3 (UT-P1000 for UT90-1000, UT-P500 for UT37 500, UT-P200 for UT22-200) is designed to receive finished humate from thermal unit 1 and mix it with additional components using cavitation. The receiving and mixing unit has a power of 2.2 kW and a working volume of 1000 l for UT-P1000,

500 l for UT-P500, and 200 l for UT-P200. Materials used: working tank, pressure and suction pipes, cavitator – stainless steel, impeller and pump volute – cast iron. The receiving and mixing unit is equipped with a power control panel containing thermal protection for the electric motor.

## **DESCRIPTION OF THE TECHNOLOGICAL PROCESS OF MAKING HUMATE from humic raw materials (for example, peat, leonardite, sapropel)**

Clean the peat\* of large inclusions and, if necessary, sieve it through a 5 mm mesh sieve to remove pieces of wood and other debris.

Load the prepared peat using loader 4 (supplied by the Buyer) into the peat dispenser hopper 2.4 of the mixer-separator 2, measuring out the required amount of peat using scales 2.5. Pour the required amount of water into the hydrocyclone tank 2.3 and transfer the peat from the peat dispenser hopper 2.4 to the hydrocyclone tank 2.3. When using sapropel with natural moisture content (90-98%), the raw material is poured directly into the hydrocyclone tank 2.3. In the UT22-200 unit, due to the relatively small amount of raw material required, the peat is weighed and poured manually.

Mix peat with water and separate solid inclusions (sand) from the peat. To do this, turn on electric pump 2.1 of mixer-separator 2 and run the peat-water mixture through the mixing circuit for 5 minutes:

*“tank-hydrocyclone 2.3 - tap K4 - electric pump 2.1 - tap K21 - cavitator 2.2 - tank-hydrocyclone 2.3,” and then for another 5 minutes through the centrifugation circuit “tank-hydrocyclone 2.3 - tap K5 - electric pump 2.1 - taps K2 - tank-hydrocyclone 2.3”.* During the first 5 minutes, the peat mixture will undergo primary cavitation treatment and be mixed to a homogeneous state, and during the second 5 minutes, it will separate into solid and liquid phases. The heaviest solid phase, in the form of insoluble ash inclusions and sand, will settle at the bottom of the cone of the hydrocyclone tank 2.3, while the liquid phase will remain at the top.

Transfer the peat-water mixture from mixer-separator 2 to cavitation heat plant 1. To do this, open valve K3 on the pipeline connecting mixer-separator 2 to the insulated working tank 1.3 of cavitation unit 1. Turn on electric pump 2.1 of mixer-separator 2 and transfer the prepared mixture from mixer-separator 2 to cavitation heat plant 1 via the line: *‘tank-hydrocyclone 2.3 - tap K4 - electric pump 2.1 - tap K3 - tap K25 - working tank 1.3 of cavitation heat plant 1’.*

After transferring the peat-water mixture from the mixer-separator 2 to the cavitation heat plant 1, pour (fill) it through the upper tap of the working tank 1.3 or feed the specified amount of alkali into the working tank using a metering pump (the loading and dosing method and the necessary equipment are selected and supplied by the Buyer), turn on electric pump 1.1 of cavitation heat plant 1 and start the moisture-thermal cavitation hydrodynamic treatment of the mixture. During the treatment, several hundred cycles of the mixture passing through the circuit *‘working tank 1.3 - electric pump 1.1 - cavitator 1.2 - working tank 1.3’* take place. When the mixture reaches the temperature specified in the technical process (50-90 °C), the plant's electric pump stops. The product is processed in the cavitation heat plant and is ready for further technical processes.

Unload humate from cavitation heat plant 1 to unit 3 for receiving and mixing finished humate with microelements along line *“working capacity 1.3 – tap K9 – tap K19 – electric pump 3.1 of the receiving and mixing unit – tap K13 – cavitator 3.2 – tank 3.3 of the receiving and mixing unit.”* After unloading the humate into the receiving and mixing unit tank, trace elements are loaded (the loading and dosing method and the necessary equipment are selected and supplied by the Buyer) and cavitation mixing of the

humate with trace elements is carried out along the line "tank 3.3 – tap K11 – electric pump 3.1 of the receiving and mixing unit – tap K13 – cavitator 3.2 – tank 3.3 of the receiving and mixing unit." After processing in the receiving and mixing unit 3, the finished humate is fed to the following technical processes (centrifugation, filtration, bottling, storage).

During the operation of the cavitation heat plant 1 prepares and loads the next batch of peat into the mixer-separator 2, where the peat is mixed with water and separated.

The process of preparing humates is then repeated.

Estimated schedule of the main technological processes, min:

- supply and dosing of peat – 5\*\*\*;
- mixing peat with water and separating impurities in the mixer-separator – 10\*\*\*;
- reloading of the peat-water mixture from the mixer-separator into the working tank of the cavitation unit – 5\*\*\*;
- cavitation treatment of peat mixture (at  $t_{init} = 15\text{ °C}$ ,  $t_{final} = 70\text{ °C}$ )\*\* - 50\*\*\*;
- reloading of humate from the working tank of the cavitation unit into the tank of the receiving and mixing unit – 5\*\*\*.

An internal sewerage system (ladders, pipelines, etc.) should be organized in the room, which allows efficiently (in accordance with sanitary standards) to drain wastewater and sedimentary material into the treatment zone and then into the external sewerage system. The room must be equipped with ventilation in accordance with sanitary standards. Appropriate safety precautions must be observed when working with chemicals. For normal operation of the equipment, the production room must be maintained at a positive air temperature of no less than +5 °C and no more than +28 °C. Для нормальной работы технологической линии в производственном помещении должна поддерживаться положительная температура воздуха не ниже +5 °C и не выше +28 °C.

Cold water is supplied to the working tanks of the process line and the hydrodynamic cavitation plant from the local water supply system, which must provide the required water flow with a pressure of at least 0.2 MPa (2.0 Bar).

Notes:

\* the operating procedure is the same for vermicompost, brown coal, leonardite and sapropel

\*\*  $t_{init}$  is the temperature of the mixture at the beginning of the treatment,  $t_{final}$  is the temperature of the mixture at the end of the treatment. If, according to the technological process, other temperatures for processing the mixture are required to achieve the quality parameters of the product, then the average productivity, energy consumption per working cycle, the schedule of technological processes may be different.

\*\*\* Depends on the properties of raw materials, the initial and final temperatures of processing the mixture, the product produced.

# HEAT PLANTS UT90-1000, UT37-500, UT22-200

(Technological lines for the extraction of humic substances from peat, sapropel, vermicompost, brown coal, leonardite)

## TECHNICAL CHARACTERISTICS

	Type		
	UT90-1000	UT37-500	UT22-200
Average productivity (at $t_{\text{start}}=15\text{ }^{\circ}\text{C}$ , $t_{\text{final}}=70\text{ }^{\circ}\text{C}$ )**, l/h	1000***	500***	200***
Installed electric power of equipment, kW	97,7	44,7	26,4
Electricity consumption for one working cycle ( $t_{\text{start}}=15\text{ }^{\circ}\text{C}$ , $t_{\text{final}}=70\text{ }^{\circ}\text{C}$ )**, no more, kW*h	90	37	22
Permissible mixture processing temperature, $^{\circ}\text{C}$ , not exceeding	90	90	90
Operating temperature of the air in the workshop, $^{\circ}\text{C}$	+5...+28	+5...+28	+5...+28
Permissible moisture content of the mixture, %, not less than	80***	80***	80***
Recommended moisture content of the mixture, %	85...96***	85...96***	85...96***
Overall dimensions of the site for the line, mm, not less than:			
• length –	6500*	5200*	5000*
• width –	4700*	4000*	3400*
• height –	4000*	4000*	2500*
Equipment weight, kg, max	2800*	1900*	1400*
Type of cavitation heat plant	UT90SM	UT37SM	UT22SM
Power of the electric pump unit of the cavitation heat plant, kW	90	37	22
Working volume of the cavitation heat plant, l	1000	500	200
Total volume of the cavitation heat plant, l	1140*	550*	260*
Mixer-separator type	UT-S1000	UT-S500	UT-S200
Power of the electric pump unit of the mixer-separator, kW	5,5	5,5	2,2
Working volume of the mixer-separator, l	1000	500	200
Total volume of mixer-separator, l	1017*	505*	220*
Type of receiving and mixing unit	UT-P1000	UT-P500	UT-P200
Power of the electric pump unit of the receiving and mixing unit, kW	2,2	2,2	2,2
Working volume of the receiving and mixing unit, l	1000	500	200
Total volume of the receiving and mixing unit, l	1260*	600*	210*

Notes:

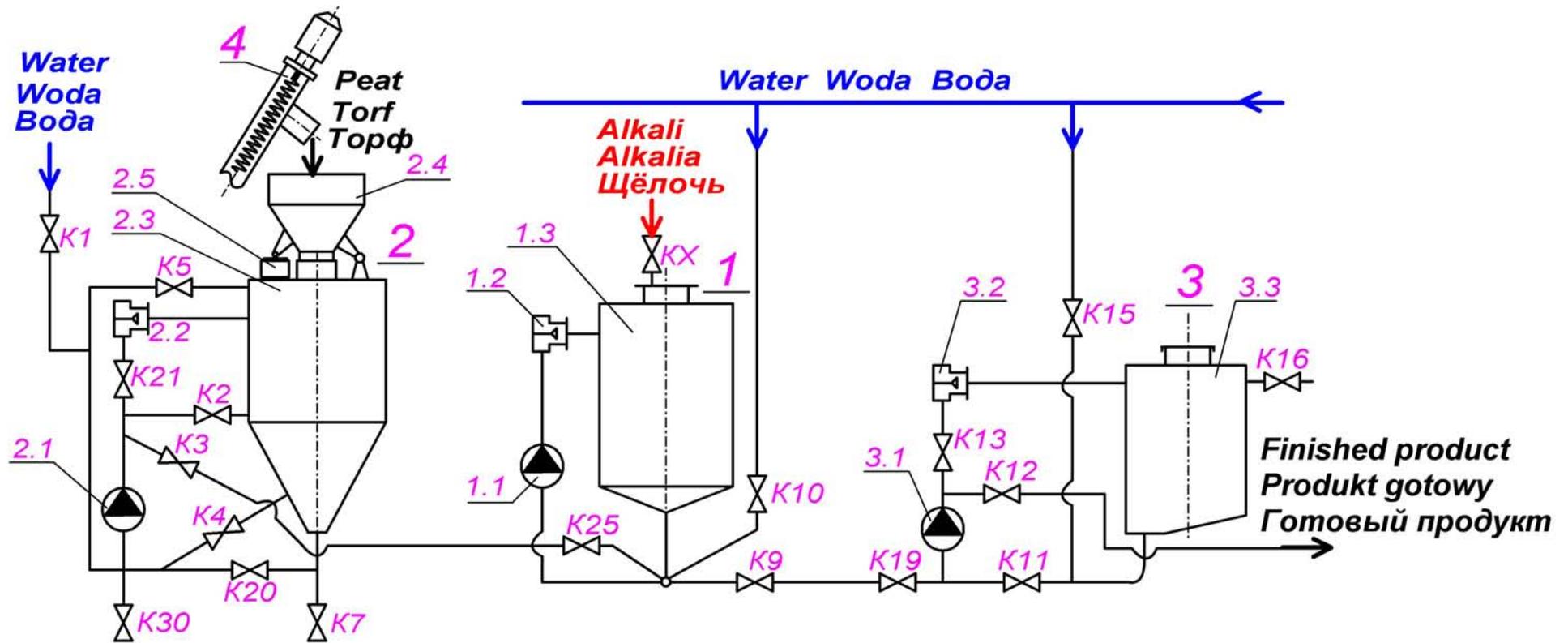
\* to be specified upon production of equipment,

\*\*  $t_{\text{start}}$  is the temperature of the mixture at the beginning of the treatment,  $t_{\text{final}}$  is the temperature of the mixture at the end of the treatment. If, according to the technological process, other temperatures for processing the mixture are required to achieve the quality parameters of the product, then the average productivity, energy consumption per working cycle, the schedule of technological processes may be different.

\*\*\* Depends on the properties of raw materials, the initial and final temperatures of processing the mixture, the product produced.

## HEAT PLANTS UT90-1000, UT37-500

(technological lines for the extraction of humic substances with a capacity of 1000 l/h and 500 l/h)

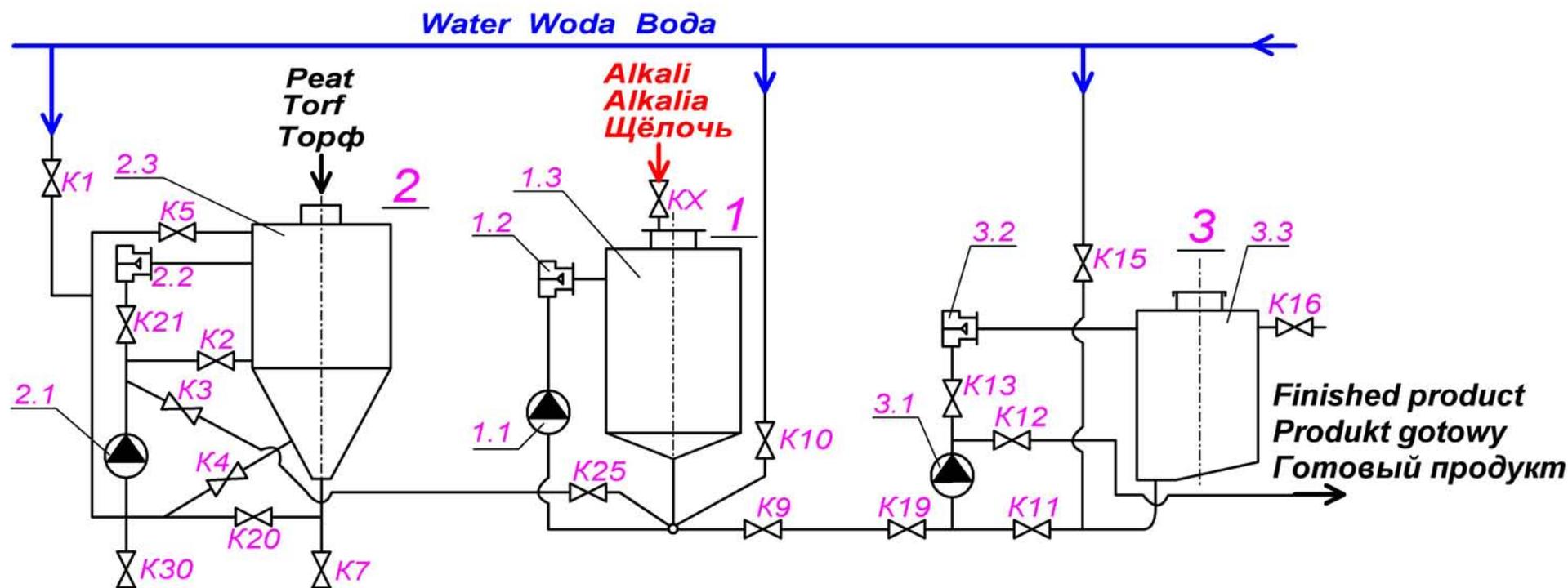


**Fig.1.1.** Basic hydraulic diagram of the plant for mixing, preliminary separation, moisture-thermal cavitation hydrodynamic treatment of an aqueous mixture of humic raw materials, receiving ready-made humate and cavitation mixing it with microelements:

- 1- Cavitation heat plant (UT90SM for UT90-1000, UT37SM for UT37-500): 1.1 – electric pump unit (90 kW for UT90SM, 37 kW for UT37SM); 1.2 – vortex cavitator; 1.3 – heat-insulated tank (V=1000 l, 500 l).
- 2- Mixer-separator (UT-S1000 for UT90-1000, UT-S500 for UT37-500): 2.1- electric pump unit 5,5 kW with modification of impeller; 2.2 – vortex cavitator; 2.3 – tank-hydrocyclone (V=1000 l, 500 l); 2.4 – peat dispenser hopper; 2.5 – scales
- 3- Unit for receiving and mixing (UT-P1000 for UT90-1000, UT-P500 for UT37-500) the finished humate with microelements  
3.1 - electric pump unit 2,2 kW; 3.2 – vortex cavitator; 3.3 – cylindrical tank (V=1000 l, 500 l).
- 4- Loader (selected and supplied by the Buyer).

## HEAT PLANT UT22-200

((technological line for the extraction of humic substances with a capacity of 200 l/h)

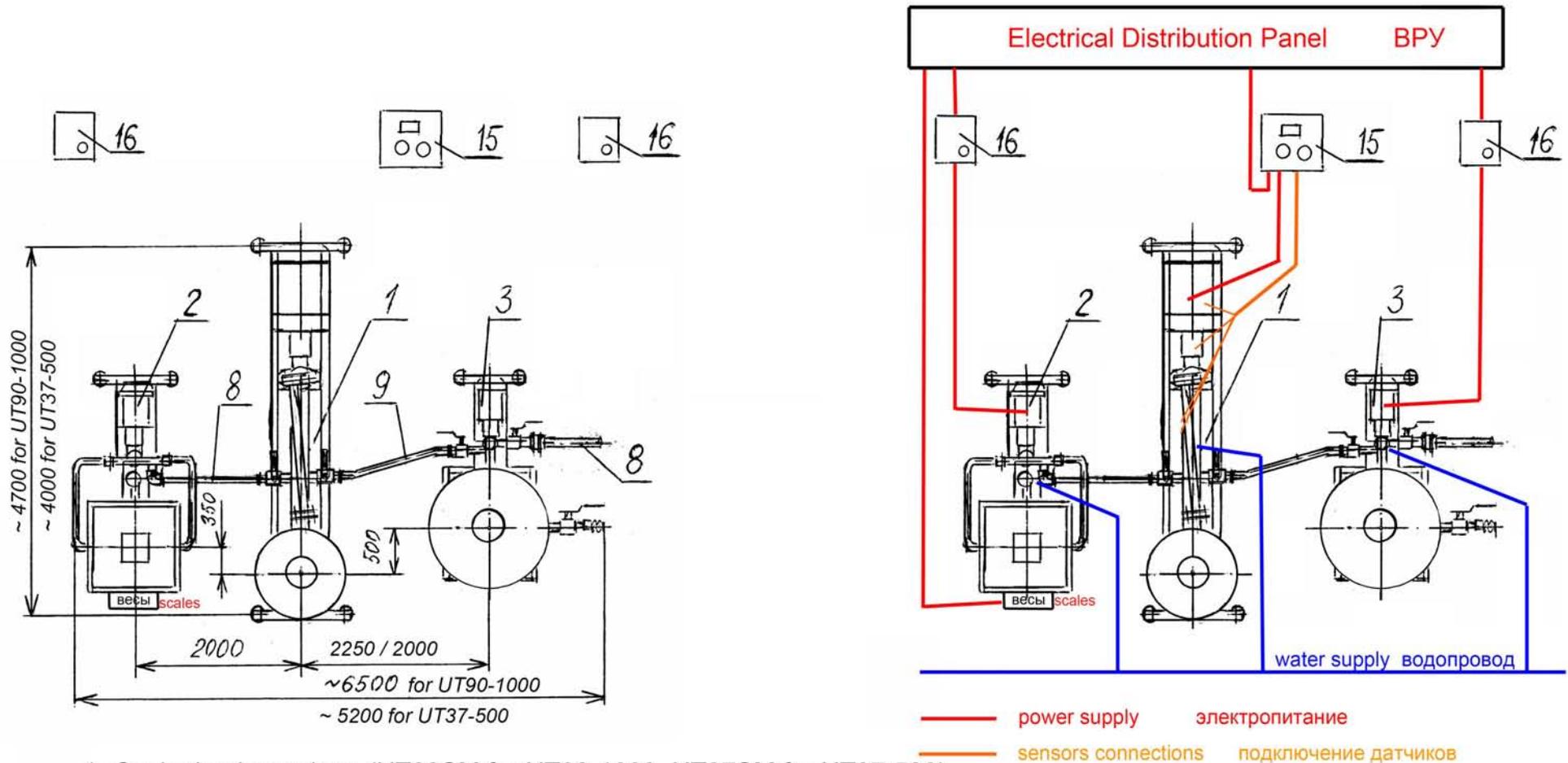


**Fig.1.2.** Basic hydraulic diagram of the plant UT22-200 for mixing, preliminary separation, moisture-thermal cavitation hydrodynamic treatment of an aqueous mixture of humic raw materials, receiving ready-made humate and cavitation mixing it with microelements:

- 1- Cavitation heat plant UT22SM: 1.1 – electric pump unit 22 kW;  
1.2 – vortex cavitation; 1.3 – heat-insulated tank, V=200 l.
- 2- Mixer-separator UT-S200: 2.1- electric pump unit 2,2 kW with modification of impeller;  
2.2 – vortex cavitation; 2.3 – tank-hydrocyclone, V=200 l.
- 3- Unit for receiving and mixing UT-P200 the finished humate with microelements  
3.1 - electric pump unit 2,2 kW; 3.2 – vortex cavitation; 3.3 – cylindrical tank, V=200 l.

# HEAT PLANTS UT90-1000 and UT37-500 equipment placement and connection

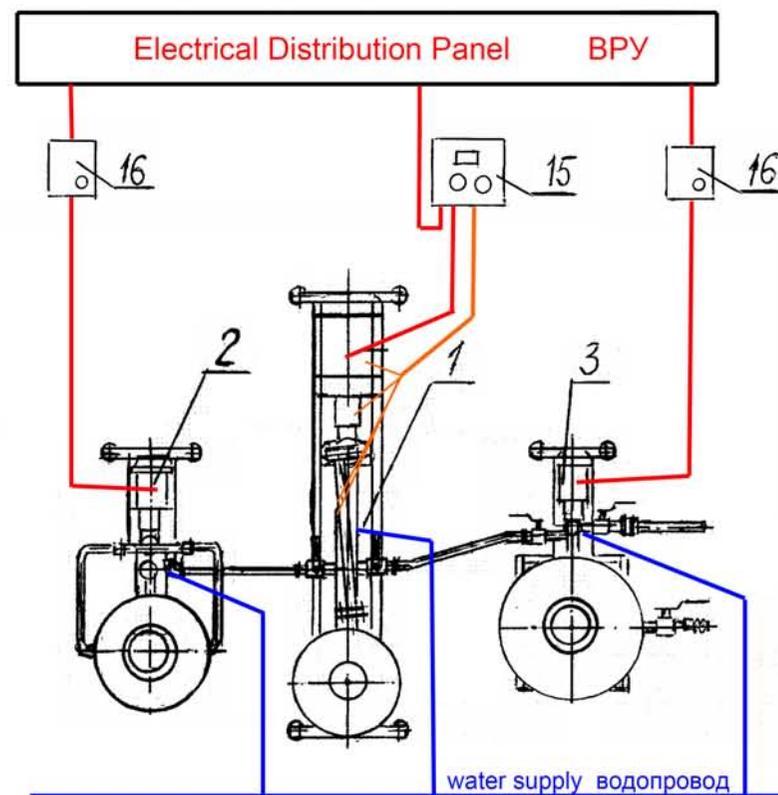
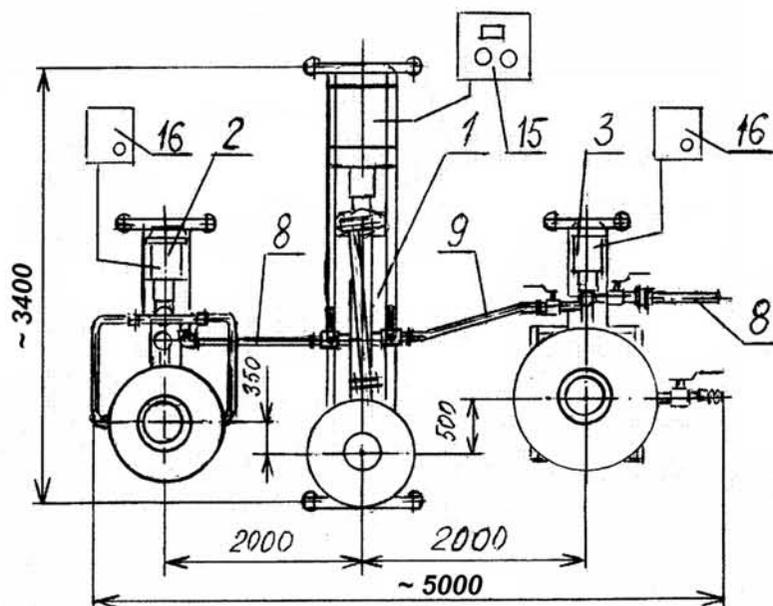
Fig.2.1



- 1- Cavitation heat plant (UT90SM for UT90-1000, UT37SM for UT37-500)
  - 2- Mixer-separator (UT1-C1000 for UT90-1000, UT-C500 for UT37-500)
  - 3- Unit for receiving and mixing (UT-P1000 for UT90-1000, UT-P500 for UT37-500)
  - 8- rubber hosepipe; 9- rubber hosepipe КЩ-50;
  - 15- Control system for a cavitation heat plant with microprocessor protection of the electric motor and control of the temperature of the technical process.
  - 16- Control devices for the mixer-separator and the receiving and mixing unit
- Electrical Distribution Panel - distribution device of the section (workshop) for the production of humic substances

Fig.2.2

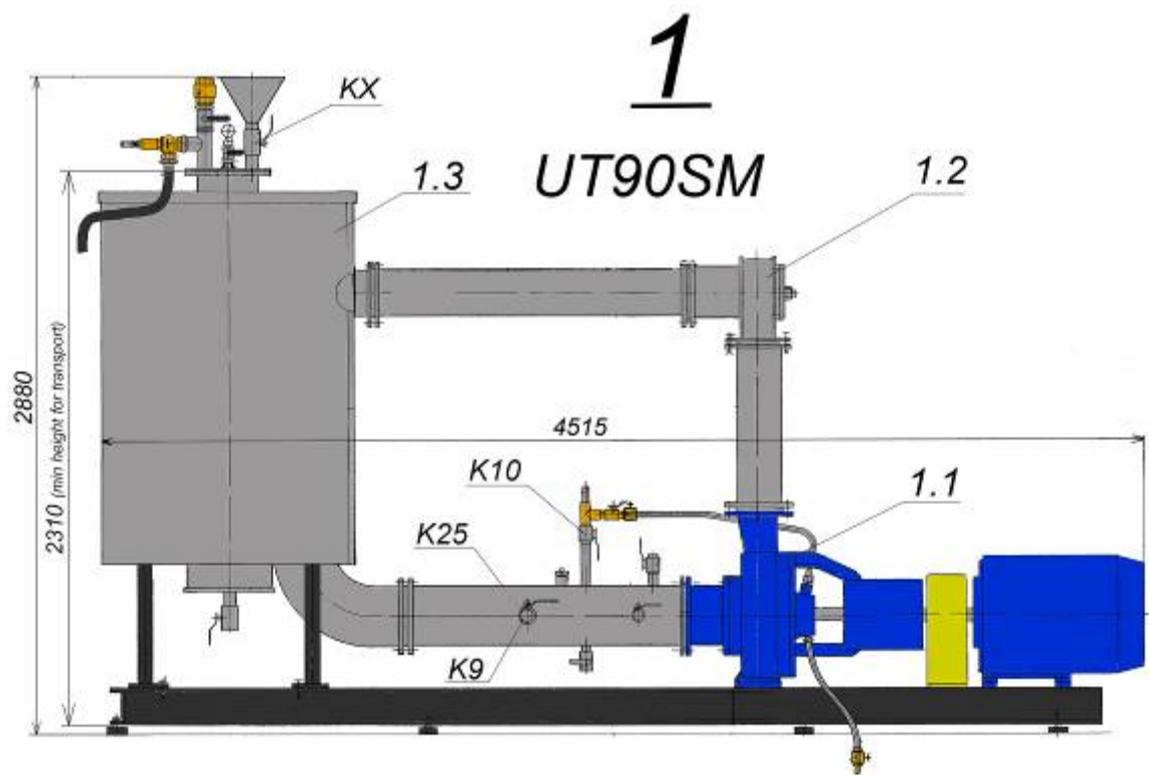
## HEAT PLANT UT22-200 equipment placement and connection

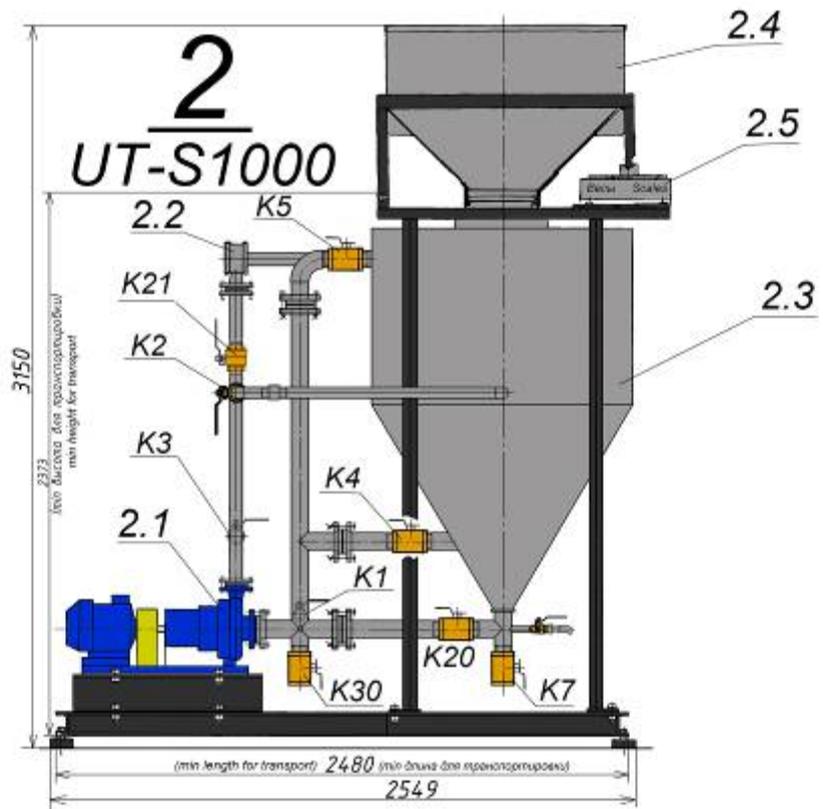


— power supply      электропитание  
— sensors connections      подключение датчиков

- 1- Cavitation heat plant UT22SM
- 2- Mixer-separator UT-S200
- 3- Unit for receiving and mixing UT-P200
- 8- rubber hosepipe; 9- rubber hosepipe КЩ-50;
- 15- Control system for a cavitation heat plant with microprocessor protection of the electric motor and control of the temperature of the technical process
- 16- Control devices for the mixer-separator and the receiving and mixing unit
- Electrical Distribution Panel - distribution device of the section (workshop) for the production of humic substances

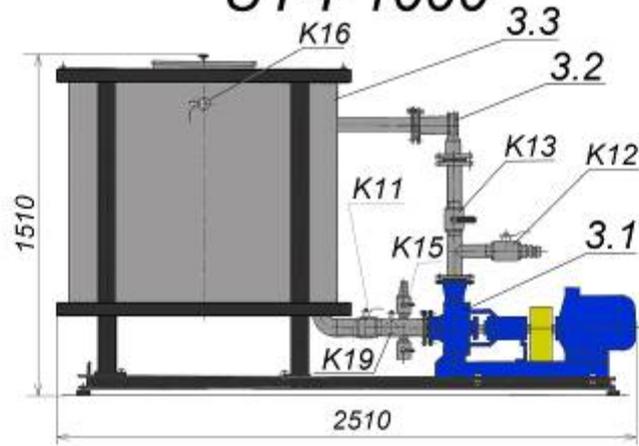






# 3

## УТ-П1000



# УТ22СМ

