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## **Station of Disinfecting Potable Water and Clarified Sewage for Capacity of 25000 - 75000 m<sup>3</sup>/day (1000 - 3000 m<sup>3</sup>/h).**

### **Description of station for disinfecting sewage.**

The station is based on the use of “Lazur M-250” units (Fig. 1) of up to 250 m<sup>3</sup>/h capacity.

The station is built up of four operative modules and one reserve unit (Figs. 2,3).

The station of 3000 m<sup>3</sup>/h capacity may be built up according to either parallel or parallel-series connection of the modules. In both configurations, the scheme engages 12 operative modules.

In the case of parallel configuration (see Figs. 2,3), all the modules are divided into two sections, each including six operative and one reserve unit. The total number of units employed in the station is 14.

When the parallel-series configuration is used (see Figs. 4,5), the station is composed of seven chains (one of them is reserve) and each chain consists of two units connected in series. The inlet and outlet of each section are separated from the corresponding collectors by pipeline valves. These valves serve for leveling the flow rates passing through the branches and cutting off a chain or a module from the total system for performing the preventive maintenance.

The power supply cabinets are mounted nearby each section. The cabinets are raised over the floor level so as to allow convenient service access for mounting/dismantling of the gas-discharge lamps in the modules. The distance between the chains or modules must be ~ 1.4 m. The minimal distance between a module and a floor level should be 0.5 m.

The overall area occupied by the station together with the service zone is 40 m<sup>2</sup> and 110 m<sup>2</sup> for the stations with capacities of 1000 m<sup>3</sup>/h and 3000 m<sup>3</sup>/h, respectively.

The total power consumption is 28 kW and 84 kW for the stations of 1000 m<sup>3</sup>/h and 3000 m<sup>3</sup>/h capacities, respectively.

### **Description of “Lazur M-250” unit.**

“Lazur M-250” unit represents the cylindrical design made of stainless steel (Fig. 1, pos. 1), wherein the ultraviolet radiators enclosed in protective quartz casings and ultrasonic transmitters (Fig. 1, pos. 2) are arranged. The volume of the unit is 150l, and the weight together with the power supply cabinet is 160 kg.

The ultraviolet radiators are essentially the low-pressure mercury vapor lamps provided with the bulb made of synthetic quartz (“Suprasil”). The length of the lamp is 1500 mm. Each lamp consumes a power of 325 W from the net (220 V, 50 – 60 Hz). The lamp radiates UV light (100 W) in the spectral region of UV – C band (254 nm). The flux density of the bactericidal radiation at a surface of the protective glass (“Suprasil”)

is not less than  $80 \text{ mW/cm}^2$ . The service life of the lamp is not less than 16,000 h of continuous burning. The lamps of NNI 300 type have longer service life (16,000 h). The lamps are supplied with power by means of the HF (44 kHz) transformer.

The ultrasonic (US) transmitters (Fig. 1, pos. 3) emit 100 W each at a frequency of 25 kHz. The service life of the US transmitter is not less than 10,000 h.

Each "Lazur M-250" module makes use of nineteen (19) UV lamps and twelve (12) US cavitators.

The total consumed power of each module is 7.0 kW.

When a liquid passes through the module, it is subjected to the simultaneous combined action of ultraviolet irradiation (with a flux density of over  $40 \text{ mW} \times \text{s/cm}^2$ ) and ultrasound (with a power density of more than  $2 \text{ W/cm}^2$ ).

Under the action of these factors, in the water under treatment strong cavitation and deep oxidative processes take place. They proceed due to the effect of ultraviolet and ozone ( $\text{O}_3$ ) resulting from UV irradiation in vapor-gas bubbles (with a mean diameter of less than 0.1 mm) uniformly spread over the whole operative volume of the module. During this treatment process, the other strong oxidants ( $\text{H}_2\text{O}_2$ , OH, etc.) also form.

This technology allows the treatment of turbid liquids (with a level of transparency to 50%) as well as of the liquids containing appreciable amounts of suspended particles (with a content of up to 10 mg/l) and the concentrations of Fecal Coliforms up to 1,000,000 units/l. Moreover, the application of ultrasound does not allow particles, which are present in the liquid to form sediment on the protective glass and walls of the working chamber thus increasing the operation effectiveness. This makes unnecessary the cleaning of the surfaces in contrast to the conventional ultraviolet water treatment technology.

The described above unit is significantly more affective (by a factor from 100 to 1000) as compared with the conventional ultraviolet disinfecting systems with analogous power consumption and capacity, for example, of the UV-3000 type produced by the Trojan Company.

The series coupling of two "Lazur M-250" units appreciably increases the reliability and still more enhances its disinfecting characteristics with respect to destruction of spore-forming (with a content of up to 1,000,000 units/l), virus forms (with a content of up to 100,000 units/l), fungous microorganisms (with a content of up to 10,000 units/l), molds (with a content of up to 1000 units/l), and protozoa (with a content of up to 1000 units/l).

To provide the necessary capacity of the station in the mode of the gravity flow, the total drop in the height from the outlet of biological (or any other) purification system to the outlet of the system in point must be from 4 to 6 m.

All the modules are provided with necessary devices controlling their operation. The levels of ultraviolet radiation and the power of ultrasonic transmitters are permanently monitored. The power supply blocks are equipped with connectors for linking-up to the total control system.

Fig . 1

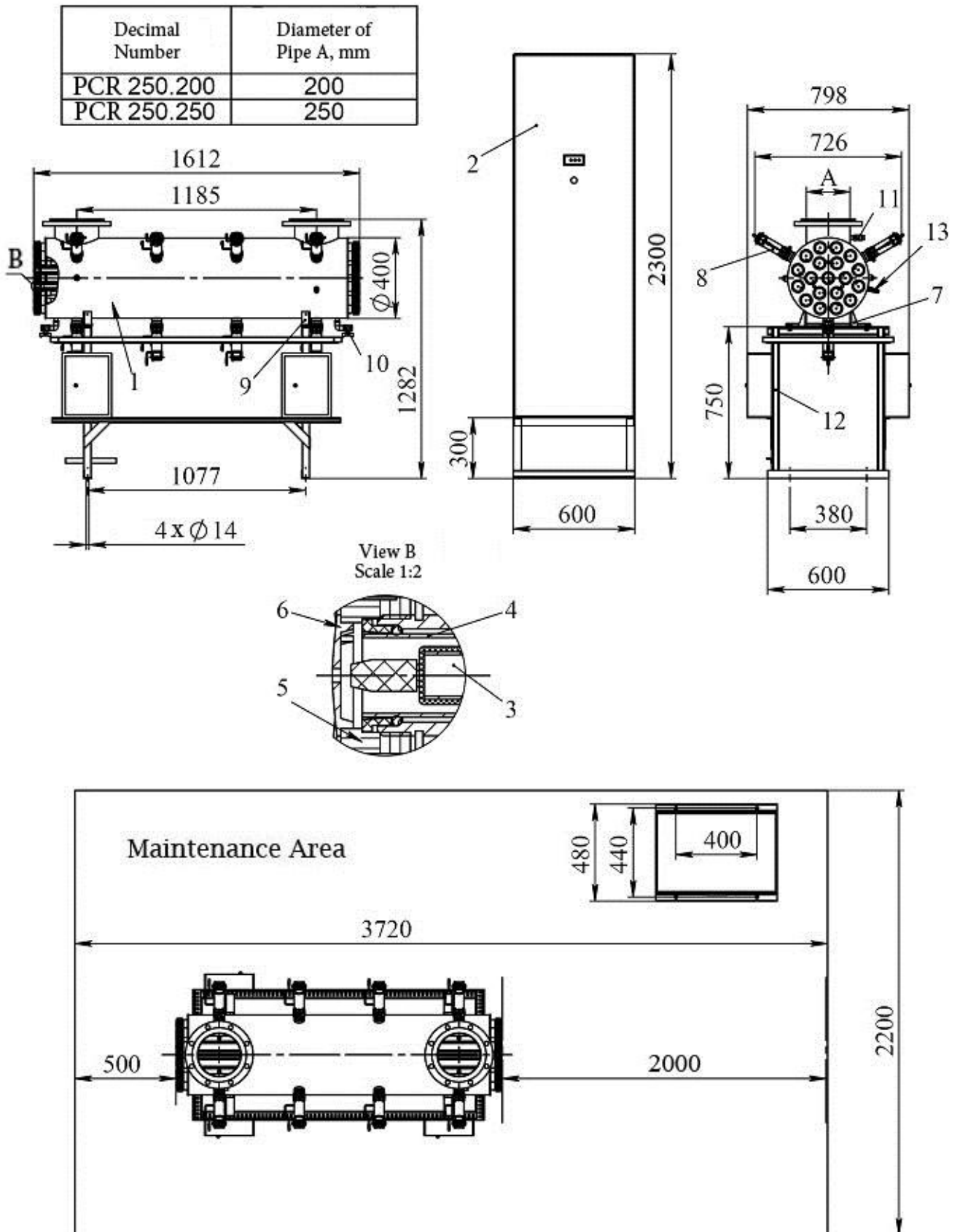
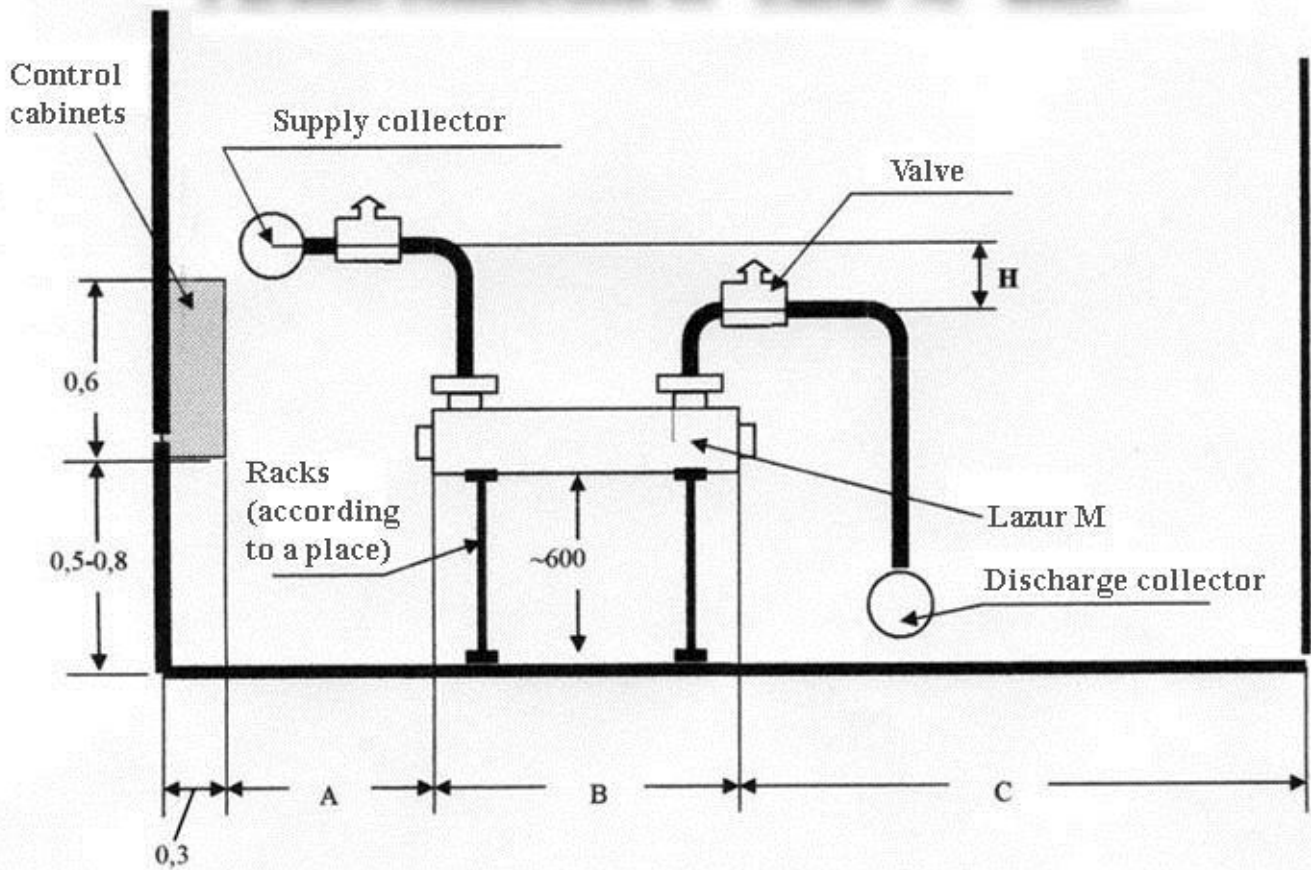


Fig. 2

## Parallel connection of "Lazur M" units



Lazur	A	B	C	t	L <sub>1</sub>	L <sub>2</sub>
M50	1,0	1,3	2,0	0,8-1,0	1,0	1,0
M100	1,0	1,7	2,0	1,2	1,2	1,2
M250	1,0	1,7	2,0	1,4	1,5	1,5
M500	1,0	3,0	2,0	1,4	1,5	1,5

All dimensions are given in meters.

Fig. 3

### Scheme of water disinfecting station with "Lazur M" modules-parallel connection (view in plan).

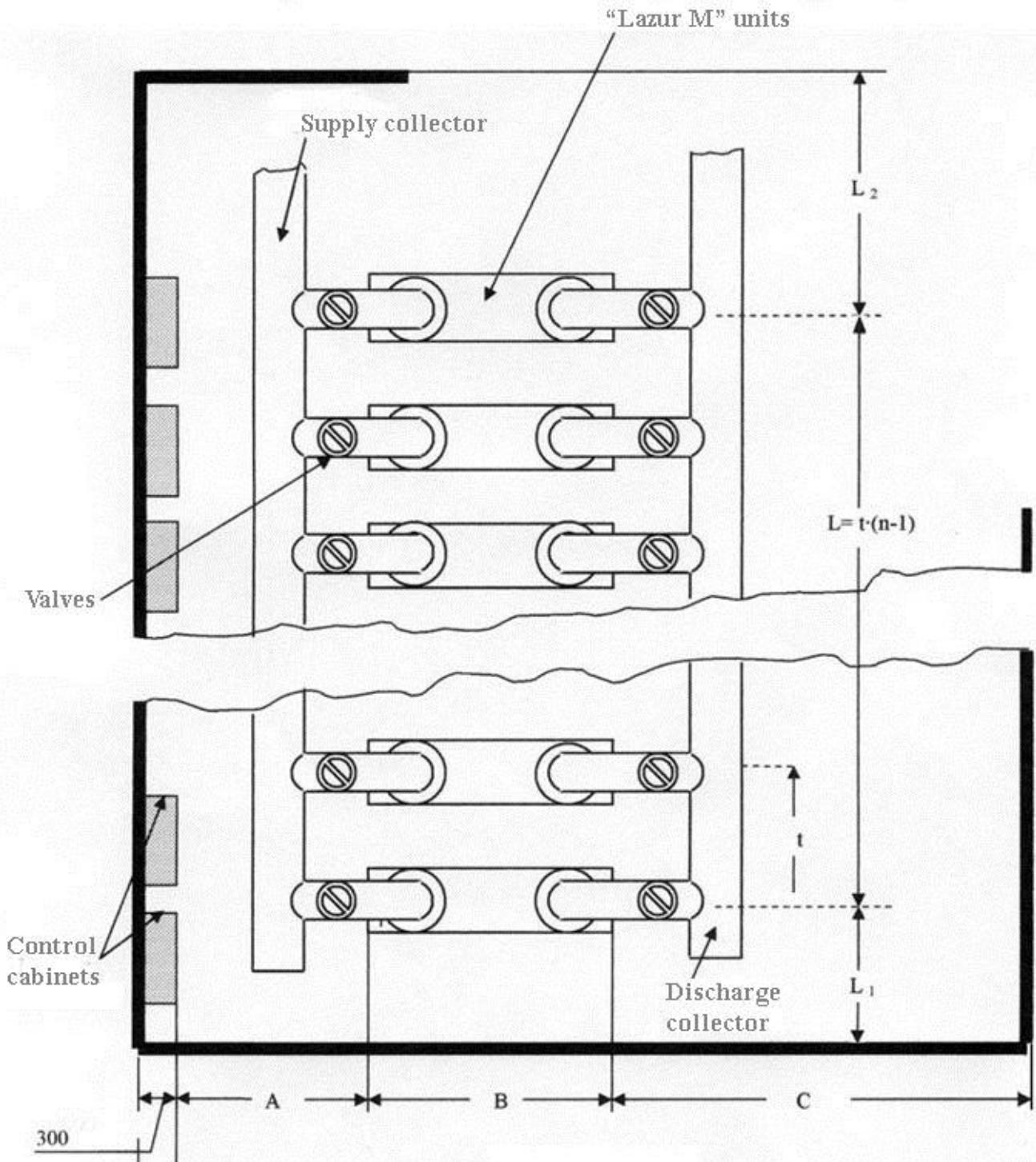
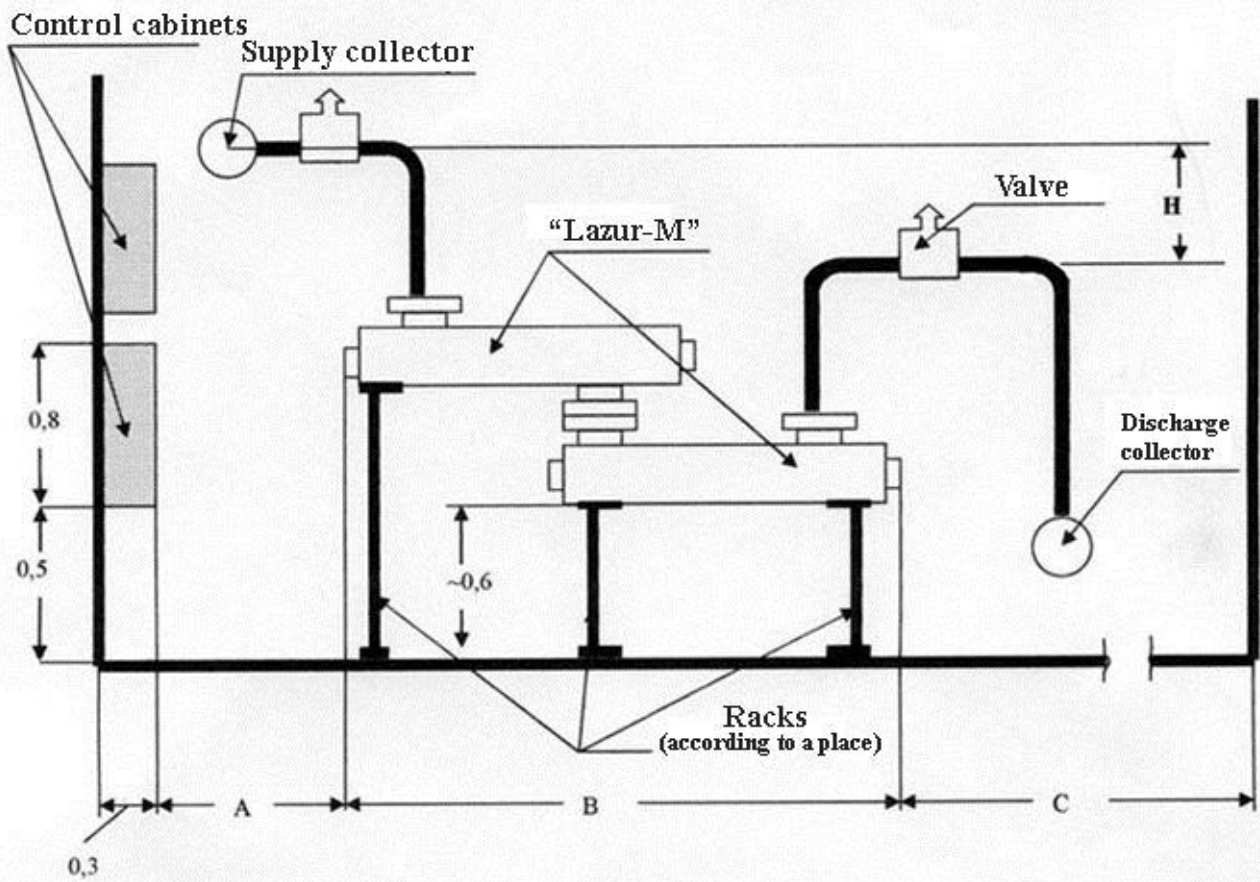


Fig. 4

## Parallel-series connection of "Lazur-M" units.



Lazur	A	B	C	t	L <sub>1</sub>	L <sub>2</sub>
M50	1,0	2,0	2,0	0,8-1,0	1,0	1,0
M100	1,0	3,0	2,0	1,2	1,2	1,2
M250	1,0	3,0	2,0	1,4	1,5	1,5

All dimensions are given in meters.

Fig. 5

### Scheme of water disinfecting station based on modules of "Lazur-M" series (parallel-series connection).

