



**INSTITUTE  
OF THERMOELECTRICITY**

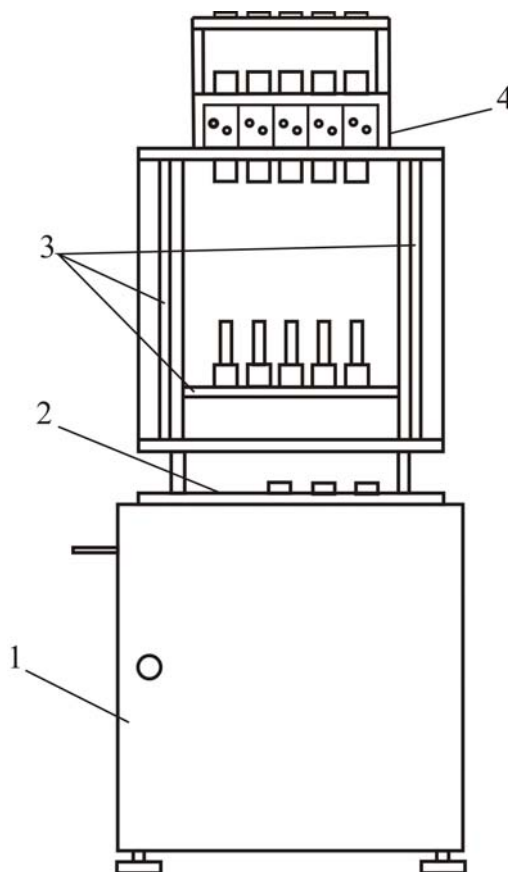
**• UKRAINE •**

# **INSTALLATION FOR GROWING HIGH-QUALITY THERMOELECTRIC MATERIAL BASED ON Bi-Sb-Te**

- The installation is intended for growing in the sealed quartz or borosilicate glass ampoules the low-temperature thermoelectric materials based on bismuth telluride.

- The operating principle of the installation is based on thermoelectric material crystallization from the melt by vertical zone melting method with the upward travel of molten zone. The sealed ampoules comprising pre-synthesized thermoelectric material pass through heaters and coolers assembly with the assigned rate. The heater with the upper and lower water heat exchangers creates inside the ampoule a zone of molten thermoelectric material with temperature gradient at solid-melt interface 150-200 K/cm.

## **Schematic and appearance of installation for growing thermoelectric material based on Bi-Sb-Te**



1 – power unit; 2 – control panel;  
3 – travel mechanism; 4 – heaters and coolers assembly.

- Installation for growing thermoelectric material comprises power unit 1 consisting of power supply unit and heat controller. Arranged above the power unit is control panel 2. Travel mechanism 3

consists of a plate and two guide screws. Heaters and coolers assembly 4 is located in the upper part of the installation and includes five segments of heaters, upper and lower coolers.

- The advantage of this installation over its analogs is that heating and temperature control of each heater is made independently and provided by individual devices. The installation allows growing up to 7 kg of material per day, with the output about 2 tons of thermoelectric material per year. A wide range of rates of growing thermoelectric material ingots and adjusted heater temperatures allows obtaining high-quality material with assigned parameters.

**Parameters of installation for growing  
thermoelectric material based on Bi-Sb-Te**

№	Parameter name, unit of measurement	Value
1.	Number of thermoelectric material ingots simultaneously grown in sealed ampoules, pcs.	5
2.	Outer diameter of ampoules for growing ingots, mm	22-28
3.	Maximum length of grown thermoelectric material ingot, mm	340
4.	Range of adjusted heater temperatures when growing thermoelectric material ingots, °C	500-850
5.	Range of adjusted rates of growing thermoelectric material ingots, mm/hour	2÷100
6.	Electric power supply, single-phase, V	220
7.	Power consumption, kW	2,0
8.	Water flow rate in cooling system, l/min	2-4
9.	Water temperature in the main or recirculation system, °C	10÷30
10.	Overall dimensions, mm length width Height	480 700 1550
11.	Mass, kg	100

**Orders and additional information at the address:** General P.O. Box 86, Chernivtsi, 58002, Ukraine; e-mail: [ite@ite.cv.ua](mailto:ite@ite.cv.ua); fax: (380-3722)-41917; phone: (380-3722)-41917; <http://ite.inst.cv.ua>.