

## HEATERS

The heaters are used for getting required operating temperatures of cathodes and getters. The heaters performing heat transfer by radiation are most widespread. They consist of a wire made of refractory metal protected from a co-touch with the cathode body or a getter by ceramic insulation. The power emitted by passing an electric current through the wire is transferred by radiation to the cathode or getter. The operating temperature of the heater can reach 1600°C.

The main purpose of the vacuum-tube cathode heater is heating a cathode for a preset time and maintaining its operating temperature within planned longevity.

The getter heater is intended for heating or activating the getter.

The main parameters of the cathode assembly provided by the heater:

### **Preset**

- Emitter temperature.
- Heater voltage.
- Heater current.

### **Basic parameters of the heaters:**

- Wire diameter.
- Resistance in the cold state.
- Dimensions of the working part.

### **By the type of insulation the heaters may be divided into three groups:**

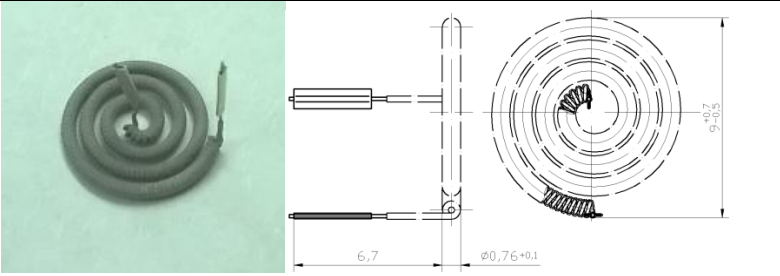
- Heaters with an oxide coating. The coating is a ceramic layer based on aluminum oxide 60-80 microns thick. As a rule, these are used for cathodes with operating temperature up to 10000°C with a diameter of 1 to 20 mm.
- Heaters on ceramic sleeves. The ceramic sleeves are made of ceramics based on alumina, and strung on a wire. These sleeves are used for cathodes with a diameter of more than 40 mm.
- Heaters in a ceramic body. The ceramic body is made of ceramic based on aluminum oxide. The heater coil is located inside the body. These heaters can be used for a cathode diameter of 1 to 40 mm.

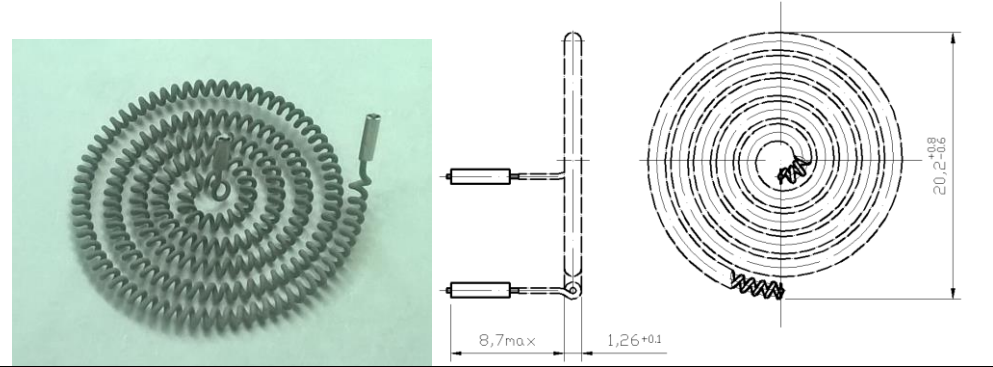
The BTKVP Company Ltd. produces heaters for cathodes and getters both as components of cathode-heated and getter assemblies and as independent products.

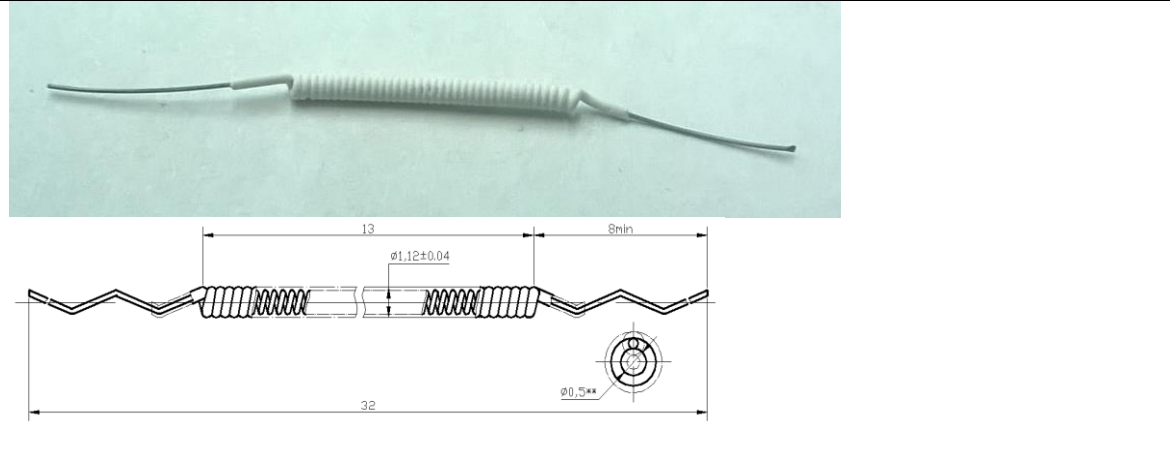
The company has a full technological cycle of manufacture in cathode heaters and getters including the operation of winding, forming, heat treatment, chemical treatment, resistance and laser welding.

The BTKVP Company Ltd. also carries out development, manufacture and tests experimental heaters for metal dispenser cathodes, oxide cathodes and getters of a customer with dimensions ranging from 1 to 100 mm, including miniature heaters in a ceramic body.

Given below are some samples of the heaters manufactured by the BTKVP Company Ltd.

Gi-21B	
Purpose	oxide cathode heater
Diameter	9 mm
Working portion height	0.76 mm
Cathode operating temperature	800°C
Heater filament power	10.8 W
Heater filament voltage	12.6 V
Resistance	5.7 ohm
Material of the wire	tungsten-rhenium alloy
Insulation type	oxide coating with thickness of 60-80 microns

Gi-23B		
Purpose	oxide cathode heater	
Diameter	20.2 mm	
Working portion height	1.26 mm	
Cathode operating temperature	800°C	
Heater filament power	31 W	
Heater filament voltage	12.6 V	
Resistance	2,10M	
Material of the wire	tungsten-rhenium alloy	
Insulation type	oxide coating with thickness of 60-80 microns	

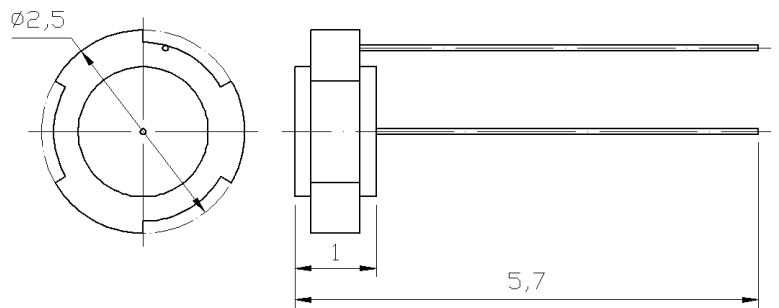
NGT S-3		
Purpose	getter	
Diameter	1.1 mm	
Working portion length	38 mm	
Getter operating temperature	800°C	
Getter filament power		
Getter filament voltage		
Resistance		
Material of the wire	tungsten-rhenium alloy	
Insulation type	oxide coating with thickness of 60-80 microns	

PTS-1	
Purpose	getter
Diameter	2.3 mm
working portion height	3.1 mm
getter operating temperature	Up to 950°C
Getter filament power	Up to 2.7 W
Getter filament voltage	Up to 9 V
Getter filament current	Up to 0.3 A
Material of the wire	tungsten-rhenium alloy
Insulation type	oxide coating with thickness of 60-80 microns

<b>P-12</b>	
Purpose	dispenser cathode heater
Diameter	11.8 mm
Высота	2.3 mm
Cathode operating temperature	1100°C
Filament power	50 W
Filament voltage	10.5 V
Resistance	0.75 ohm
Material of the wire	tungsten-rhenium alloy
Insulation type	ceramic body

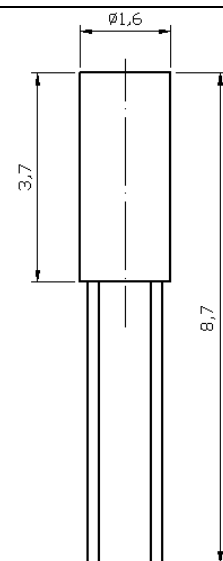
<b>P-35</b>	
Purpose	dispenser cathode heater
Diameter	38 mm
Высота	3.5 mm
Cathode operating temperature	1100°C
Filament power	315 W
Filament voltage	11,7 V
Resistance	0.18 ohm
Material of the wire	tungsten-rhenium alloy
Insulation type	ceramic body

P-2,5



Purpose	dispenser cathode heater
Diameter	2.5 mm
Height	10 mm
Cathode operating temperature	1100°C
Filament power	5.9 W
Filament voltage	7B
Resistance	3 ohm
Material of the wire	tungsten-rhenium alloy
Insulation type	ceramic body

P-1,7



Purpose	dispenser cathode heater
Diameter	1.6 mm
Height	3.7 mm
Cathode operating temperature	1100°C
Filament power	9.0 W
Filament voltage	3 V

Resistance	0.3 ohm
Material	tungsten-rhenium alloy
Insulation type	ceramic body
<b>Tsern</b>	
Purpose	dispenser cathode heater
Diameter	95 mm
Height	7 mm
Cathode operating temperature	1100°C
Filament power	670 W
Filament voltage	24 V
Material of the wire	tungsten-rhenium alloy
Insulation type	Ceramic sleeves

Key words: cathode heater, getter, production, development, heating, filament heater parameters.