

### Description

The equipment is a robotized workstation and is used to drill off samples from a silicon ingot. The ingot is clamped in the machine in a fixture on an adjustable carriage which is located on an assembly of linear guidance systems.

The samples are cut off with a hollow drill and they have cylindrical shape. Two independent drilling units are used for drilling and they are installed vertically on the frame of the workstation. The tool is cooled down with demineralised water in course of drilling.

The SCARA robot adjusts the drilling position and takes the finished samples away in the machine. A part of the end effector of the robot is formed by a laser optical sensor which makes it possible to measure every ingot being processed, to find its centre and to calculate the optimum distribution of positions for drilling on the ingot. Finished samples are placed by the robot into a bin wherefrom they are removed by the operator after the automatic process is finished.

### Facts and interesting things:

- The frame of the workstation is welded from stainless-steel profiles and is covered with covers which are blocked with security locks during operation.
- The drilling units are robust, their spindles are driven with a three-phase electric motor which is controlled by a frequency converter with an option to adjust the revolutions within a range of 3,500 up to 7,000 revolutions / minute.
- Vertical thrust to the cut is pneumatically controlled.
- The drilling units are located under a muffled cover.
- The position of the assembly of the carriage to clamp the ingot is adjustable in two axes in the horizontal plane by means of the robot and the entire assembly including the ingot can be tilted in all directions with servomotors in order to balance the plane of the crystal towards the drilling plane.
- Standard samples of silicon material of nominal diameter equal to 5 mm are drilled on the drilling unit number 1 and are subsequently used as the incipient material to draw new monocrystals.
- Samples of FTIR type and diameter equal to 15.4 mm are drilled on the drilling unit number 2 and are used for development purposes.
- The workstation is managed by a PLC with an operator interface with a touch screen of a diagonal equal to 10.4" including a software application.

### Basic technical data:

Length: 2,000 mm  
 Width: 900 mm  
 Height: 2,350 mm  
 Weight: 850 kg  
 Power supply: 3 NPE 400/230 V AC 50 Hz TN-S

