A new cryopump of 300 m$^3$/s has been developed for a neutral beam injector (NBI) with an electrical output of about 2 MW in the JIPP T-IIU Tokamak. As the major requirement for this design was to meet the specification of the pump (Table I) and to make a maintenance simple and running-cost cheap, the pump design has been decided to apply a large area of a charcoal sorbent wall without both liquid helium and liquid nitrogen (i.e., maintenance-free), which were necessitated for the cryo-condensation pump in old JIPP T-IIU-NBI system.

The cryo-sorption pump consists of (Fig. 1) the body of the pump (nominal diameter 1500 mm by 1900 mm deep), internal structure of two stage (generally called the 20K stage, and the 80K stage) and seven cryogenerators. The pump was installed at the top of the injector vacuum vessel. It was found that the measured pumping speed of 330 m$^3$/s for hydrogen was very close to the design value of 300 m$^3$/s (Fig. 2). At the bottom of the beam line pumping speed was limited to about half due to a restricted conductance of the beam line components.

This pump has been successfully operated in about a year without any trouble. The maintenance and the operation has been simplified dramatically. The operation of high pumping speed cryo-sorption pump on the JIPP T-IIU-NBI has been accumulated for the application of the pump in the LHD-NBI system.

### Table I. Specification of 300 m$^3$/s Cryo-sorption Pump for Hydrogen

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumping speed</td>
<td>300 m$^3$/s</td>
</tr>
<tr>
<td>Ultimate pressure</td>
<td>&lt; $10^{-7}$ Torr</td>
</tr>
<tr>
<td>Pumping capacities</td>
<td>&gt; 660 stdl</td>
</tr>
<tr>
<td>Size</td>
<td>1500 diam x 1900</td>
</tr>
<tr>
<td>Gas flow</td>
<td>30 Tl/s for 1.5 s</td>
</tr>
<tr>
<td>Ion source</td>
<td>Beam current of 50 A</td>
</tr>
<tr>
<td>Utilities</td>
<td>Beam energy of 40 keV</td>
</tr>
<tr>
<td></td>
<td>Without Liq.He and Liq.N$_2$</td>
</tr>
</tbody>
</table>

Fig. 1. Schematic diagram of a new cryo-sorption pump for JIPP T-IIU-NBI. Nominal pumping speed is 300 m$^3$/s.

Fig. 2. Pumping speed for hydrogen vs the gas pressure.