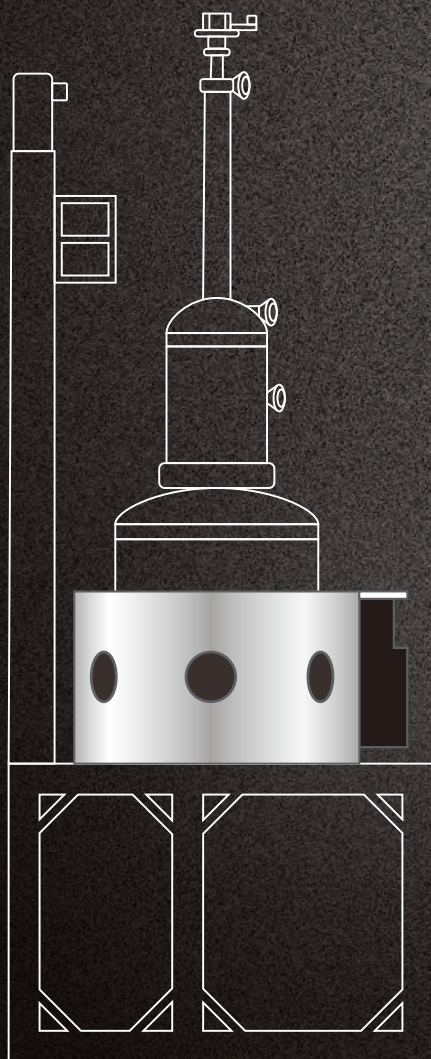


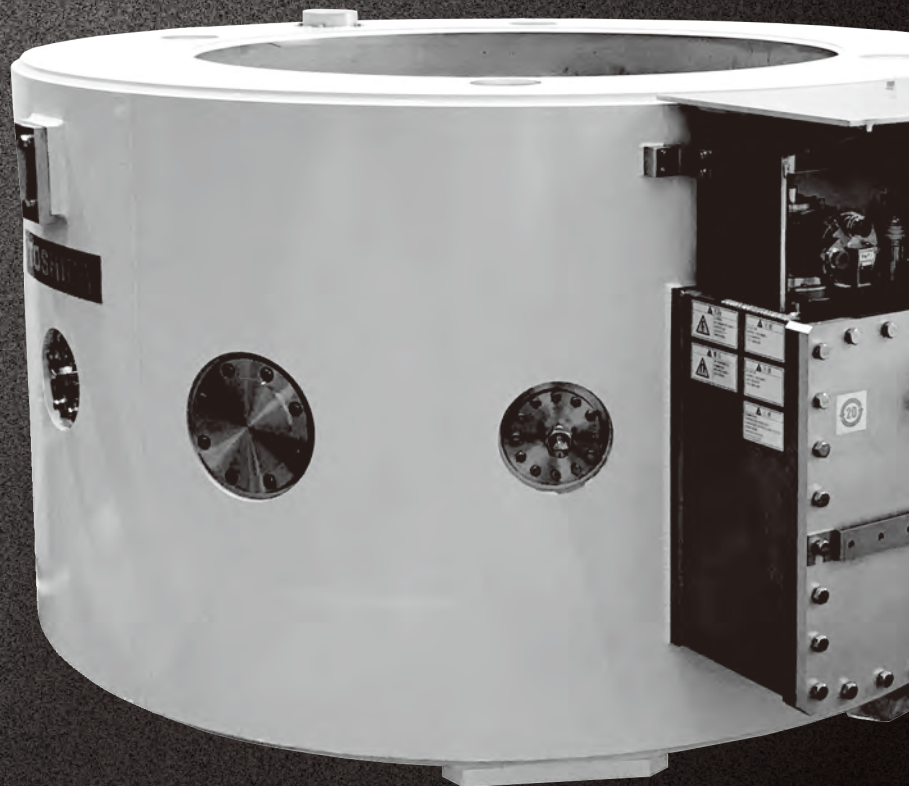
TOSHIBA

SUPERCONDUCTING MAGNET

**for SILICON
SINGLE-CRYSTAL
PULLER**



INGOT GROWING SYSTEM



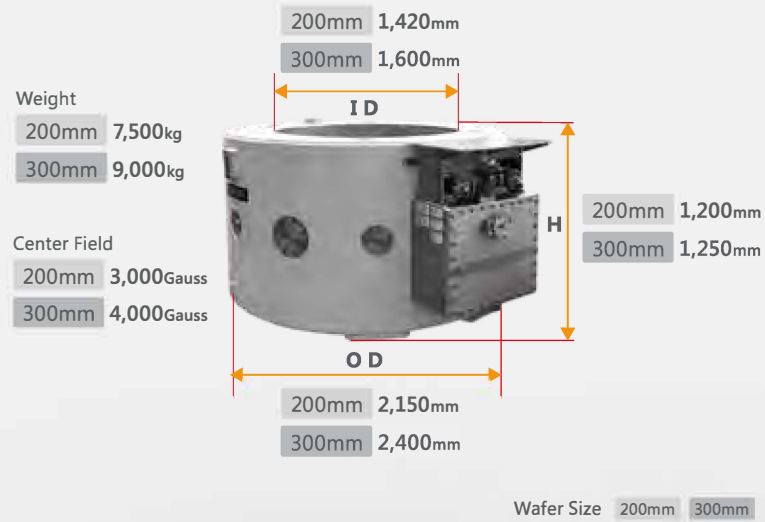
Toshiba Energy Systems & Solutions Corporation

We can provide magnetic field distribution according to your request.

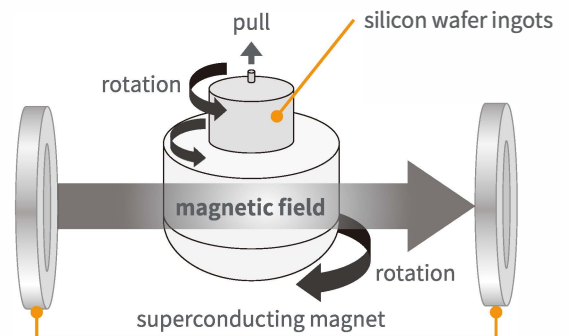
JP.PAT.4594794, 5889509, 5421170

Specification

► Scale



► Effect of magnetic field



Effect of high magnetic field

Suppression of convection and temperature gradient..

Extend life of crucible.

Improvement of productivity

Good quality of silicon ingot.

Increasing yield.

Benefit



Helium less

Liquid helium is not used.
Directly cooled by refrigerator.

Simple structure
and high reliability.



Light weight

Optimally designed
high efficiency structure.

Light enough
even with magnetic iron shield.

Easy to handle.

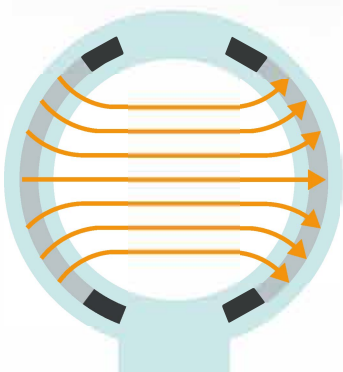


Low cost

Only two refrigerators are used.
Expensive liquid helium is not used.

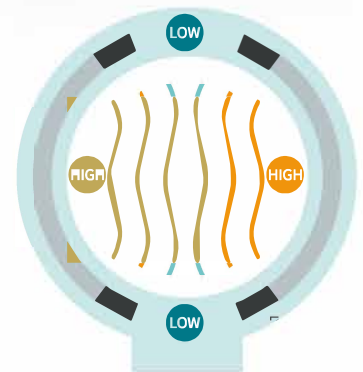
Low running cost
and low maintenance cost.

Effect of magnetic field



Uniform magnetic
flux directionality.

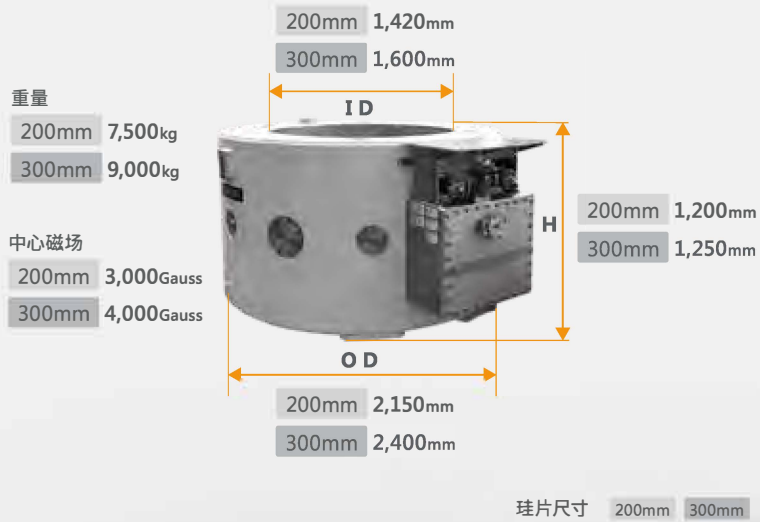
Magnetic flux directionality
is uniform over a wide range.
Easy convection control
of the silicon melt.



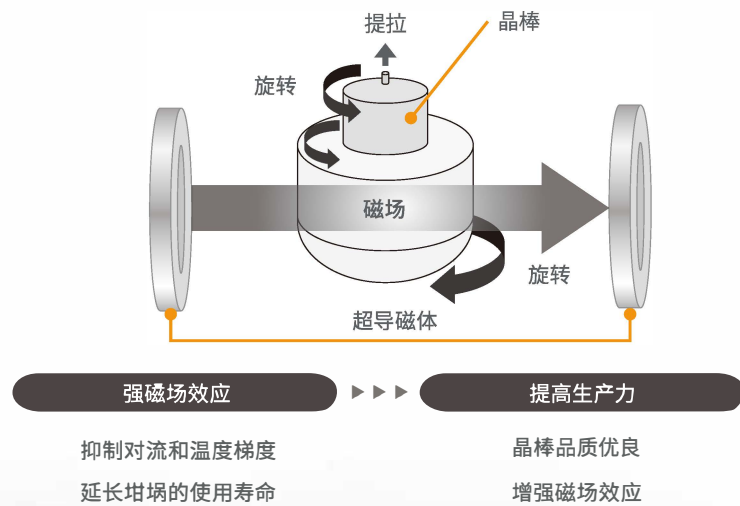
Large uniform field area.

规格

尺寸



磁场效应



优势



无液氮

不使用液氮
制冷机直接干式冷却

结构简单、可靠性高



轻量级

优化设计的高效结构

具有漏磁屏蔽仍足够轻量化
便于操作

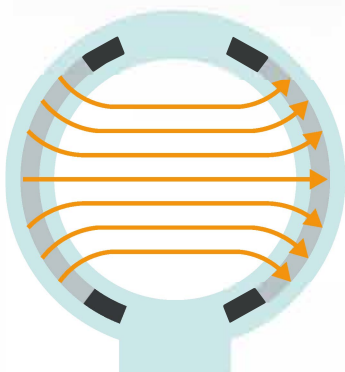


低成本

仅使用两台制冷机
不使用昂贵的液氮

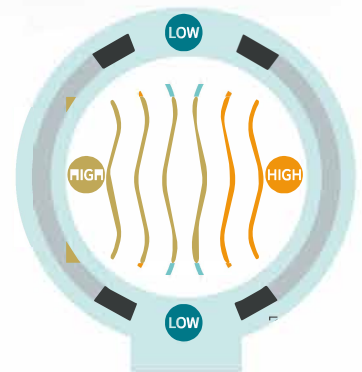
运行成本低，维护成本低

磁场效应



均匀的磁通量分布

磁通量方向性在较大
范围内分布均匀
易于控制硅熔体对流



小强度梯度