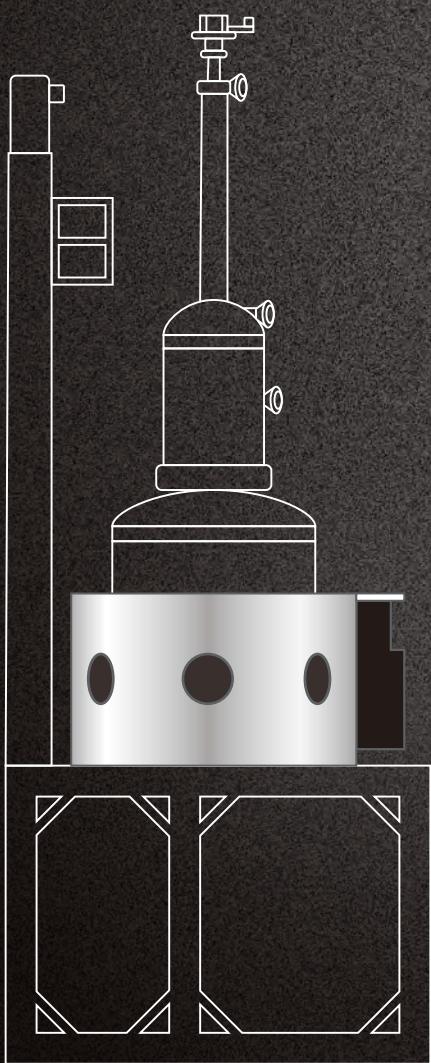


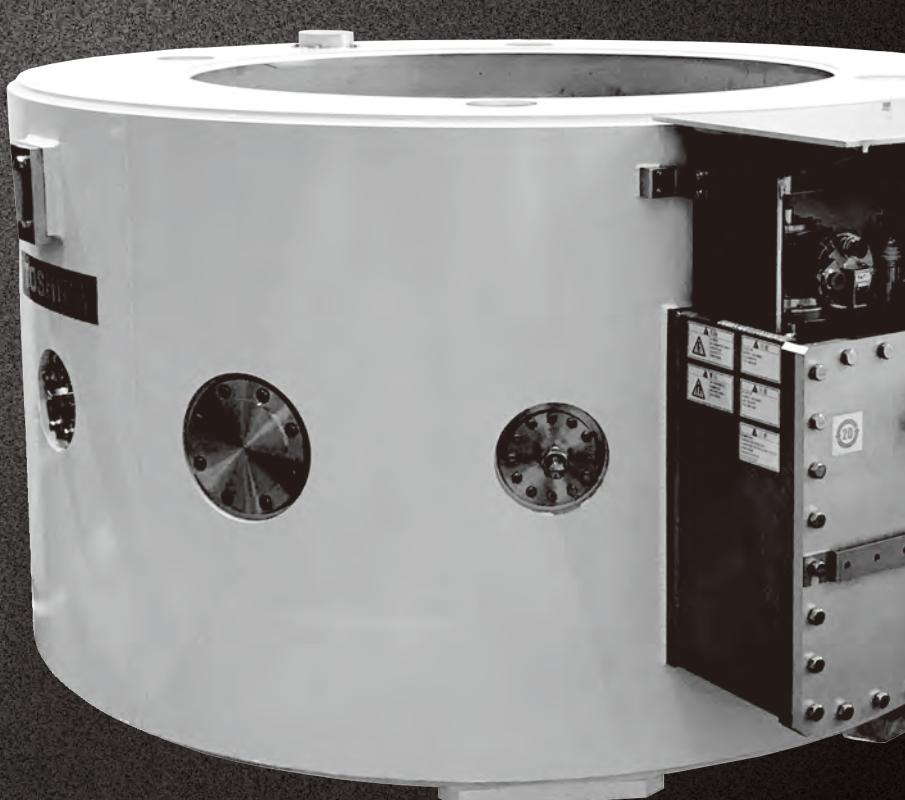
TOSHIBA

SUPERCONDUCTING MAGNET

for SILICON
SINGLE-CRYSTAL
PULLER



INGOT GROWING SYSTEM

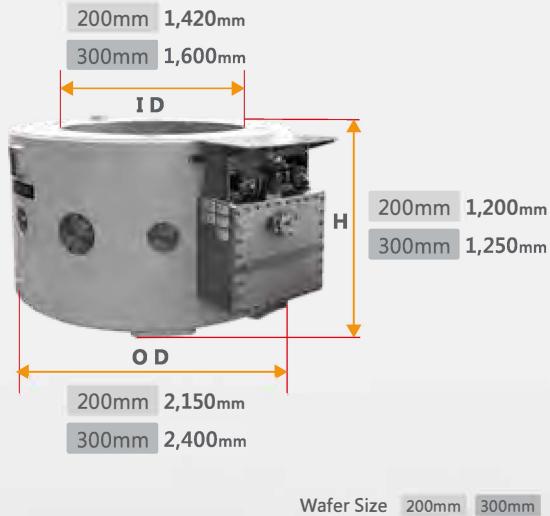


Specification

► Scale

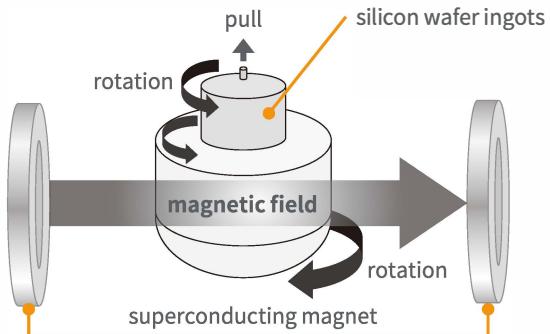
Weight	
200mm	7,500kg
300mm	9,000kg

Center Field	
200mm	3,000Gauss
300mm	4,000Gauss



Wafer Size 200mm 300mm

► Effect of magnetic field



Effect of high magnetic field

Suppression of convection
and temperature gradient..

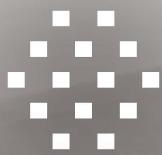
Extend life of crucible.

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.

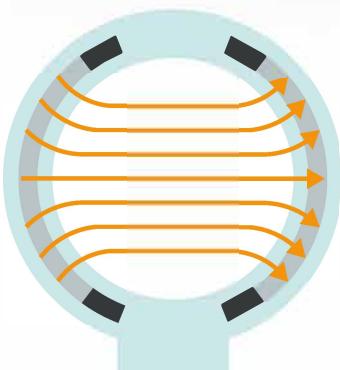


Low cost

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

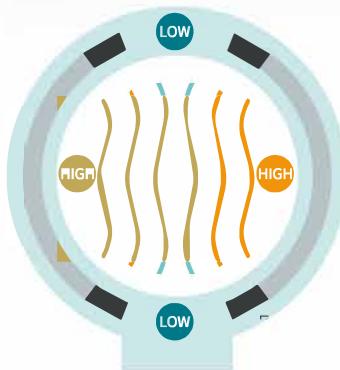
Low running cost
and low maintenance cost.

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.



e-mail : Psc_scm_support@toshiba.co.jp
TEL : +81-044-331-0528

Toshiba Energy Systems & Solutions Corporation
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规格

►尺寸

重量

200mm 7,500kg

300mm 9,000kg

中心磁场

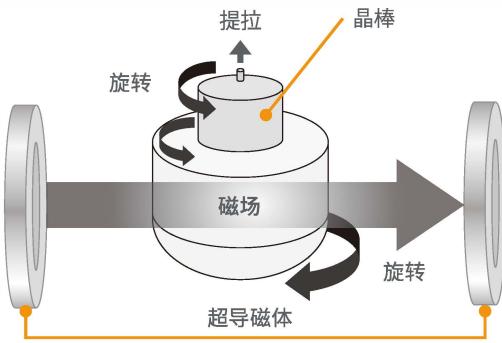
200mm 3,000Gauss

300mm 4,000Gauss



硅片尺寸 200mm 300mm

►磁场效应



强磁场效应

抑制对流和温度梯度

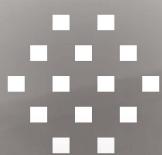
延长坩埚的使用寿命

提高生产力

晶棒品质优良

增强磁场效应

优势



无液氦

不使用液氦
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

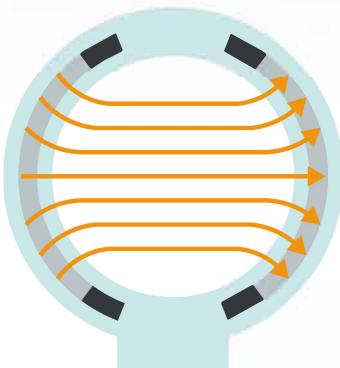


低成本

仅使用两台制冷机
不使用昂贵的液氦

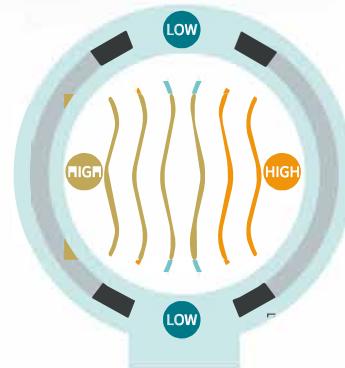
运行成本低，维护成本低

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



e-mail : Psc_scm_support@toshiba.co.jp

TEL : +81-044-331-0528

Toshiba Energy Systems & Solutions Corporation

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