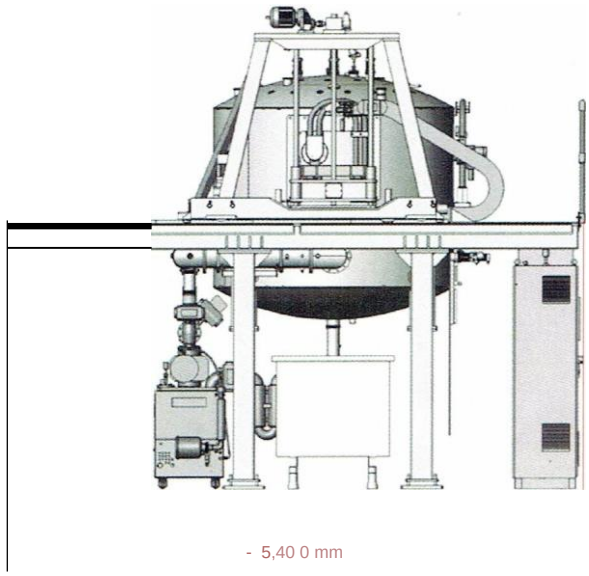
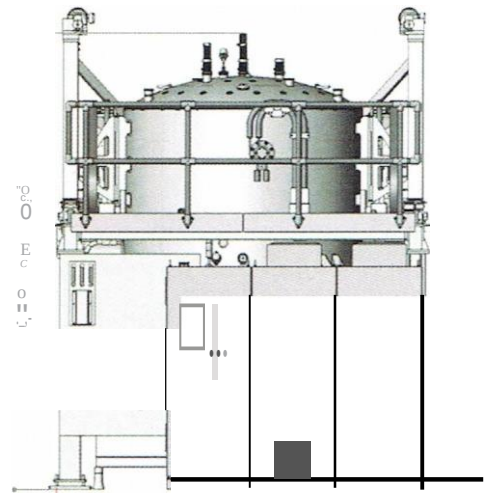
Key Equipment for integrated Ingot & Wafer Production Lines

Multi - Crystalline Ingot Furnace



- 5,400 mm



- LI,000 mm

Technical Data

Dimensions and Weights

Charge weight	450 kg I max. 600 kg
Crucible dimensions [standard GenS]	880 mm x 880 mm **x** 420 mm ILxWxH]
Furnace dimensions in serial order	- 5,400 mm **x** - 4,000 mm **x** - 4,400 mm IL **x** W x H)
Footprint single furnace	20.16 m'
Lifting height [for operation]	- 6,000 mm
Total furnace weight	- 17,500 kg '

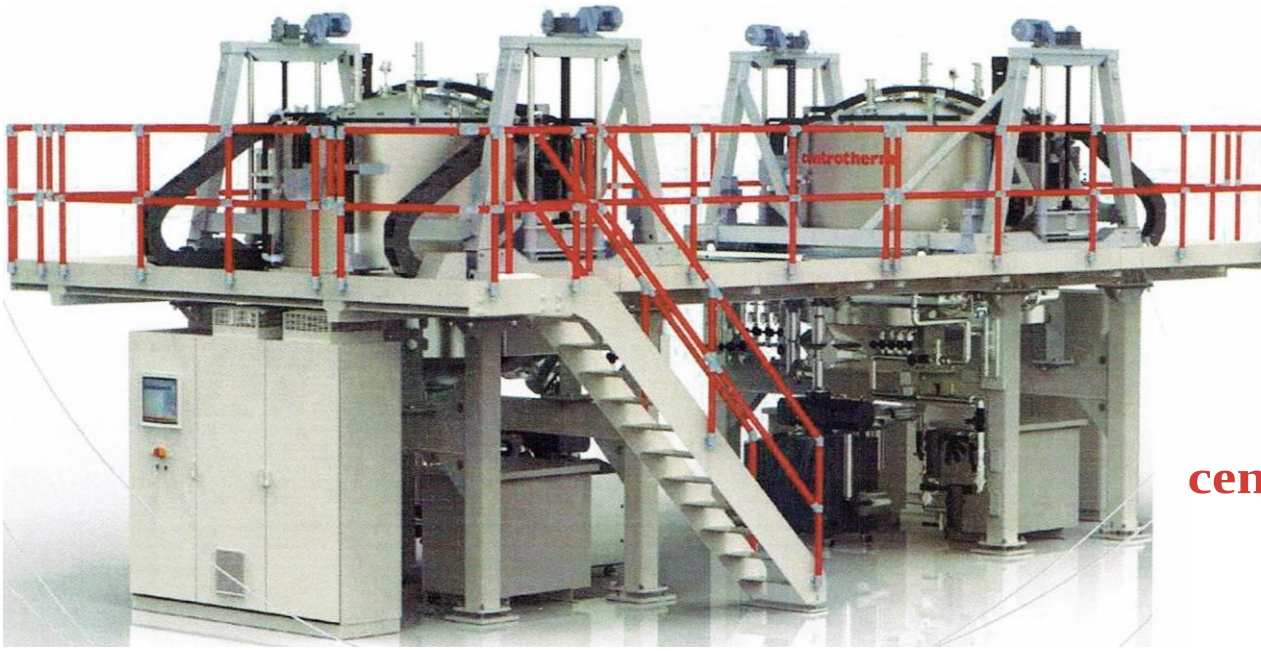
Infrastructure Requirements

Power supply	300 kVA by 3 x 400 VAC ± 5 % ai 50 Hz
Cooling water supply	- 280 l/min at 4.5 bar
Argon consumption [average]	- 30 si/ min at 5 bar
Compressed air	7 bar

[1] ne1 weight without charge weight

Features and Benefits

- Low total energy consumption: < 10 kWh/kg* of ingot
- Low process cycle time: < 60 h with uptime of > 92 %"
- High productivity: > 60 metric t/a or > 7.5 MWp/·a
- Prepared for the future pseudo-mono process
- Easy process control by PLC: Siemens S7 / PCS7
- High safety: bottom graphite shield as final safety barrier
- Delivered with process know-how package
- Technology created in Germany



centrotherm
SiTec

Silicon & Wafer

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Ingot & Wafer Production Lines

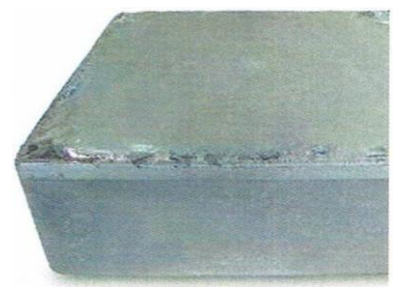
Multi - Crystalline Ingot Furnace

Equipment and Process

The centrotherm SiTec multi-crystalline ingot furnace is a key equipment for photovoltaic silicon ingot and wafer facilities. The furnace grows multi-crystalline silicon ingots by vertical gradient directional solidification of silicon melt in silica crucible after melting of polysilicon chunks. The multi-crystalline ingot furnace is already prepared to grow pseudo-mono ingots. The process consists of heating, melting, growing, annealing and cooling stages. Process temperature varies up to 1,600 °C and process pressure ranges from 0.1 to 600 mbar.

The furnace consists of a graphite hot zone located in a stainless steel vacuum chamber supported by a base frame. The hot zone contains 3 independent active thermal elements - sicie resistive heater, bottom resistive heater and bottom active cooling unit. The hot zone is designed in modular structure and optimized for ingot generation Gens and 450 kg basie charge weight.

The furnace has integrated water cooling, argon flow, vacuum pump, power supply, temperature monitoring and fully automated process control systems. The base frame is equipped with an electro-mechanical opening and closing mechanism and with an integrated tool for top loading and unloading of the charged crucible.



Multi-crystalline ingot

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