CGS1000PV
PRODUCT OVERVIEW

CRYSTAL GROWTH. ENGINEERED IN EUROPE.

Every solar module begins as a single silicon crystal. The CGS1000PV grows it: a Czochralski puller built for high-volume solar ingot production – efficient in energy, long-lived in service, and engineered to European safety standards.

PVA TePla

PRODUCT INTRODUCTION

CGS1000PV
OUR SOLUTION

Ingot capacity is the narrowest step in the solar chain – and the hardest to source. The CGS1000PV closes that gap with a puller engineered and supported from Europe.

PVA TePla has been building Czochralski crystal growth systems for decades. The CGS1000PV applies that engineering experience to solar ingot production, where volume is high, margins are thin, and every idle hour shows up in the cost per kilogram.

Dedicated to the high efficiency needs of the Solar Industry, we developed a state-of-the-art hotzone and puller combination. Each component was assessed against four questions: what it costs to run, how long it survives, how quickly it can be serviced, and how reliably it can be supplied.

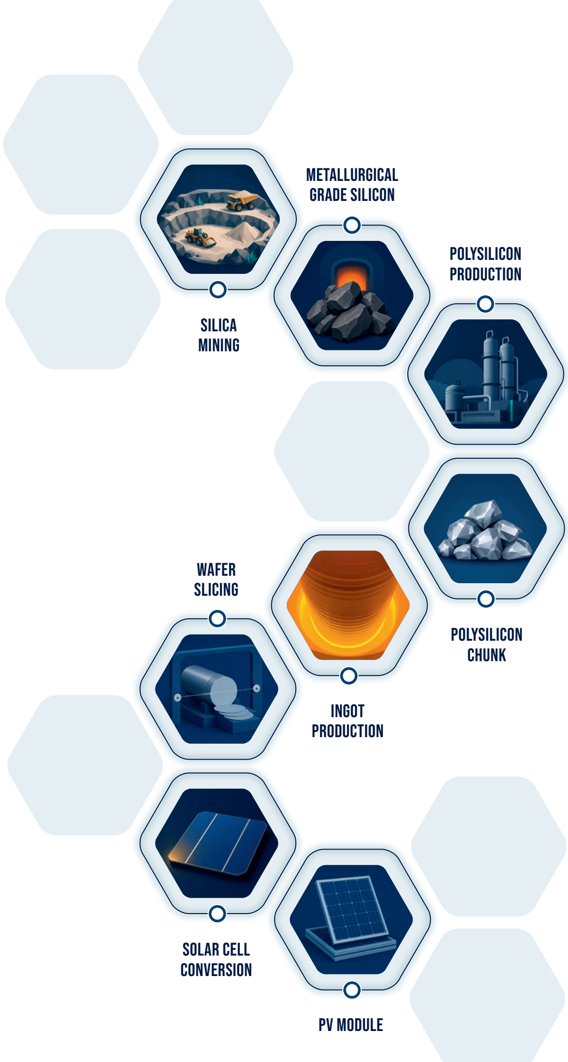
The result is a system built for continuous industrial operation – with engineering, service and process support from PVA TePla.

Dual-zone side heater
900 kg melted in 10–11 hours, with lower oxygen uptake from the crucible.

Hot turnaround
The next run starts at up to 250 °C – no cool-down, no process change.

Heaters that last years
Under 5 % resistance change after five years of continuous service.

Broad supplier base
Graphite and C/C parts, no long-fiber felt – components you can resource.



FROM SUNLIGHT TO SOLAR MODULE

EVERY MODULE STARTS WITH A CRYSTAL

The path from raw material to a finished solar module runs through a small number of well-defined steps: quartz sand becomes metallurgical silicon, silicon is purified into polysilicon, polysilicon is grown into a monocrystalline ingot, the ingot is sliced into wafers, wafers are processed into cells, and cells are laminated into modules.

One of these steps carries disproportionate weight. Crystal growth is where the electrical quality of the finished cell is decided – oxygen content, dislocation density and resistivity are all set here, and no downstream process can recover what is lost at this point. It is also the single most energy-intensive step in the chain, and therefore one of the largest contributors to cost per watt. Ingot production is where materials science, process engineering and economics converge.

THE CASE REGIONAL INGOT PRODUCTION

As photovoltaic manufacturing expands, investment is moving upstream – from cell and module assembly to ingot and wafer production. These steps require specialised equipment, stable processes and technical expertise. In crystal growth, equipment quality and process precision influence the quality of the resulting silicon ingot and wafers.

Regional ingot production is a demanding industrial capability and a long-term investment. PVA TePla provides the required technology and know-how: with its experience in CZ crystal growth systems for semiconductor and solar silicon, the company supports customers from commissioning to process optimisation – helping establish reliable and efficient ingot production.

TECHNICAL DATA

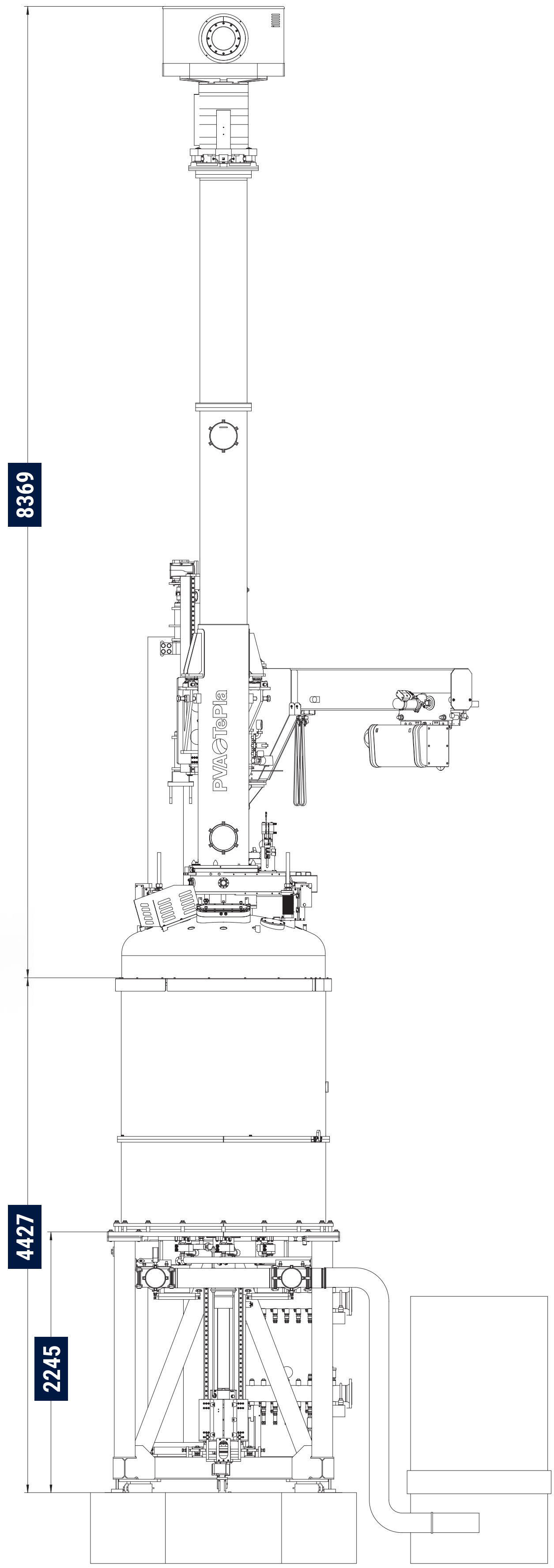
SPECIFICATIONS

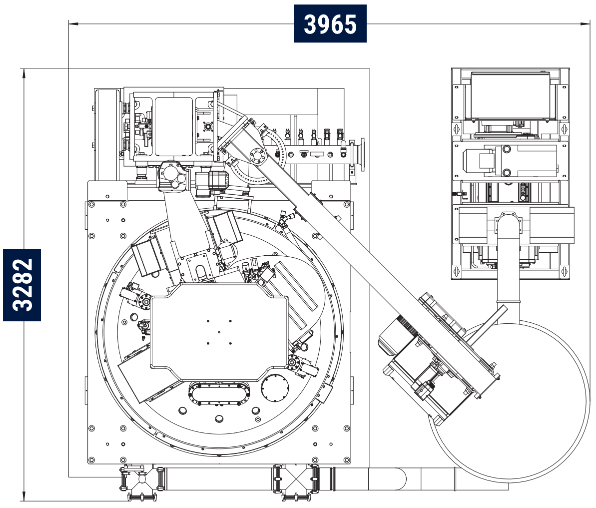
Three numbers decide whether an ingot line makes money: the energy it takes to grow a kilogram, the hours it runs each year, and the cost of keeping it running. The CGS1000PV addresses all three – with the hot zone. A larger process chamber leaves room for insulation that a 1,600 mm design cannot fit, so less heat escapes and less power is needed to replace it. A dual-zone heater shortens melt-down and limits oxygen uptake from the crucible. Long-lived heaters, in-situ servicing and hot turnaround between runs cut the downtime that follows every production cycle.

SPECIFICATIONS	
Features and Benefits	■ Lower energy per kg of ingot – faster melt-down ■ Prolonged heater lifetime – longer maintenance intervals ■ Triple-redundant melt gap control – reduced water-in-melt risk – integrated spill containment ■ Lower ingot oxygen content – higher average cell conversion efficiency
Crystal material	Silicon (Si)
Crystal diameter (max.) / Total crystal length (max.)	up to 305 mm (12") / 7 m
Crystal weight (max.) / Si charge weight (max.)	1,000 kg / 1,000 kg
Crucible size (standard)	36" (upgrade to 42" possible)
Charge weight (standard)	for 36" approx. 610 kg (500 kg initial charge + 110 kg recharged) (Optional with Feeding (3–5x) up to ~ 950 kg)
Melt temperature	approx. 1,420 °C
Melt-down time (500 kg Si)	approx. 6–7 hours
Max. side-heater power	180 kW (both segments)
Max. bottom-heater power	120 kW
Heating power during melt-down (500 kg)	approx. 250 kW
Heating power during crystal growth (300 mm)	approx. 50 kW
Process-chamber inner diameter	Ø 1,700 mm
Operating pressure (process)	5–30 mbar
Leak rate	$\leq 3 \times 10^{-2}$ mbar·l/s
Argon gas flow	approx. 150 slpm
Main pump capacity	approx. 4,000 m³/h
Cooling water supply (inlet/outlet)	20 / 50 °C
Total system weight	approx. 20 to
Footprint (complete system)	approx. 8 × 8 m
Fieldbus	PROFINET® and I/O-Link®
Overall dimensions (closed)	approx. 13,800 mm × 2,300 mm × 3,300 mm (h × w × d)
Overall dimensions (opened, highest lifting position)	approx. 14,600 mm × 5,500 mm × 5,000 mm (h × w × d)

TECHNICAL DATA

DIMENSIONS





All dimensions are in mm.

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