BERNT LORENTZ GmbH
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Monday, February 10, 2020

New project

Solar pumping project

Note: Solar power porject in Gange Ezat Abad village

Parameter

Location:	Afghanistan, Herat (34° North; 62° East)	Water temperature:	25 °C		
Required daily output:	30 m³; Sizing for average month	Dirt loss:	5.0 %	Motor cable:	100 m
Pipe type:	plastic	Static head:	111 m	Pipe length:	1,600 m

Products

	Quantity	Details
PS2-4000 C-SJ5-25	1 pc.	Submersible pump system including controller with DataModule, motor and pump end
LC250-P60	18 pc.	4,500 Wp; 9 x 2 modules; 34 ° tilted
Pole Mount PM-1-5	3 pc.	Beam length: 5200 mm (205 in); Pole diameter: 114,3 mm (4.5 in)
Pole Mount PM-1-3	1 pc.	Beam length: 3400 mm (134 in); Pole diameter: 114,3 mm (4.5 in)
Motor cable	100 m	25 mm² 3-phase cable for power and 1-phase cable for ground
Pipeline	1,600 m	50 mm (inner diameter) Pipeline
Accessories	1 set	Well Probe, PV Disconnect 440-40-3, Surge Protector2

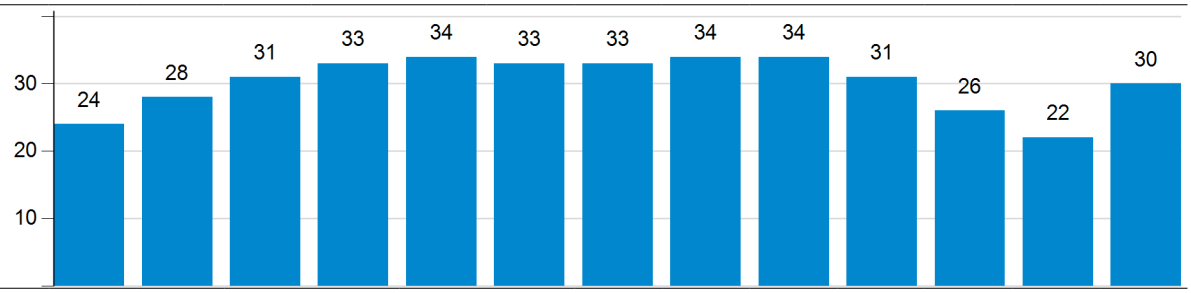
Sun Sensor setting in PumpScanner

min. 200 W/m²

Daily output in average month

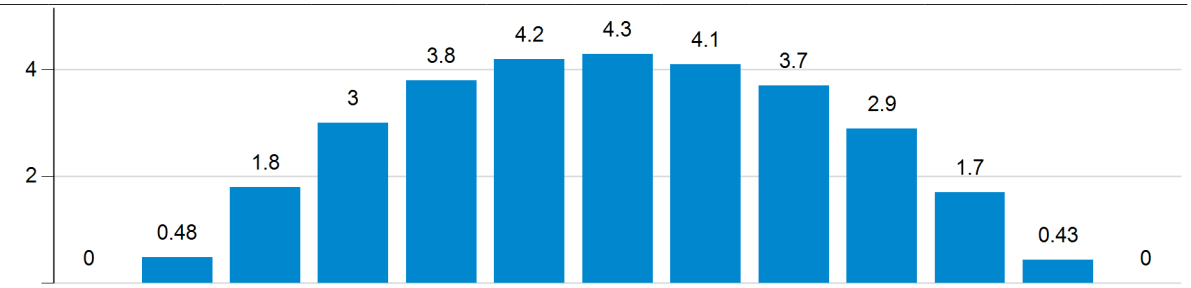
30 m³

Daily values



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Energy [kWh]	18	21	23	25	25	25	25	25	26	24	20	17	23
Irradiation [kWh/m²]	4.1	4.9	5.5	6.1	6.4	6.4	6.3	6.5	6.5	5.8	4.6	3.8	5.6
Ambient temp. [°C]	2	3	8	15	20	25	26	24	19	14	9	4	14

Hourly values



	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Energy [kWh]	0.099	0.61	1.4	2.1	2.7	3.0	3.1	3.0	2.6	2.0	1.3	0.59	0.096
Irradiation [kWh/m²]	0.023	0.14	0.32	0.50	0.65	0.75	0.79	0.75	0.65	0.50	0.32	0.14	0.023
Ambient temp. [°C]	9	9	10	12	14	16	18	19	19	19	19	18	18

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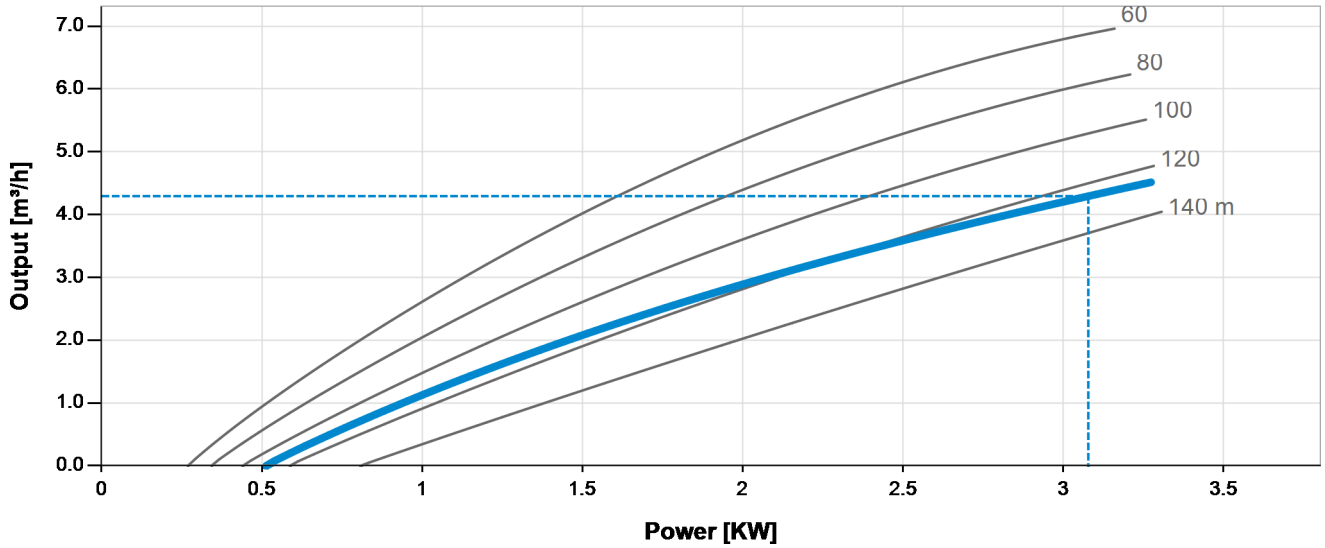
System characteristic



			Min.	800 W/m², 20 °C	Max./STC*
PV generator	Cell temperature	[°C]		46	25
	Temperature loss	[%]		8.8	-
	Dirt loss	[%]		5.0	-
	Pmax	[Wp]		3,120	4,500
	Vmp	[V]		250	274
	Imp	[A]		13	16
	Voc	[V]		308	338
	Isc	[A]		14	18
	Pout	[W]		3,120	-
	Vout	[V]		250	-
	Iout	[A]		13	-
Motor cable	Power loss	[%]	0.28	0.84	0.85
Pump systems	Motor power	[W]	514	3,080	3,275
	Motor voltage	[V EC]	161	228	234
	Motor current	[A]	3.2	14	14
	Motor speed	[rpm]	2,510	3,100	3,145
	Flow rate	[m³/h]	0	4.3	4.5
	Efficiency	[%]	0	47	47
Pipeline	Flow speed	[m/s]	0	0.61	0.64
	Friction loss	[m]	0.003	14	16

*STC: Standard test conditions for photovoltaic modules, 1000 W/m² solar iradiance, 25 °C cell temperature

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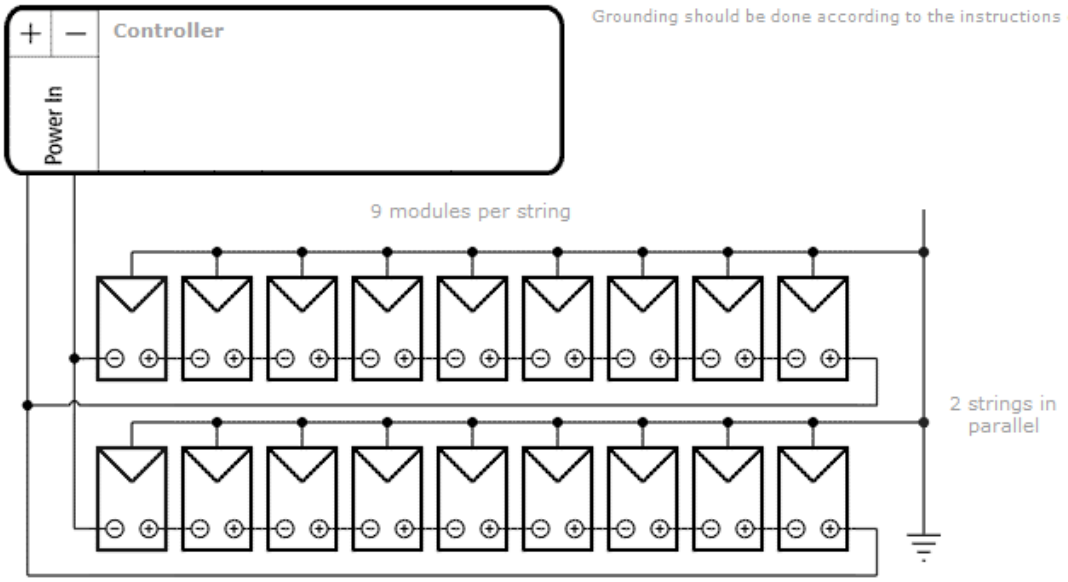
Wiring diagram



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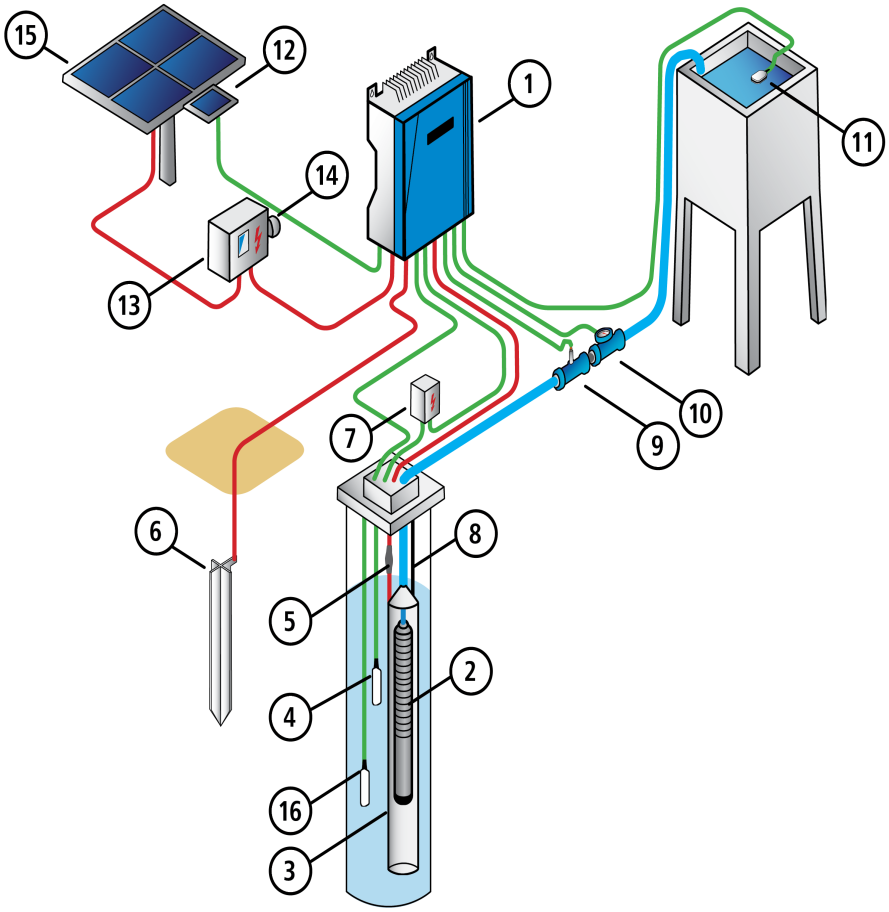
System Layout



1: PS2 Controller	**11:** Float Switch
2: Submersible Pump	**12:** Sun Switch
3: Flow Sleeve	**13:** PV Disconnect
4: Well Probe	**14:** Lightning Surge Protector
5: Cable Splice Kit	**15:** PV Generator
6: Grounding Rod	*It is recommended to install a Surge Protector at each controller sensor input.
7: Surge Protector*	
8: Safety Rope	
9: Water Meter	
10: Pressure Sensor	

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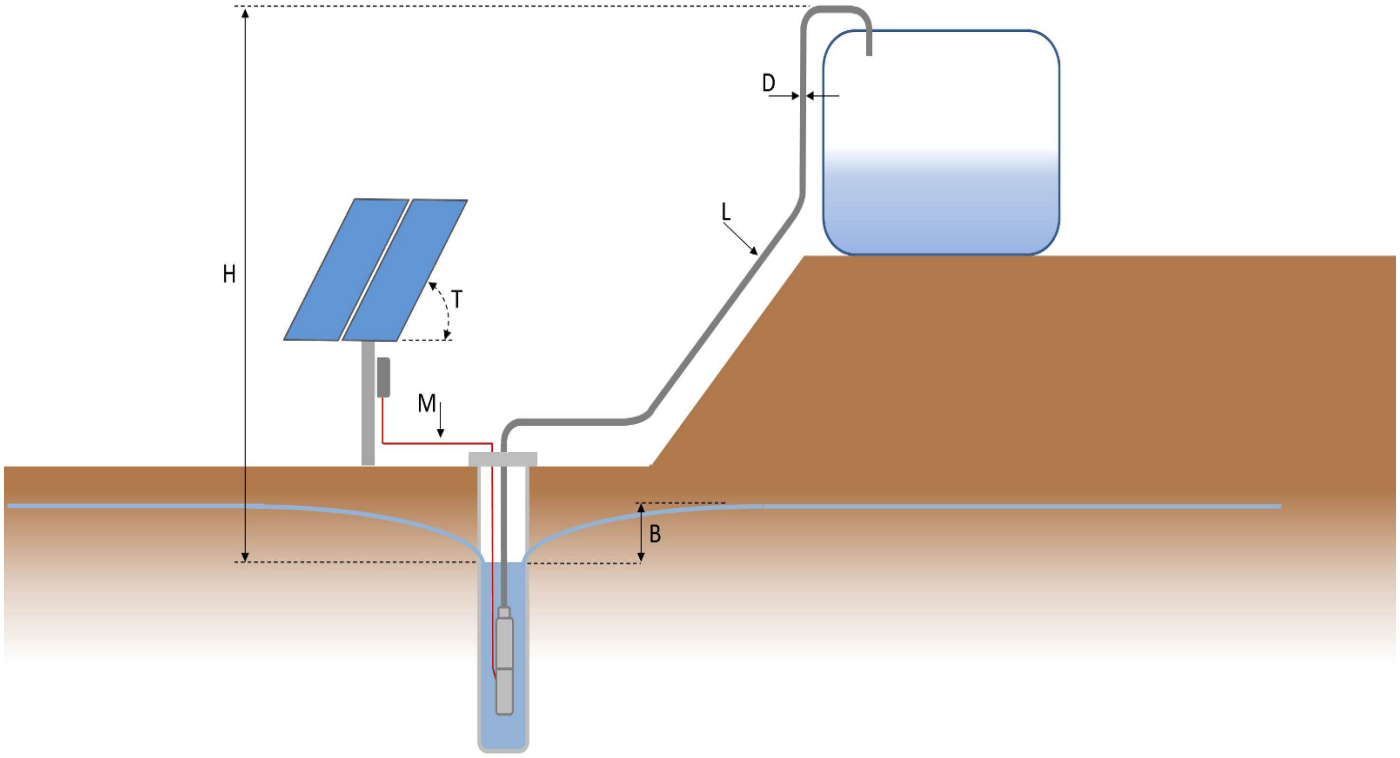
Sizing Layout



H (Static head):	Vertical height from the dynamic water level to the highest point of delivery.
B (Drawdown):	Lowering of water level depending on flow rate and recovery rate of the well.
D (Pipeline inner diameter)	
L (Pipe length):	Entire pipeline from the pump outlet to the point of delivery. Ellbows and armatures must be added as an equivalent length of pipeline.
M (Motor cable):	The cable between controller and pump unit.
T (Tilt angle):	Angle of the PV generator surface from the horizontal plane.

PS2-4000 C-SJ5-25

Solar Submersible Pump System for 4" wells

System Overview

Head	max. 140 m
Flow rate	max. 7.0 m³/h

Technical Data

Controller PS2-4000

- Controlling and monitoring
- Control inputs for dry running protection, remote control etc.
- Protected against reverse polarity, overload and overtemperature
- Integrated MPPT (Maximum Power Point Tracking)
- Integrated Sun Sensor

Power	max. 4.0 kW
Input voltage	max. 375 V
Optimum Vmp**	> 238 V
Motor current	max. 14 A
Efficiency	max. 98 %
Ambient temp.	-40...50 °C
Enclosure class	IP68

Motor ECDRIVE 4000-C

- Maintenance-free brushless DC motor
- Water filled
- Premium materials, stainless steel: AISI 304/316
- No electronics in the motor

Rated power	4.0 kW
Efficiency	max. 92 %
Motor speed	900...3,300 rpm
Insulation class	F
Enclosure class	IP68
Submersion	max. 150 m

Pump End PE C-SJ5-25

- Non-return valve
- Premium materials, stainless steel: AISI 304
- Centrifugal pump

Efficiency	max. 54 %

Pump Unit PU4000 C-SJ5-25 (Motor, Pump End)

Borehole diameter	min. 4,0 in
Water temperature	max. 50 °C

Standards

CE 2006/42/EC, 2004/108/EC, 2006/95/EC

IEC/EN 61702:1995, IEC/EN 62253 Ed.1

The logos shown reflect the approvals that have been granted for this product family. Products are ordered and supplied with the approvals specific to the market requirements.

**Vmp: MPP-voltage under Standard Test Conditions (STC): 1000 W/m² solar irradiance, 25 °C cell temperature

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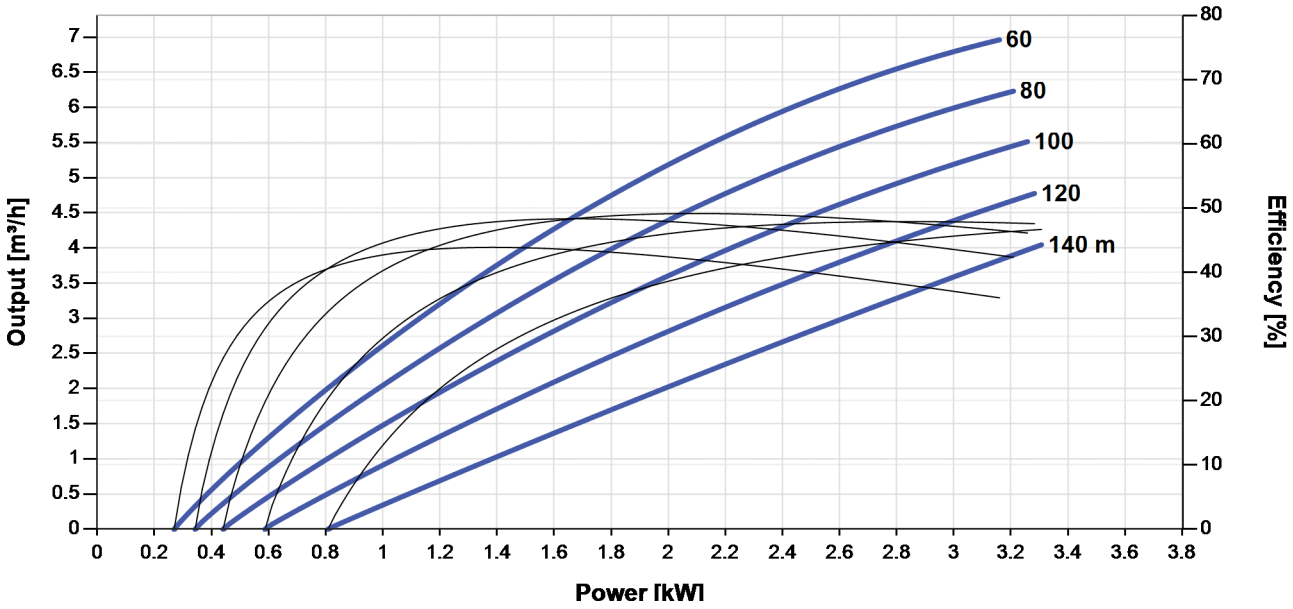
PS2-4000 C-SJ5-25

Solar Submersible Pump System for 4" wells

Pump Chart

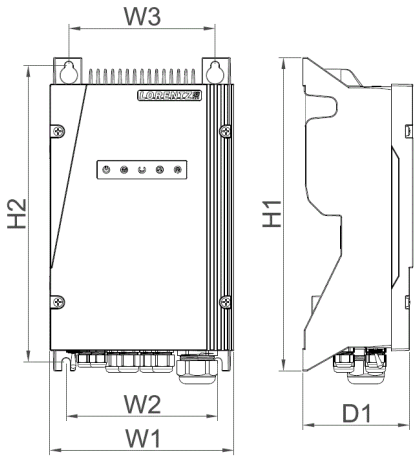
Vmp* > 238 V



Dimensions and Weights

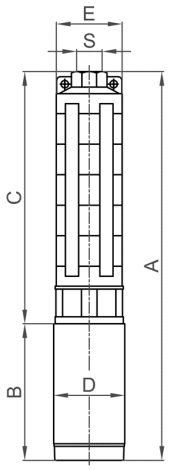
Controller

H1 = 352 mm
H2 = 333 mm
W1 = 207 mm
W2 = 170 mm
W3 = 164 mm
D1 = 124 mm



Pump Unit

A = 941 mm
B = 245 mm
C = 696 mm
D = 96 mm
E = 98 mm
S = 1.5 in



	Net weight
Controller	6.1 kg
Pump Unit	18 kg
Motor	10 kg
Pump End	8.0 kg

*Vmp: MPP-voltage under Standard Test Conditions (STC): 1000 W/m² solar irradiance, 25 °C cell temperature

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LC250-P60
High-efficiency PV Module


photo may differ from actual product

Features

- high energy yields ensured by high conversion efficiency
- sturdy, clear-anodized aluminum frame with pre-drilled holes for quick installation
- advanced EVA encapsulation with triple-layer backsheet, meets the most stringent safety requirements for high-voltage operation
- pre-wired junction box equipped with connectors "plug'n'play"
- reliable bypass diodes to prevent overheating (hot spot effect) and to minimise power loss by shading
- manufactured in ISO 9001:2000-certified factory

Warranty

- Warranty: 2 years
- Performance guarantee:
  up to 10 years (90% power output)
  up to 20 years (80% power output)

  Details according to warranty issued by LORENTZ

Standards

LC250-P60 is certified according to IEC 61215 and 61730 by TÜV Rheinland and meets the requirements for CE.

TÜVRheinland CERTIFIED

IEC 61215
IEC 61730
Regular Production Surveillance

www.tuv.com
ID 1419063782

Specifications

Electrical Data

Peak power	Pmax	[Wp]	250
Tolerance		[%]	+5/0
Max. power current	Imp	[A]	8.23
Max. power voltage	Vmp	[V]	30.4
Short circuit current	Isc	[A]	8.81
Open circuit voltage	Voc	[V]	37.6
Temperature co-efficient for Pmax		[%/°C]	-0.42
Temperature co-efficient for Voc		[%/°C]	-0.34
Temperature co-efficient for Isc		[%/°C]	0.06
Max. system voltage		[VDC]	1,000
Module efficiency		[%]	15.27
Practical module efficiency		[%]	17.12

All technical data at standard test condition:
AM = 1.5, E = 1,000W/m², cell temperature: 25 °C

Cells

Number of cells in series	60
Number of cells in parallel	1
Cell technology	polycrystalline
Cell shape	rectangular

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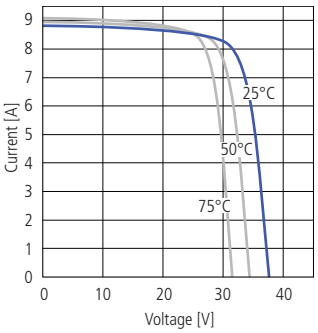
V180904

Electrical Performance

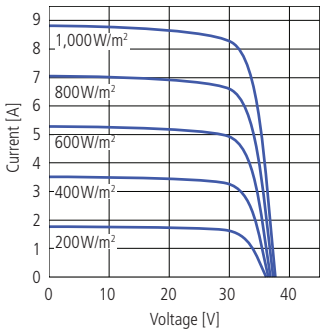
Electrical Performance

for different temperatures, at AM=1.5, E=1,000W/m²



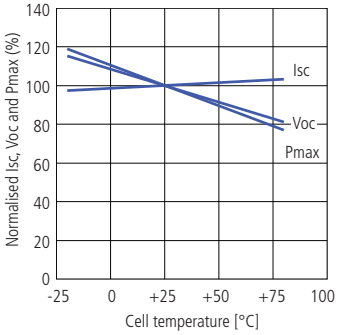
Electrical Performance

for different irradiation, at 25 °C



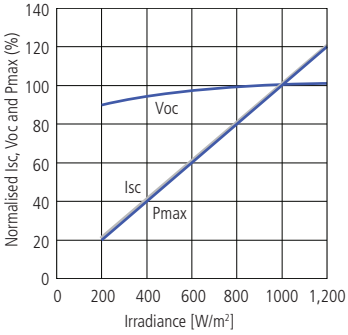
Temperature Dependence

of Isc, Voc and Pmax

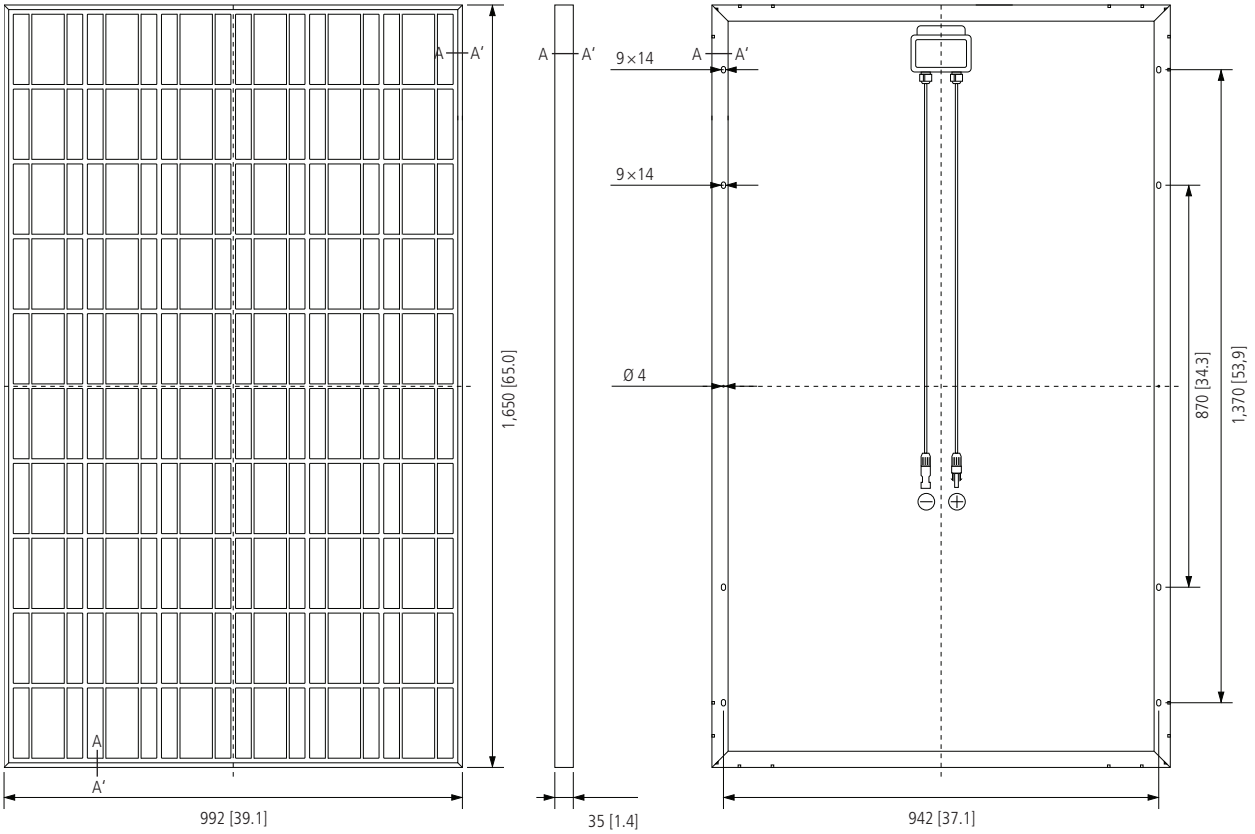


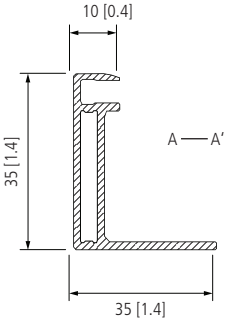
Irradiation Dependence

of Isc, Voc and Pmax at 25 °C



Physical Specifications mm





Weight	[kg]	18.5
Dimension	[mm]	1,650 × 992 × 35
Strength	[N/m²]	2,400
Cable		approx. 900 mm, 4 mm²
Connectors		MC4 PV-KBT4/6II-UR / PV-KST4/6II-UR

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