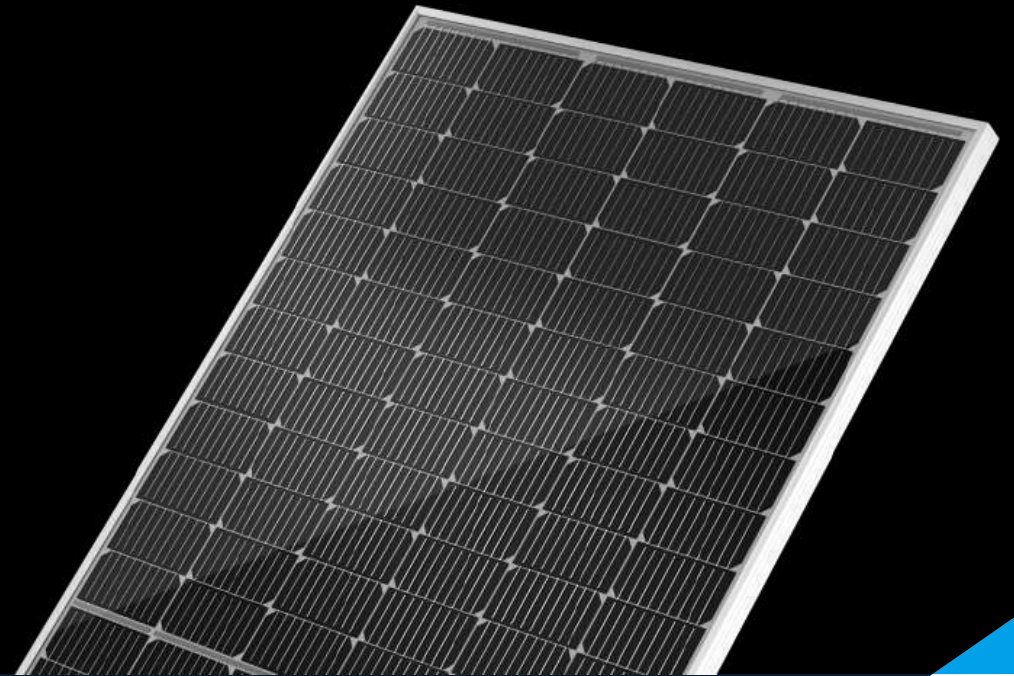


PRODUCT CATALOGUE 2020/21

Finest high-power solar modules and energy storage solutions



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Belgium

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WEB www.belinus.be

belinus[®]
Designed and Engineered in Flanders



EVERY DAY

WE DO OUR UTMOST TO HELP OUR CLIENTS BE SUCCESSFUL

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Dear Client,

As a user of our products, you are always the focus of our work. We want you to be successful and to offer your customers only the best products and services.

A lot has happened at Belinus, and our 2020/2021 product catalogue testifies to it: more comprehensive than before, but all the clearer and expanded by essential product groups that you need every day. In the Belinus product catalogue you will find everything you need to work with your customers in addition to our powerful and excellent solar modules.

So what's new? From now on, we will also provide you with BE.WAFFEL™166 and BE.PERC and BE.AntiPID™/LID™, the newest technologies for your photovoltaic systems and with BE.HUIS ESS a wide range of storage options.

Belinus is your central partner for all photovoltaic products and services. Our BE.INSTALLATEUR partners take over the important part of the high quality installation of our products.

As a BE.INSTALLATEUR partner you benefit from a variety of services to score points with your customers. Whether by supporting your marketing activities, delivering all components directly to your construction site or supporting your customer acquisition - BE.INSTALLATEUR will cut a fine figure with their customers at any time. Feel free to inform yourself at www.belinus.be about the possibilities that are open to you.

And now we hope you enjoy browsing and look forward to working with you.

Your Belinus team

BELINUS SOLAR MODULES

THE FOUR LEVELS OF QUALITY

For our solar modules high quality means a long service life and excellent technical characteristics. That is why quality assurance plays a critical role for us.

LEVEL 1 - YIELD SECURITY

Since 2015, Belinus Yield Security has been the guarantee for PID resistance, BE.AntiPID™ and BE.AntiLID™ Technology which is ensured by weekly production monitoring. For protection against Hot-Spots, 100 % of the cell production is tested.

LEVEL 2 - ONE-TIME CERTIFICATION TESTS

The second level is comprised of international initial certification tests, for example, in accordance with IEC, ISO, CE, J-PEC, CHUBB INMETRO, MCS and JET. These guarantee that the electrical safety of the modules and the safety of its construction comply with international standards.

LEVEL 3 - TUV QUALITY TESTED

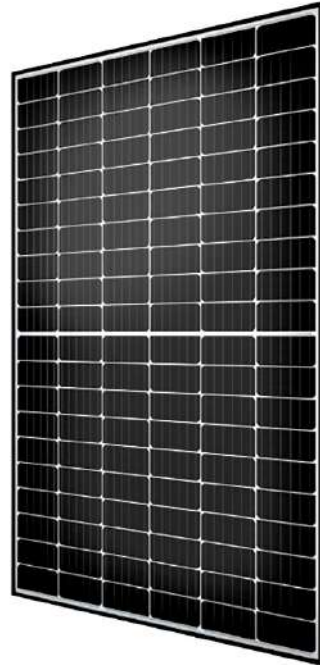
The "TUV SUD Quality Tested" program exceeds the initial certification testing of IEC by e.g. double cycles of thermal tests. In addition, monthly re-testing guarantees consistent quality.

LEVEL 4 - BELINUS QUALITY PROGRAM

Belinus internal quality program ensures that all products meet our company's high standards and additional tests than required by TUV SUD as e.g. 3 x more cycles of humidity-frost Test. 100 % high-resolution EL inspection is Belinus standard.

BELINUS:

- is designed and engineered in the Innovatie & Incubatiecentrum (I&I) Leuven, Flanders by our engineers who are the Groep T, Katholieke Universiteit Leuven (KULeuven) scientists. I&I Leuven is located at the campus Arenberg of KULeuven, the 7th most innovative university in the world by Reuters.
- is guaranteed quality with an outstandingly low rate of module degradation backed by a 25-year product warranty and a 25-year linear performance warranty.
- operates one of the largest technology and module test centre in the industry, as well as its own certified testing laboratory.
- tests its products under extreme climate conditions, such as tropical humidity, desert heat, and Arctic cold.



BE.WAFER TECHNOLOGY

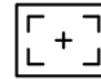
SOLAR CELL ENGINEERING MEETS ART

The pursuit of precision and quality shines in every cell



BE.WAFER CELL PRODUCT FEATURES

- Superior performance mono and poly crystalline cells with efficiency up to 22.3%
- Nine-busbar design optimizes the entire cell surface's current collection, which assures more power output for higher fill factors
- Improved charge-collection effect through finer and closer fingers design
- Blue Si3N4 Anti-reflecting coating allows more sunlight to be captured and converted
- Lower light-induced degradation and hotspot prevention lead to maximum yield over the entire module lifetime
- Highly uniform and aesthetically appealing modules



HIGH-PRECISION AND HIGH-FLATNESS SCREEN PRINTING

High solder ability; Optimized stencil design; Zero defect in appearance.



PERFECT TEXTURED SURFACE

Monocrystalline pyramid-type textured surface and polycrystalline wormhole-type textured surface

High nucleation density, large light receiving area, and low reflectivity



ADVANCED PECVD FILM

Silicon-nitride Anti-reflective coating; Uniform and pleasing navy blue



PRESICE FQA

Parallel resistance test to reduce hotspot effect and to test for weak light response

Precise and efficient sorting cells with consistent electric properties into 24 grades with high accuracy up to 0.2%

Appearance sorting ensures cells with similar color are combined together into a module.

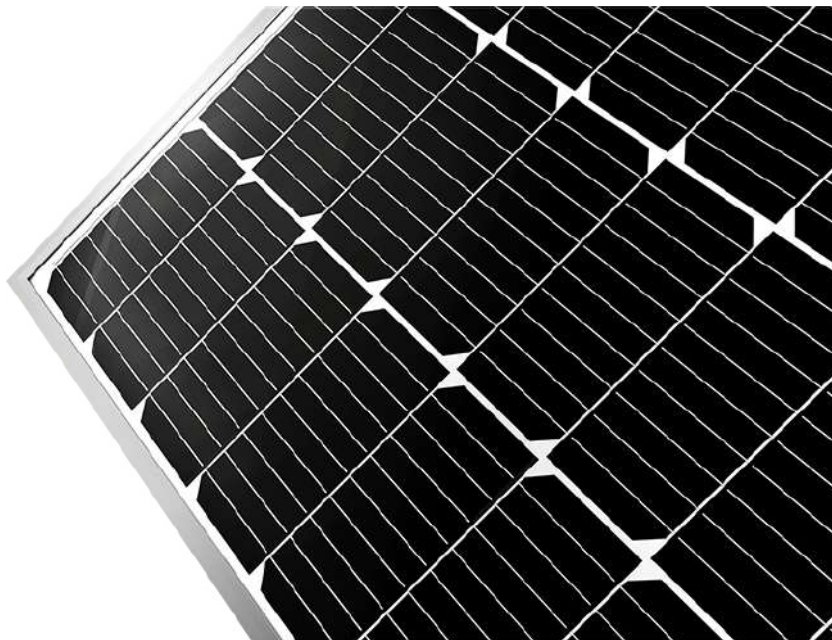
BE.WAFER™ PERK TECHNOLOGY

PERFORMANCE HAS NEVER LOOKED THIS GOOD

The BE.WAFER™ PERK and BE.WAFER™ PERK ZWT solar modules benefit from the BE.PERK Technology for outstanding performance and aesthetics.

WHAT IS BE.WAFER™ PERK TECHNOLOGY ALL ABOUT?

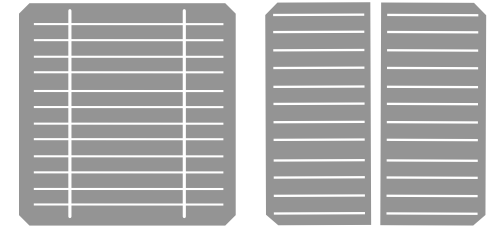
The BE.WAFER™ PERK technology developed by Belinus is based on our original BE.WAFER Technology and further cell separation technology with round wires. Three additional technologies further augmented to original BE.WAFER™ Technology came up with a result of the state of art BE.WAFER™ PERK Technology. The 9 busbar, half-cell, and wire interconnection delivered not only the superior performance but also overwhelming aesthetic look of the modules. The BE.WAFER™ PERK Technology reduces both electrical and optical losses, respectively, by halving the current passing through each cell and making use of incident light more effectively.



1

9-12 BUSBAR TECHNOLOGY

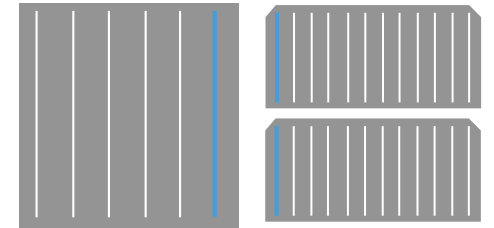
Reduced distance in between the busbars and additional paths for electric current results in 2%-4% power increase. More paths means lower congestion which in return reduces resistive losses.



2

HALF-CELL TECHNOLOGY

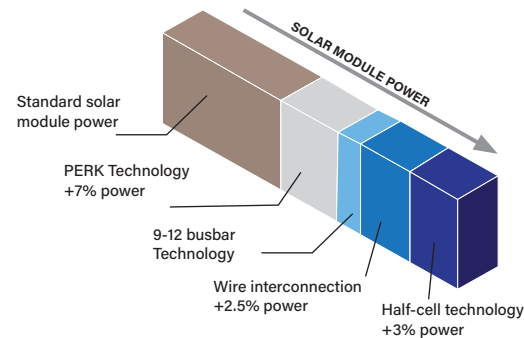
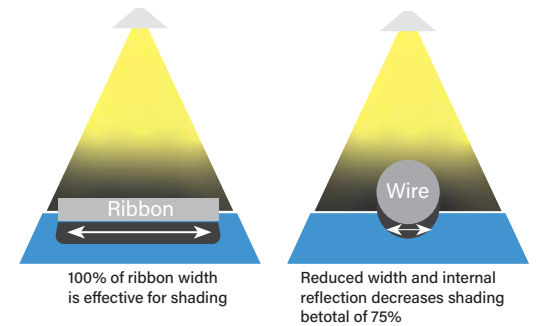
Halving the cell halves the current. Combined with a module layout which reduces the distance travelled by the electric current results in an increase of power by 3%.



3

WIRE CONNECTION

Utilizing wires instead of flat ribbons reduces both the width and the effective shading width decreasing shading by 75% and increasing the power by 2.5%. The light reflected from the round shape of the wires improves the light capturing effect of the module.



THE PERK EFFECT

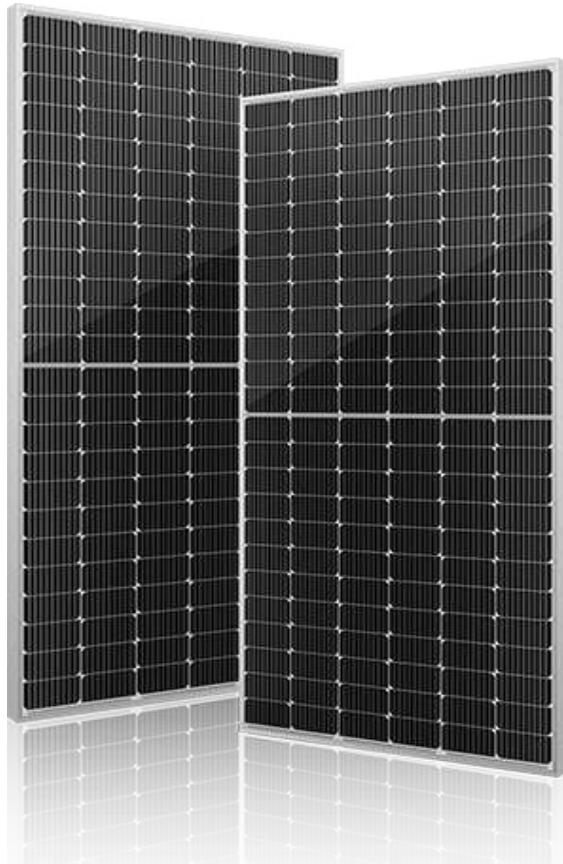
EXCEPTIONAL POWER, SUPERIOR EFFICIENCY AND BEST-IN-CLASS WARRANTIES

Belinus solar modules equipped with BE.WAFER™ PERK Technology not only offer impressive performance under real life conditions, but also best-in-class warranty terms of 98 % power in the first year and 85 % after 25 years.

BE.WAFER™166 CELL TECHNOLOGY

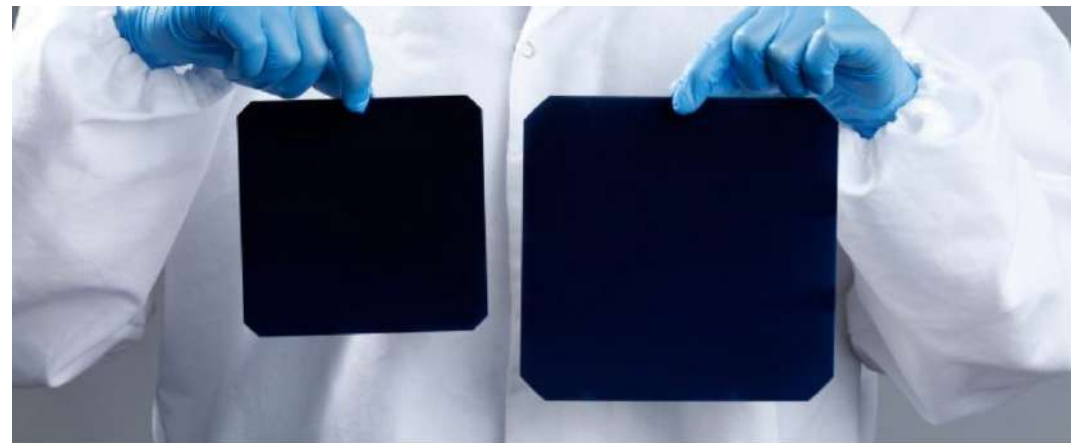
THE AMALGAMATION OF ADVANCED TECHNOLOGIES

Belinus redefined the high-efficiency module series by integrating 166mm silicon wafers with bifacial, multi-busbar, and half-cut cell technologies. The maximum module efficiency of the bifacial 166 half-cell series is 21%, and the maximum power output of the front side is 425W.



ENHANCED PERFORMANCE AND RELIABILITY

The multi-busbar improves the power generation performance of the cells, and the half-cell technology reduces losses caused by ribbon resistance, thereby improving the overall efficiency of the new 166 half-cell module by more than 5%. In addition, cutting cells in half also reduces the impact of micro-cracks and hot spot effects, allowing for dual performance and reliability improvements.



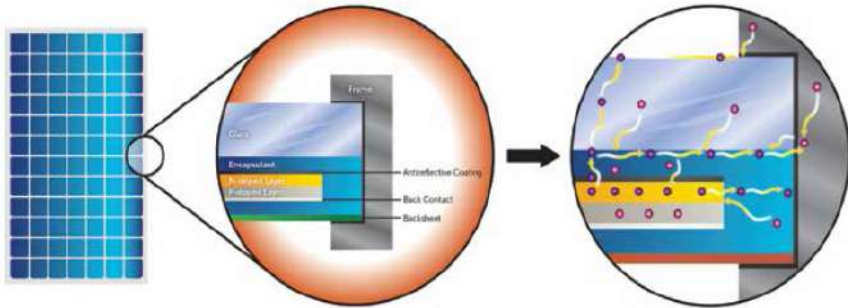
BE.AntiPID™ & BE.AntiLID™ TECHNOLOGY

SO THAT YOUR YIELDS DON'T SWERVE OFF COURSE

WHAT IS PID?

Based on the way conventional photovoltaic systems work, voltage differences occur between the frames and the solar cells of a module. Especially in wet weather this can lead to undesired leakage currents which can decrease the performance of the cells. According to a report by the industry journal Photon (Dec 2010), this can result in yield losses of 20 % or more. This effect has been named "Potential Induced Degradation", abbreviated "PID".

Trust is good, but prevention is better. For solar cells and solar modules from Belinus, potential induced degradation (PID) doesn't exist. Potential induced degradation can lead to a performance loss of 20 % or more, even in the first few months. The AntiPID™ Technology from Belinus will save you from this fate.



WHAT DOES PID MEAN IN TERMS OF REAL USE?

Progressive performance losses decrease a system's yield and this often leads to high claim rates for module manufacturers and installers. Plus, proving PID is a very complicated and costly process. Belinus prevents PID at the cell level so that modules and entire systems permanently generate reliably high yields.

HOW DOES Belinus PREVENT PID?

The Belinus' BE.AntiPID™ Technology optimizes the cell production process so that the negative effects of leakage currents are already eliminated at the cell level. This makes both our solar cells and our solar modules PID-resistant. In plain English: PV systems from Belinus generate reliable energy without any PID-affected performance loss. This means operators and installers can sit back and relax.

WHAT IS AntiLID?

BE.AntiLID Technology is our latest innovation to extend our performance. Light-induced degradation (LID) is created by instable boron oxygen compounds. These can be found in all p-type solar cells. The exposition of this type of solar cells to sunlight leads to a substantial drop of performance of up to 6 %. Belinus' BE.WAFER™ technology is designed to stabilize boron oxygen compounds in order to minimize light-induced degradation. This makes our BE.WAFER solar modules more efficient than modules which are not fitted with BE.WAFER Technology.

BE.PERK ZWT SOLAR MODULES

AESTHETIC YET POWERFUL

With their BE.WAFER™ PERK Technology the solar modules of the BE.PERK™ ZWT series cannot fail to impress thanks to especially high performance and efficiency, combined with an outstanding look and feel. Their homogeneous black surface allows these to be integrated unobtrusively on even the most exclusive building roofs.

MONOCRYSTALLINE BELINUS DUO TECHNOLOGY

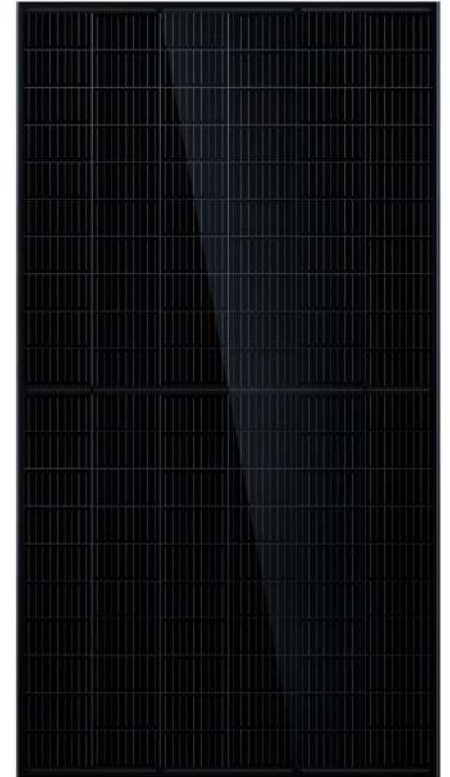
Our BE.PERK ZWT solar modules have been developed for use on truly exclusive buildings. To this end, we utilise black half-cells and black anodised aluminium frames in conjunction with black rear foil. Ultra-thin connecting wires on the solar cells allow the solar modules to look like a uniformly black area. Our monocrystalline solar modules of the BE.PERK ZWT family are also distinguished by outstanding yields thanks to power classes of up to 370 Wp and efficiencies of up to 19.8 %.

TECHNICAL DATA

Type	120-half-cell module
Power	Up to 370Wp
Efficiency	Up to 19.8%
Sorting	+5/-0 W
Weight	20.0 kg

HOW YOU BENEFIT:

Belinus solar modules have a 25-year product warranty and 25-year linear performance warranty.



BE.WAFER PERK-M6

MULTIPLE UPGRADES WERE FORGET INTO ONE

The BE.PERK-M6 solar module from Belinus stands out with its impressive look and the latest generation of innovative BE.WAFER™166 PERK Technology with outstandingly high area output, plus module efficiency



MONOCRYSTALLINE BE.WAFER166 PERK TECHNOLOGY

The BE.PERK-M6 is our monocrystalline solar module with power classes of up to 370Wp and an efficiency of up to 19.8 %. Thanks to the latest generation of unrivalled cell concept BE.WAFER™ 166 PERK, the BE.PERK-M6 solar module provide uniquely high yields on a small surface area. To this end, half-cells are combined with state-of-the-art circuitry and 9-busbar design. The black half-cells of the BE.WAFER™ 166 PERK lend even the most exclusive building an aesthetic elegance. The Belinus AntiLID™ Technology prevents light-induced degradation (LID), which can reduce system performance drastically – or almost totally. Other conventional monocrystalline solar cells lose much of their initial power through insolation. The BE.PERK-M6 prevents this with Anti LID Technology.



TECHNICAL DATA

Type	120-half-cell module
Power	Up to 370Wp
Efficiency	Up to 19.8%
Sorting	+5%/0%
Weight	20 kg

HOW YOU BENEFIT:

Belinus solar modules have a 25-year product warranty and 25-year linear performance warranty

BE.WAFER PERK-M5

MAXIMUM PERFORMANCE AND OUTSTANDING EFFICIENCY

Besides its outstandingly high efficiency – thanks to innovative BE.WAFER PERK Technology – the BE.PERK-M5 solar module from Belinus also stands out with its sleek look.



MONOCRYSTALLINE BE.WAFER158 PERK TECHNOLOGY

The BE.PERK-M5 is our monocrystalline solar module with power classes of up to 345 Wp and an excellent efficiency of up to 20.4 %. BE.PERK-M5 solar modules provide excellent and reliable yields thanks to the new generation of the unrivalled BE.WAFER™158 PERK solar cell concept, which is now combined with state-of-the-art circuitry and 9-busbar cell design. The black BE.WAFER™158 PERK half-cells in the panel lend even the most exclusive building a refined look. Our Belinus yield security guarantees reliable electricity production over the entire life cycle of your solar installation. Thanks to integrated Belinus AntiLID™ Technology preventing light-induced degradation (LID), which can reduce system performance drastically – or almost totally – the BE.PERK-M5 eliminates slumps in yield. In contrast, conventional monocrystalline solar modules without AntiLID™ Technology lose much of their initial power through normal insolation.



TECHNICAL DATA

Type	120-half-cell module
Power	Up to 345Wp
Efficiency	Up to 20.4%%
Sorting	+5/-0 W
Weight	19.0 kg

HOW YOU BENEFIT:

Belinus solar modules have a 25-year product warranty and 25-year linear performance warranty

BE. WAFER PERK GlasGlas SOLAR MODULES

ENHANCED RELIABILITY AND DURABILITY

Dual glass module improves upon the standard modules by providing better protection to the solar cells, the strength of glass is greater than backsheet, better reliability and durability during its lifetime, which could be used for high humidity zone, agriculture/fishing and solar integrated projects, high salt fog area. In addition, dual glass module is more wear-resistant than standard module and can be applied in deserts.



ROBUST MODULE DESIGN TO LOWER POWER DEGRADATION

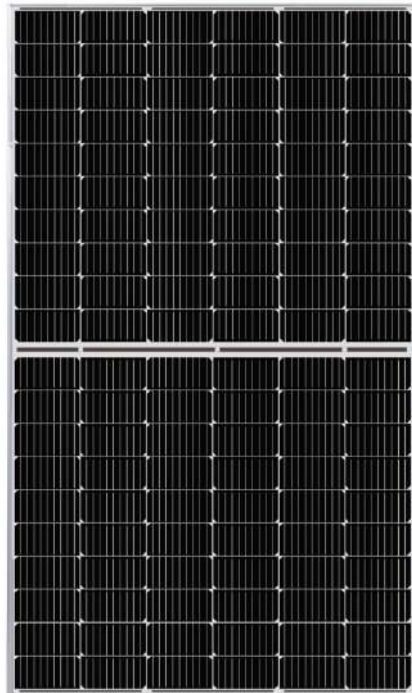
Belinus's dual glass module has a lower annual power degradation by heat-strengthened glass reducing micro-cracks, snail trail, UV aging, and environmental corrosion, and frameless design reducing PID effect.

TECHNICAL DATA

Type	120-half-cell module
Power	Up to 370Wp
Efficiency	Up to 20.0%
Sorting	+5/-0 W
Weight	24.0 kg

HOW YOU BENEFIT:

Belinus solar modules have a 25-year product warranty and 25-year linear performance warranty

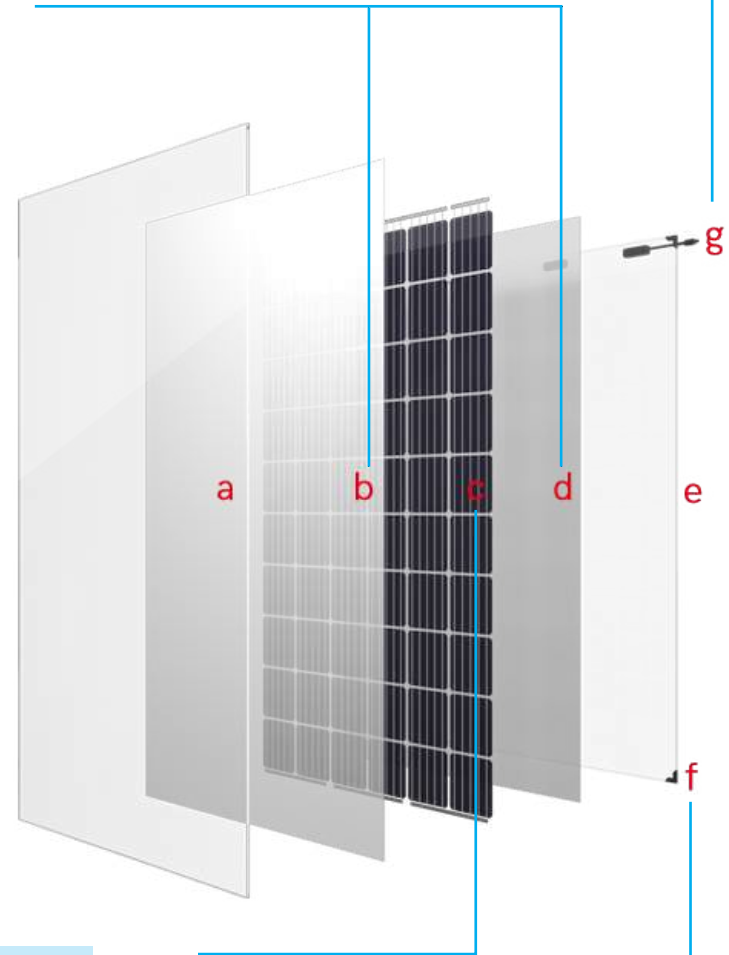


POE

- High light transmittance to ensure high power output
- Higher volume resistance contribute to excellent PID resistance
- POE encapsulant material applied, longer life span

J-BOX

- IP68 protection class
- Diode integrated to reduce hotspot risk
- Separate design to reduce cable loss



CELL

- High efficiency and long term redivividvty
- Good resistance to PID effect

PLASTIC CORNER

- Protect the module weak-nesses from external force



SCALABLE SOLUTION ADVANTAGES AT A GLANCE



SCALABLE SOLUTION FOR OPTIMISED CONSUMPTION

Scalable storage capacity from 5.37 kWh up to 21.5 kWh to suit the specific energy consumption. reduces resistive losses.



DURABILITY

High durability with 10 years product warranty and a performance to be maintained at least 80 % of the initial battery capacity after 10 years. Very short recharge time and a high discharge depth.



SMART DESIGN

Modular design for easy and fast installation, remote control operated systems with lithium-ion battery and battery charger.



REMOTE MAINTENANCE

Easy maintenance of the device due to early error detection function, web and mobile monitoring and a reliable service network.



SAFETY

Premium quality Samsung lithium-ion battery.



CYCLE STRENGTH

Gotion battery cell - A Volkswagen company
Exceptionally good cycle strength

BELINUS ESS HYB-M2 OPTIMISED CONSUMPTION

BELINUS ESS HYB-M2 is our scalable storage solution with integrated PV inverter for private photovoltaic systems.

General product information	Remote monitoring	Web, mobile
	Touch display	Touch Display
	Backup operation	Display
	Energy Management System	Integrated
DC Input (PV)	Max. power	5 kWp
	No. of strings (MPPT)	1 (2)
AC output	Power	5 kW
	Feed-in phase / Connection	1 / 1
Efficiency	PV to grid (European)	96.5 %
Lithium-Ion battery	Battery capacity	4.37 / 10.75 / 21.50 kWh
	Max. charging power / Max. discharge	2 kW (one battery module), 3 kW (≥ two battery modules) / 3 kW





SCALABLE SOLUTION ADVANTAGES AT A GLANCE



CAPACITY OPTIMISED FOR HOUSEHOLD APPLICATIONS

The AC-coupled home storage solution, for integration in new and existing solar installations. The system can communicate directly with the most common PV inverters in the market.



INTELLIGENT DESIGN

Lean design for quick and easy installation, system with AC inverter and powerful lithium ion battery.



ENERGY MANAGEMENT

The integrated energy management system enables a complete overview of energy production and self-consumption.



TREMENDOUS DURABILITY

Thanks to a product guarantee of 10 years and retention of at least 80 % of the original battery capacity after 10 years.



BACKUP POWER FUNCTION

Thanks to the integrated backup power function, the electricity stored in the battery can also be used at the backup socket in the event of a power failure (230 V / 9 A).



SAFETY

High-quality lithium ion battery with integrated battery management system

BELINUS ESS RETRO-M2 OPTIMISED CONSUMPTION

BELINUSW ESS HYB-M2 is our AC-connected energy storage solution for existing photovoltaic systems

General product information	Dimensions	480*520*173mm
	display	LED: Battery SOC, grid connection state,
	Remote monitoring	Web, mobile
	Energy Management System	Inclusive and integration
Grid data (inverter)	Rated power	5000W
	Rated voltage/ Rated voltage range	230/ 186-264V
Battery data (Dircter current)	Battery	FLA, Gel, AGM, Lithium- ion
	Rated battery voltage / rated voltage range	48 / 40-60 V
Back power output	Rated apparent power / rated power	96.5 %
Lithium-Ion battery	Battery capacity	5.37kWh/ 10.75kWh
	Max. charging power / Max. discharge	60A-3KW 100A-5KW

RELIABLE, HIGH-OUTPUT PV SYSTEMS MATCHING TO YOUR ELECTRICITY DEMAND AND ROOFTOP

There are all kinds of energy needs, just as there are all kinds of roofs. That is why we offer individually tailored solar packages – you can choose your own combination of products out of our wide range of high performance solar modules, inverters, and energy storage systems. Just choose the ideal Belinus solar packages optimized to your customers needs and self-consumption rate.

EXEMPLARY PV SYSTEM SIZES WITH AND WITHOUT ENERGY STORAGE (USING BE.HUIS ESS HYB-M2)

HOUSEHOLD SIZE / ENERGY CONSUMPTION	PV SYSTEM SIZE	MINIMUM ROOF SIZE	SELF-CONSUMPTION WITHOUT STORAGE SOLUTION	SELF-CONSUMPTION WITH STORAGE SOLUTION
2 people up to 3,200kWh/p.a.	5.3 kWp	31 m2	45%	73%
3 people up to 3,800kWh/p.a.	6.6 kWp	32 m2	44%	68%
4 people up to 4,400kWh/p.a.	7.9 kWp	39 m2	41%	67%
5 people up to 5,000kWh/p.a.	8.6 kWp	42 m2	40%	65%



BENEFITS FOR OUR PARTNERS

Are you a believer in our products, and want to show it? Would you like to become our brand ambassador? Then choose a partnership with BELINUS and become our BE.INSTALLATUER.

Lead generation

Exclusive online portal

Local technical service support

Individual contacts

Product and online training

Professional sales documents

Attractive pricing

Special delivery conditions

Individual marketing and sales support

Bonus compensation

Extensive planning software

Speedy and direct product requests

GET IN TOUCH WITH US

info@belinus.be
+32 (0) 16 91 03 14

WE WILL VISIT YOU

Our sales representative will come for a visit and complete the partnership agreement with you.

BENEFIT AS A BELINUS PARTNER

Receive access to our Belinus BE.INSTALLATUER portal and marketing materials and benefit from attractive purchasing and delivery conditions.

REFERENCES



VAHRN, ITALY
1.3 MWp



REMINI, ITALY
1.8 MWp



WOLPERSTETTE, GERMANY
2.2 MWp



ROANHEAD, UK
7 MWp



RAVENTHORPE FARM, UK
39.2 MWp



OURIQUE, PORTUGAL
46.13 MWp



Belinus BELGIAN QUALITY AND DESIGN

For Belinus the solar module technology is the key to reliable, powerful, and sustainable energy supply – today and for future generations.

Belinus is a Sino-Belgian company backed by the world's largest and most recognized photovoltaic manufacturers for its high-quality, high-efficiency solar cells and modules. It is headquartered in the Arenberg Campus of KU Leuven, Belgium (HQ & Technology and Innovation) with manufacturing facilities in Vietnam, Malaysia and China. Belinus offer the full spectrum of photovoltaic products and solutions.

Belinus, as brand of Generate Bv with assets over EUR 180 million, is both a trusted and bankable solar partner for our customers in the European Union. Our solar cell production capacity of 800 MW (as of January 2020) makes us and one of the largest solar module manufacturers in the Asia. Apart from manufacturing Belinus modules, we manufacture for the Tier 1 Bloomberg module companies.

GENERATE BV SOLAR INVESTOR AND DISTRIBUTOR

As a member of the Generate Bv, Belinus is backed by a strong partner with a proud 5-year history. At the centre of it all, it is our groups belief and desire to lead a sustainable future for both mankind and our planet. The sun powers everything that grows on earth it is clean, cost-effective, and infinite.

Our full-scale entry into the photovoltaic business in 2015 was a natural extension of this mission, allowing us to offer a world-class array of sustainable solar products and services for generations to come.

Driven by our corporate philosophy of giving and earning trust and loyalty, we are able to meet the energy needs of people and institutions in diverse markets.

OUR NETWORK OF SUPPLIERS:



1.1GW+

Modules Installed
Worldwide by 2019



800MW

Modules Production
Capacity



TIER 1

Solar Module
Maker



12+

Destination
Countries



50+

Global Financial
Partners



100+

Technology
Patents

Modules

Residential
Systems

EPC/Systems

Distribution

System
Intergration

BELINUS

GENERATE BV