



SOLAR MODULES

# FOR STANDARD APPLICATIONS

410 Wp HC silver  
450 Wp | 480 Wp HC black  
430 Wp HC black (bifacial) | 435 Wp HC (bifacial)

## Top price-performance ratio

Suitable for a wide range of standard applications and large systems.

## Various modulas guides

Available in different formats, colors and frame heights, as well as rear-side structure (double glass / glass-foil).

## Innovative half-cell technology

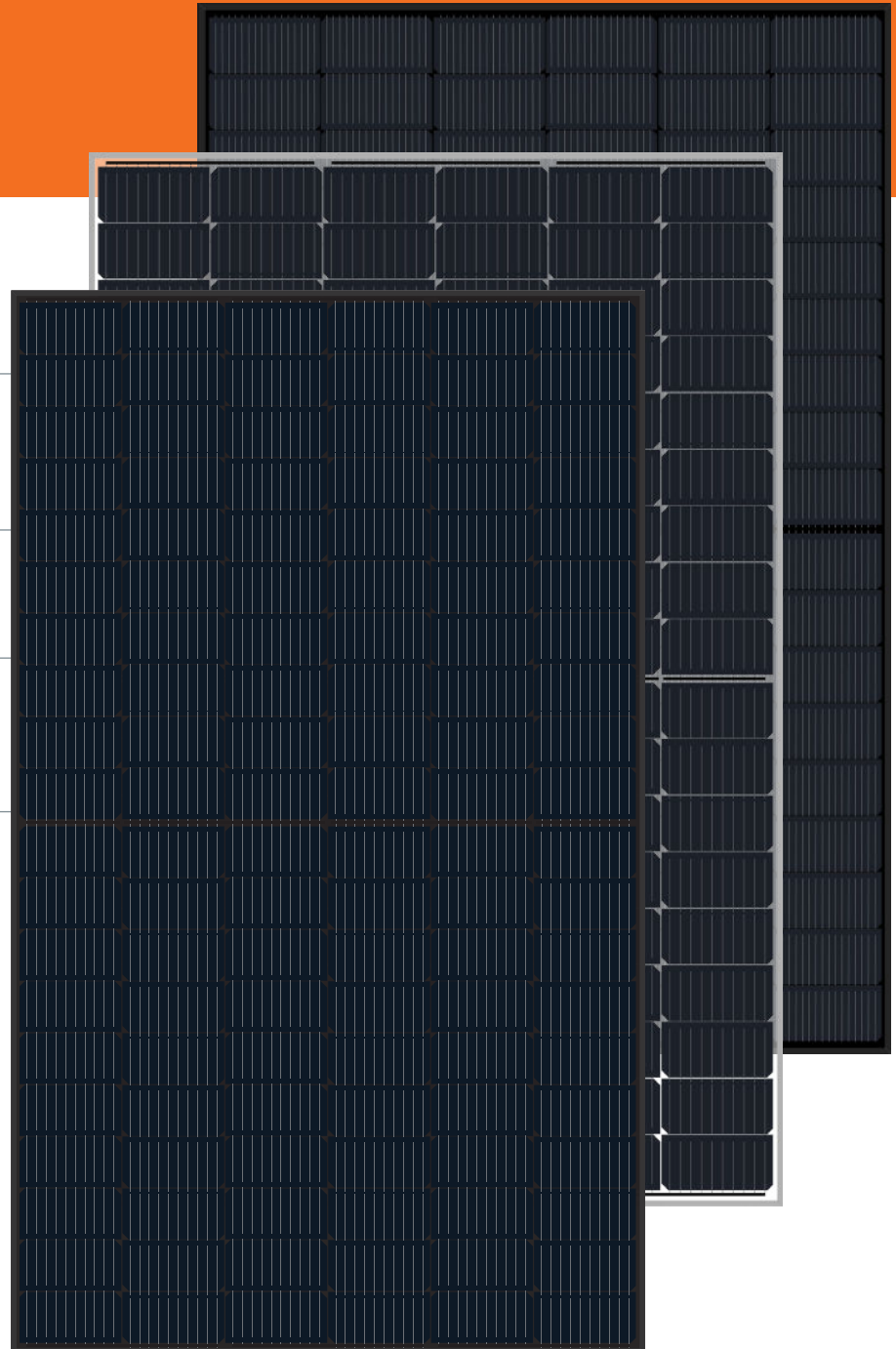
Half-cell technology with optimized module interconnection with regard to shading.

## Decentralized junction boxes for half-cell modules

Original Stäubli MC4 connectors with up to 1500 V max. system voltage.

## Homogeneous design

Anodized aluminium frame optionally with mitre cut or plastic corner connectors, solar glass with reduced glare thanks to anti-reflective coating.



**EFFICIENT!**  
The module series with a wide range of possible applications.



**SOLAR MODULE for standard applications 35 mm**

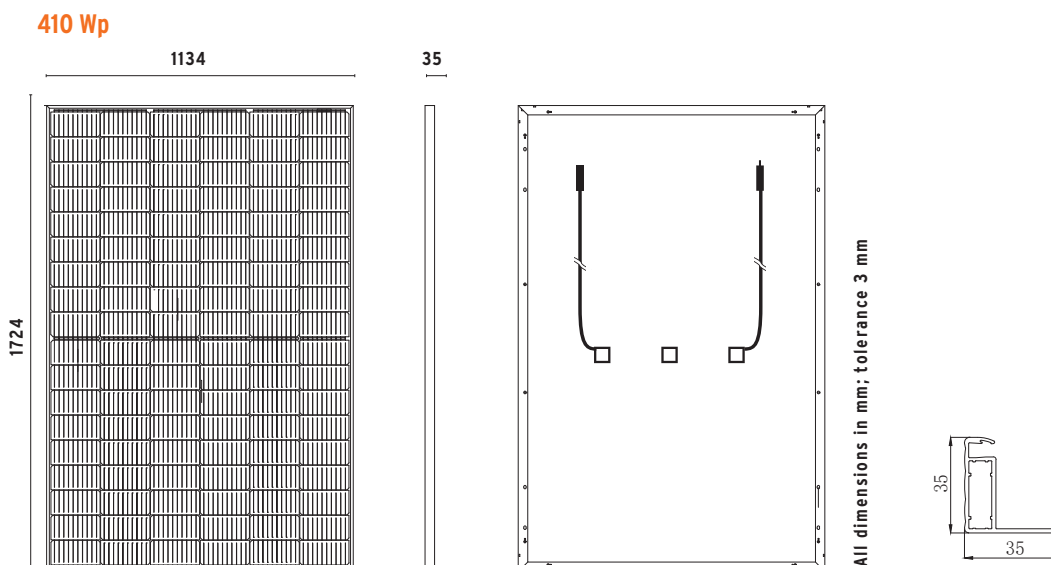
| <b>410 Wp</b>        |                     |
|----------------------|---------------------|
| <b>Module data</b>   | HC silver           |
| P <sub>mpp</sub>     | 410 Wp              |
| U <sub>mpp</sub>     | 31,30 V             |
| I <sub>mpp</sub>     | 13,10 A             |
| U <sub>oc</sub>      | 37,26 V             |
| I <sub>sc</sub>      | 13,79 A             |
| Efficiency           | 20,97 %             |
| Area requirement/kWp | 4,77 m <sup>2</sup> |

**Electrical data**

|                            |   |
|----------------------------|---|
| Cells                      | 108 PERC half cells (6 x 18)<br>182 x 91 mm (10 busbar)                                 |
| Connection and plug system | Decentralized junction box with original Stäubli MC4 EV02 connectors                    |
| Max. system voltage        | 1500 V DC   |
| Power tolerance            | +5 W / -0 W (measurement under standard test conditions)                                |
| Temperature coefficients   | P <sub>mpp</sub> -0,350 %/K<br>U <sub>oc</sub> -0,270 %/K<br>I <sub>sc</sub> +0,048 %/K |
| Maximum reverse current    | 20 A  |
| Operating temperature      | +85 °C to -40 °C  |
| Cable length               | 2 x 1150 mm   |
| Bypass diodes              | 3 pieces  |
| Power guarantee            | min. 97 % in the first year, then max. reduction of 0.7 % p.a. for up to 25 years       |
| Product warranty           | 12 years  |

**Technical data**

|                         |   |
|-------------------------|---|
| Weight                  | 22,00 kg  |
| Dimensions (HxWxD)      | 1724 x 1134 x 35 mm (± 3 mm)  |
| Optical design          | silver anodized frame<br>Backsheet: front and back white                                    |
| Glass specifications    | 3.2 mm ESG - Solar glass with anti-reflective coating (solar transmission AM 1.5 min. 94 %) |
| Test certificate        | IEC 61215, Ed. 2 incl. extended mechanical load test up to 5400 Pa, IEC 61730 by TÜV Süd    |
| Extended tests          | Salt mist & ammonium test, certified by TÜV Nord, qualified for HW4                         |
| Packaging configuration | 868 modules/truck<br>31 + 31 modules per storage position                                   |



The customer shall be solely responsible for ensuring that the goods ordered and delivered are suitable for the customer's purposes. Any technical advice given by SONNENKRAFT ENERGY GmbH, whether verbal, in writing, by way of tests or in any other way, shall be given to the best of its knowledge, but without any warranty or liability, and special technical designs or special constructions may be subject to official approval. Obtaining such approval is the responsibility of the client or building owner. Any resulting changes to the design or additional services, in particular tests and proof of calculations, shall be borne by the client; we have not carried out or checked any project-related, static pre-dimensioning or the correct use of the glass in terms of glass technology. Measuring tolerance 3 %

# SOLAR MODULES for standard applications 40 mm

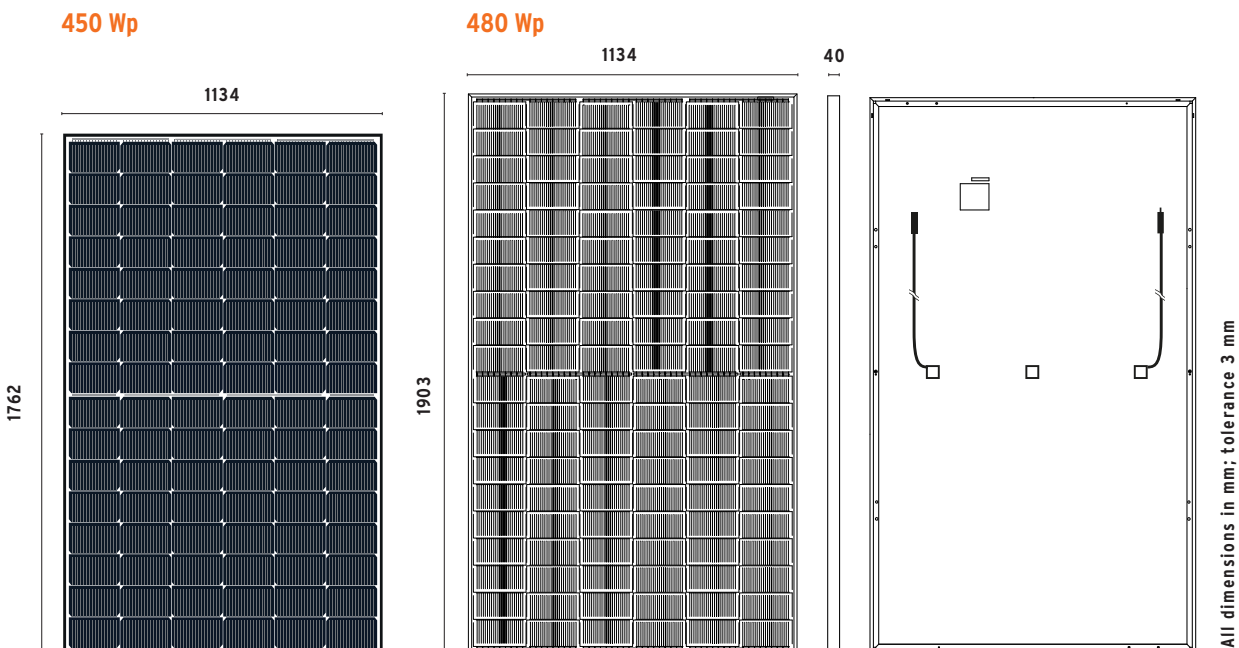
|                      | 450 Wp              | 480 Wp              |
|----------------------|---------------------|---------------------|
| <b>Module data</b>   | HC black            | HC black            |
| P <sub>mp</sub>      | 450 Wp              | 480 Wp              |
| U <sub>mp</sub>      | 29,14 V             | 35,51 V             |
| I <sub>mp</sub>      | 15,45 A             | 13,52 A             |
| U <sub>oc</sub>      | 35,14 V             | 41,99 V             |
| I <sub>sc</sub>      | 16,01 A             | 16,40 A             |
| Efficiency           | 22,52 %             | 22,24 %             |
| Area requirement/kWp | 4,43 m <sup>2</sup> | 4,48 m <sup>2</sup> |

## Electrical data

|                            |  |  |
|----------------------------|--|--|
| Cells                      | 96 TOPCON half cells (6 x 20)<br>182 x 91 mm (16 busbar)                                   | 120 TOPCON half cells (6 x 20)<br>182 x 91 mm (16 busbar)                                  |
| Connection and plug system | Decentralized junction box<br>with original Stäubli MC4 EVO2 connectors                    | Central junction box<br>with original Stäubli MC4 connectors                               |
| Max. system voltage        | 1500 V DC  | 1500 V DC  |
| Power tolerance            | +5 W / -0 W (measurement under standard test conditions)                                   | +5 W / -0 W (measurement under standard test conditions)                                   |
| Temperature coefficients   | P <sub>mp</sub> -0,350 %/K<br>U <sub>oc</sub> -0,270 %/K<br>I <sub>sc</sub> +0,048 %/K     | P <sub>mp</sub> -0,37 %/K<br>U <sub>oc</sub> -90,7 mV/K<br>I <sub>sc</sub> +2,85 mA/K      |
| Maximum reverse current    | 20 A   | 20 A   |
| Operating temperature      | +85 °C to -40 °C   | +85 °C to -40 °C   |
| Cable length               | 2 x 1150 mm  | 2 x 1150 mm  |
| Bypass diodes              | 3 pieces   | 3 pieces   |
| Power guarantee            | min. 97 % in the first year, max. reduction thereafter<br>by 0.7 % p.a. for up to 25 years | min. 97 % in the first year, max. reduction thereafter<br>by 0.7 % p.a. for up to 25 years |
| Product warranty           | 15 years   | 12 years   |

## Technical data

|                         |   |  |
|-------------------------|---|--|
| Weight                  | 24,50 kg  | 25,00 kg   |
| Dimensions (HxWxD)      | 1762 x 1134 x 35 mm (± 3 mm)  | 1903 x 1134 x 40 mm (± 3 mm)   |
| Optical design          | Black anodized frame<br>Back: 2.0 mm solar glass with partial ceramic print black                         | black anodized frame<br>Backsheet: front black, back white   |
| Glass specifications    | 2.0 mm highly transparent reinforced glass with anti-reflective coating                                   | 3.2 mm ESG - Solar glass with anti-reflective coating (solar<br>transmission AM 1.5 min. 94 %)                                     |
| Test certificate        | Conformity to IEC 61215, Ed. 2 incl. extended mechanical load test up to<br>5400 Pa, IEC 61730 by TÜV Süd | IEC 61215, Ed. 2 incl. extended mechanical load test (test load: 8100 Pa;<br>design load: 5400 Pa) up to 5400 Pa, IEC 61730; IP 65 |
| Packaging configuration | 868 modules/truck<br>31 + 31 modules per storage position   | 702 modules/truck<br>27 + 27 modules per storage position  |



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# SOLAR MODULES for standard applications 35 mm

| Module data          | 430 Wp              | 435 Wp              |
|----------------------|---------------------|---------------------|
| Pmpp                 | 430 Wp              | 435 Wp              |
| Ump                  | 31,95 V             | 32,10 V             |
| Imp                  | 13,46 A             | 13,56 A             |
| Uoc                  | 38,50 V             | 38,65 V             |
| Isc                  | 13,96 A             | 14,07 A             |
| Efficiency           | 22,02 %             | 22,28 %             |
| Area requirement/kWp | 4,54 m <sup>2</sup> | 4,49 m <sup>2</sup> |

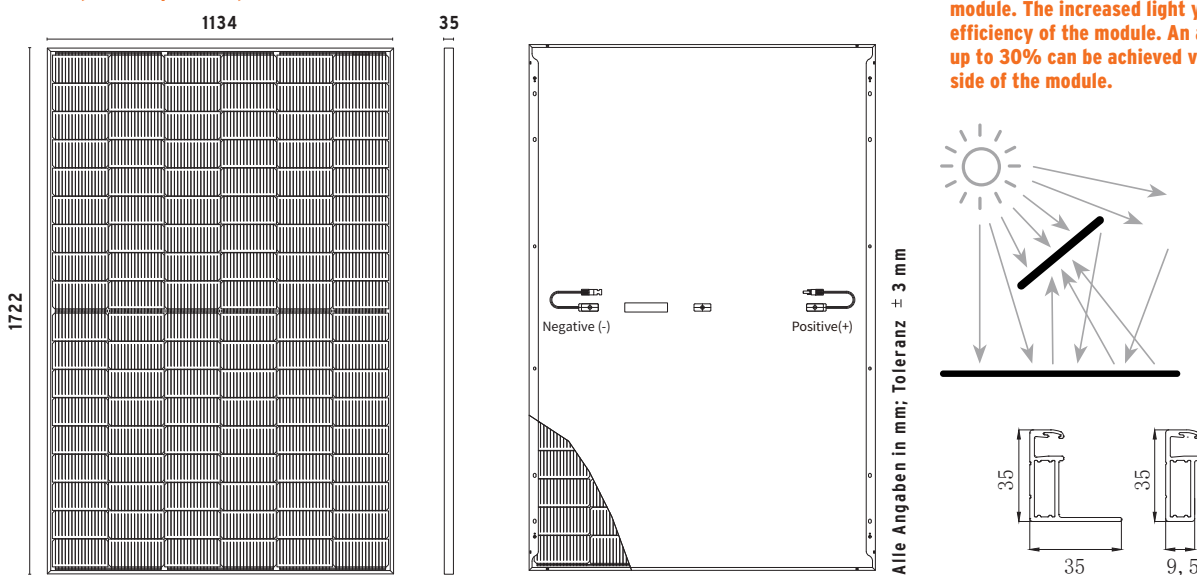
## Electrical data

|                            |   |  |
|----------------------------|---|--|
| Cells                      | 108 bifaciale TOPCON Halbzellen (6 x 18)<br>182 x 91 mm (16 busbar)               | 108 bifaciale TOPCON half cells (6 x 18)<br>182 x 91 mm (16 busbar)  |
| Connection and plug system | Decentralized junction box with original Stäubli MC4 EVO2 connectors              | Decentralized junction box with original Stäubli MC4 EVO2 connectors |
| Max. system voltage        | 1500 V DC   | 1500 V DC  |
| Power tolerance            | +5 W / -0 W (measurement under standard test conditions)                          |  |
| Temperature coefficients   | Pmpp -0,300 %/K<br>Uoc -0,250 %/K<br>Isc +0,046 %/K                               | Pmpp -0,300 %/K<br>Uoc -0,250 %/K<br>Isc +0,046 %/K                  |
| Maximum reverse current    | 20 A  | 20 A   |
| Operating temperature      | +85 °C to -40 °C  | +85 °C to -40 °C   |
| Cable length               | 4,0 mm <sup>2</sup><br>2x 1150 mm   | 4,0 mm <sup>2</sup><br>2x 1150 mm                                    |
| Bypass diodes              | 3 pieces  | 3 pieces   |
| Power guarantee            | min. 97 % in the first year, then max. reduction of 0.7 % p.a. for up to 25 years |  |
| Product warranty           | 15 years  | 15 years   |

## Technical data

|                         |  |  |
|-------------------------|--|--|
| Weight                  | 25,00 kg   | 25,00 kg   |
| Dimensions (HxD)        | 1722 x 1134 x 35 mm (± 3 mm)   | 1722 x 1134 x 35 mm (± 3 mm)   |
| Optical design          | Black anodized frame   | Black anodized frame   |
| Frontside               | 2.0 mm highly transparent, reinforced glass with anti-reflective coating | 2.0 mm highly transparent, reinforced glass with anti-reflective coating |
| Backside                | 2.0 mm solar glass with partial ceramic print black                      | 2.0 mm Solar glass with partial ceramic print ceramic print white        |
| Conformity              | IEC 61215, IEC 61730   |  |
| Extended tests          | Salt mist & ammonium test, certified by TÜV Nord                         |  |
| Packaging configuration | 868 modules/truck<br>31 + 31 modules per storage position                | 868 modules/truck<br>31 + 31 modules per storage position                |

### 430 Wp black | 435 Wp



### Bifacial cell technology

With bifacial cell technology, the light is absorbed on both the front and back of the module. The increased light yield increases the efficiency of the module. An additional yield of up to 30% can be achieved via the active rear side of the module.