

# 475 W

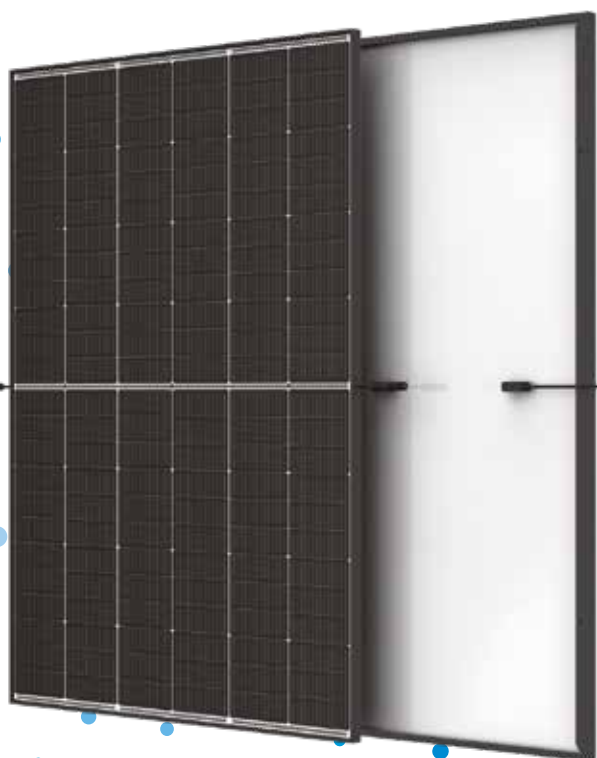
MAXIMUM POWER OUTPUT

# 0/+5 W

POSITIVE POWER TOLERANCE

# 23.8 %

MAXIMUM EFFICIENCY



### Small in size, bigger on power

- Generates up to 475 W, 23.8 % module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Reduces installation cost with higher power bin and efficiency



### Dual-glass Design, High Reliability

- Excellent fire rating and resistance to harsh environmental conditions
- 5,400 Pa snow load and 4,000 Pa wind load (test loads)



### Maximize Energy Harvest

- Up to 25 years product warranty and 30 years power warranty
- 1 % first-year degradation and 0.4 % annual degradation enabled by N-type technology



### Universal solution for residential and C&I rooftops

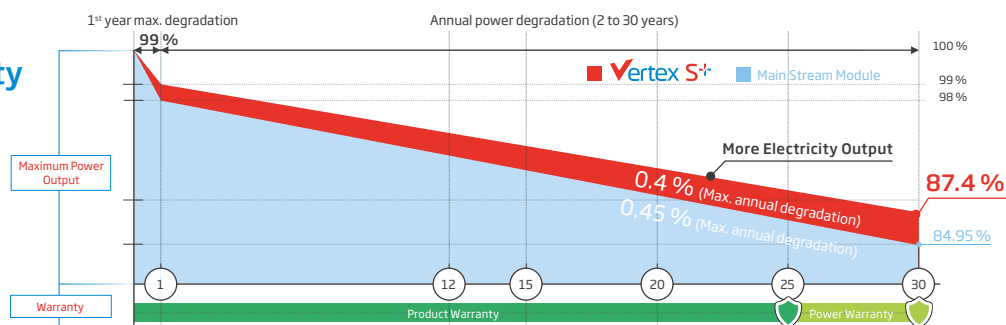
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling. Optimized transportation cost
- Flexible installation solutions for system deployment

### Extended Vertex S<sup>+</sup> Warranty

**1 %**  
1<sup>st</sup> year max. degradation

**0.4 %**  
Max. annual degradation from year 2 to 30

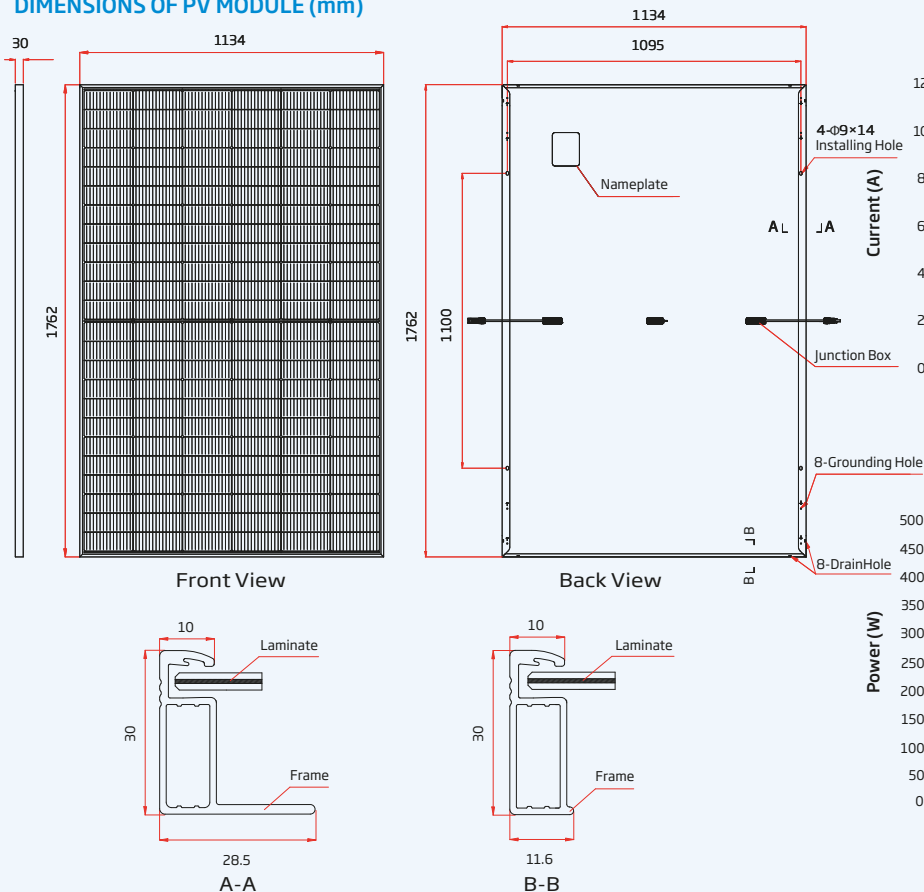
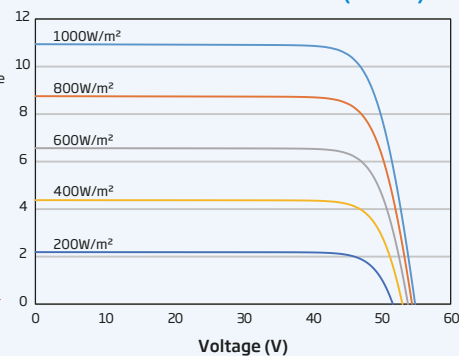
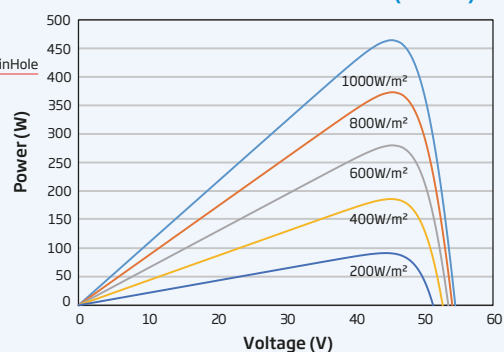
**25 Years**  
Product Workmanship Warranty



### Comprehensive Products and System Certificates



IEC61215/IEC61730/IEC61701/IEC62716  
 ISO 9001: Quality Management System  
 ISO 14001: Environmental Management System  
 ISO14064: Greenhouse Gases Emissions Verification  
 ISO45001: Occupational Health and Safety Management System  
 ISO14067: Product Carbon Footprint Limited Assurance  
 ISO14025: Environmental Product Declaration

**DIMENSIONS OF PV MODULE (mm)**

**I-V CURVES OF PV MODULE (465 W)**

**P-V CURVES OF PV MODULE (465 W)**

**ELECTRICAL DATA (STC)**

|                                      | TSM-450<br>NEG9R.28 | TSM-455<br>NEG9R.28 | TSM-460<br>NEG9R.28 | TSM-465<br>NEG9R.28 | TSM-470<br>NEG9R.28 | TSM-475<br>NEG9R.28 |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Peak Power Watts- $P_{MAX}$ (Wp)*    | 450                 | 455                 | 460                 | 465                 | 470                 | 475                 |
| Power Selection (W)**                | 0/+5                |                     |                     |                     |                     |                     |
| Maximum Power Voltage- $V_{MPP}$ (V) | 44.6                | 45.0                | 45.4                | 45.8                | 46.1                | 46.4                |
| Maximum Power Current- $I_{MPP}$ (A) | 10.09               | 10.11               | 10.14               | 10.16               | 10.20               | 10.24               |
| Open Circuit Voltage- $V_{OC}$ (V)   | 52.9                | 53.4                | 53.8                | 54.2                | 54.6                | 55.0                |
| Short Circuit Current- $I_{SC}$ (A)  | 10.74               | 10.77               | 10.81               | 10.85               | 10.89               | 10.93               |
| Module Efficiency $\eta_m$ (%)       | 22.5                | 22.8                | 23.0                | 23.3                | 23.5                | 23.8                |

STC: Irradiance 1000 W/m<sup>2</sup>, Cell Temperature 25 °C, Air Mass AM 1.5. \*Measuring tolerance:  $\pm 3\%$ . \*\*Power Selection up to:  $\pm 3\%$

**ELECTRICAL DATA (NOCT)**

|                                      | TSM-450<br>NEG9R.28 | TSM-455<br>NEG9R.28 | TSM-460<br>NEG9R.28 | TSM-465<br>NEG9R.28 | TSM-470<br>NEG9R.28 | TSM-475<br>NEG9R.28 |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Maximum Power- $P_{MAX}$ (Wp)        | 344                 | 348                 | 352                 | 355                 | 358                 | 362                 |
| Maximum Power Voltage- $V_{MPP}$ (V) | 42.0                | 42.3                | 42.7                | 42.8                | 43.1                | 43.4                |
| Maximum Power Current- $I_{MPP}$ (A) | 8.19                | 8.22                | 8.25                | 8.28                | 8.31                | 8.35                |
| Open Circuit Voltage- $V_{OC}$ (V)   | 50.2                | 50.6                | 51.0                | 51.4                | 51.8                | 52.1                |
| Short Circuit Current- $I_{SC}$ (A)  | 8.66                | 8.68                | 8.71                | 8.74                | 8.76                | 8.79                |

NOCT: Irradiance at 800 W/m<sup>2</sup>, Ambient Temperature 20 °C, Wind Speed 1 m/s.

**MECHANICAL DATA**

|                   |                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------|
| Solar Cells       | N-type i-TOPCon Monocrystalline                                                                       |
| No. of cells      | 144 cells                                                                                             |
| Module Dimensions | 1762×1134×30 mm                                                                                       |
| Weight            | 21.0 kg                                                                                               |
| Front Glass       | 1.6 mm, AR Coating Heat Strengthened Glass                                                            |
| Back Glass        | 1.6 mm, Heat Strengthened Glass                                                                       |
| Frame             | 30 mm Anodized Aluminium Alloy, black                                                                 |
| J-Box             | IP 68 rated, 3 bypass diodes                                                                          |
| Cables            | Photovoltaic Technology Cable 4.0 mm <sup>2</sup><br>Landscape: 1100/1100 mm<br>Portrait: 200/320 mm* |
| Connector         | TS4 Plus / TS4 / MC4 EVO2*                                                                            |

\*Special order only

**TEMPERATURE RATINGS**

|                                           |                     |
|-------------------------------------------|---------------------|
| NOCT (Nominal Operating Cell Temperature) | 43 °C ( $\pm 2$ °C) |
| Temperature Coefficient of $P_{MAX}$      | -0.29 %/°C          |
| Temperature Coefficient of $V_{OC}$       | -0.24 %/°C          |
| Temperature Coefficient of $I_{SC}$       | 0.04 %/°C           |

**MAXIMUM RATINGS**

|                         |                 |
|-------------------------|-----------------|
| Operational Temperature | -40 to +70 °C   |
| Maximum System Voltage  | 1500 V DC (IEC) |
| Max Series Fuse Rating  | 25 A            |

PV module 98th percentile operating temperature: 70 °C

**WARRANTY**

|                                      |
|--------------------------------------|
| 25 year Product Workmanship Warranty |
| 30 year Power Warranty               |
| 1 % first year degradation           |
| 0.4 % Annual Power Attenuation       |

(Please refer to product warranty for details)

**PACKAGING CONFIGURATION**

|                            |            |
|----------------------------|------------|
| Modules per box:           | 36 pieces  |
| Modules per 40' container: | 936 pieces |

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

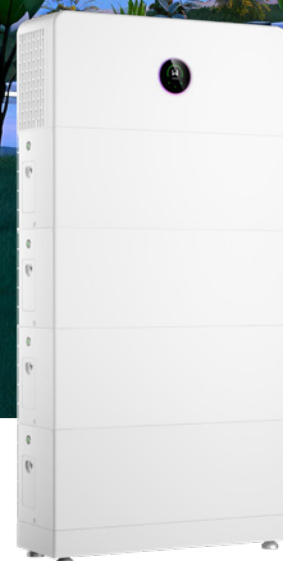
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Version number: TSM\_EN\_2026\_A

## ESA Series

### 5-30kW/5-108kWh | Three Phase Energy Storage Solution (HV)

The GoodWe ESA Series 5-30kW/5-108kWh is a three-phase all-in-one energy storage solution that integrates the inverter, battery, and intelligent energy management into a single system. Its pre-wired, modular design unifies the inverter and battery, delivering an installation-friendly structure that streamlines setup and accelerates commissioning. With four battery module options-5, 6, 8, and 9kWh-up to 12 modules can be connected for a total storage capacity of 108kWh. Featuring simplified configuration, large expandable storage, and an AI-driven EMS for dynamic tariff optimization, the ESA Series 5-30kW/5-108kWh provides an efficient, flexible, and future-ready solution for both residential and small commercial use.



#### Optimized Performance

- Up to 200% DC oversizing & AC backup overload
- Up to 1C charge/discharge for rapid energy cycling
- Smart fan cooling for quiet operation, noise as low as 30dB\*



#### Flexible & Adaptable Applications

- Dual-port design for whole-home backup
- Flexible battery mixing with different capacity or old & new batteries
- Supports on- and off-grid parallel operation



#### Superb Safety & Reliability

- Advanced 6-layer safety protection
- AI-driven AFCI 3.0 for safety
- Heating mode ensures reliable performance even in -20°C



#### Smart Control & Monitoring

- Ready for AI-driven EMS
- Seamless switching to backup <4ms
- One-click upgrade & one-click configuration

| Technical Data                                   |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
|--------------------------------------------------|----------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|------------------------------------------------|----------------------------------------------|----------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
|                                                  | GW5K-<br>ETA-G20                                         | GW6K-<br>ETA-G20                              | GW8K-<br>ETA-G20                              | GW9.999K-<br>ETA-G20                           | GW10K-<br>ETA-G20                              | GW12K-<br>ETA-G20                            | GW15K-<br>ETA-G20                            | GW20K-<br>ETA-G20                              | GW25K-<br>ETA-G20                              | GW29.999K-<br>ETA-G20                          | GW30K-<br>ETA-G20                              |
| Battery Side                                     |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Battery Type                                     | LFP (LiFePO4)                                            |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Nominal Voltage (V)                              | 750                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Voltage Range (V)                                | 700 ~ 950                                                |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Start-up Voltage (V)                             | 720                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Number of Battery Input                          | 1                                                        |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Max. Continuous Charging Current (A)             | 6.7                                                      | 8.1                                           | 10.7                                          | 13.4                                           | 13.4                                           | 16.1                                         | 20.1                                         | 26.7                                           | 33.3                                           | 40.0                                           | 40.0                                           |
| Max. Continuous Discharging Current (A)          | 7.4                                                      | 8.9                                           | 11.8                                          | 14.7                                           | 14.7                                           | 17.7                                         | 22.1                                         | 29.4                                           | 36.7                                           | 44.1                                           | 44.1                                           |
| Max. Charging Power (kW)                         | 5.0                                                      | 6.0                                           | 8.0                                           | 10.0                                           | 10.0                                           | 12.0                                         | 15.0                                         | 20.0                                           | 25.0                                           | 30.0                                           | 30.0                                           |
| Max. Discharging Power (kW)                      | 5.5                                                      | 6.6                                           | 8.8                                           | 11.0                                           | 11.0                                           | 13.2                                         | 16.5                                         | 22.0                                           | 27.5                                           | 33.0                                           | 33.0                                           |
| PV Side                                          |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Max. Input Power (kW)                            | 10                                                       | 12                                            | 16                                            | 20                                             | 20                                             | 24                                           | 30                                           | 40                                             | 50                                             | 60                                             | 60                                             |
| Max. Input Voltage (V) <sup>1</sup>              | 1000                                                     |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| MPPT Operating Voltage Range (V) <sup>2</sup>    | 120 ~ 950                                                |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Start-up Voltage (V)                             | 150                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Nominal Input Voltage (V)                        | 750                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Max. MPPT Current (A)                            | 21 / 21 / 21                                             |                                               |                                               |                                                |                                                | 21 / 21 / 21 / 21                            |                                              |                                                | 21 / 21 / 42 / 42                              |                                                |                                                |
| Max. MPPT Short Circuit Current (A)              | 26 / 26 / 26                                             |                                               |                                               |                                                |                                                | 26 / 26 / 26 / 26                            |                                              |                                                | 26 / 26 / 52 / 52                              |                                                |                                                |
| Number of MPPTs                                  | 3                                                        |                                               |                                               |                                                |                                                | 4                                            |                                              |                                                |                                                |                                                |                                                |
| Number of Strings per MPPT                       | 1 / 1 / 1                                                |                                               |                                               |                                                |                                                | 1 / 1 / 1 / 1                                |                                              |                                                | 1 / 1 / 2 / 2                                  |                                                |                                                |
| AC Side (Grid Port)                              |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Rated Power (kW)                                 | 5                                                        | 6                                             | 8                                             | 9.999                                          | 10                                             | 12                                           | 15                                           | 20                                             | 25                                             | 29.999                                         | 30                                             |
| Max. Power (kW)                                  | 5                                                        | 6                                             | 8                                             | 9.999                                          | 10                                             | 12                                           | 15                                           | 20                                             | 25                                             | 29.999                                         | 30                                             |
| Rated Apparent Power to Grid (kVA)               | 5                                                        | 6                                             | 8                                             | 9.999                                          | 10                                             | 12                                           | 15                                           | 20                                             | 25                                             | 29.999                                         | 30                                             |
| Rated Apparent Power from Grid (kVA)             | 5                                                        | 6                                             | 8                                             | 9.999                                          | 10                                             | 12                                           | 15                                           | 20                                             | 25                                             | 29.999                                         | 30                                             |
| Max. Apparent Power to Grid (kVA) <sup>3</sup>   | 5                                                        | 6                                             | 8                                             | 9.999                                          | 10                                             | 12                                           | 15                                           | 20                                             | 25                                             | 29.999                                         | 30                                             |
| Max. Apparent Power from Grid (kVA) <sup>4</sup> | 43.5                                                     | 43.5                                          | 43.5                                          | 43.5                                           | 43.5                                           | 43.5                                         | 43.5                                         | 43.5                                           | 55.2                                           | 55.2                                           | 55.2                                           |
| Nominal Voltage (V)                              | 220 / 380, 230 / 400, 3L / N / PE                        |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Voltage Range (V) (According to local standard)  | 180 ~ 260                                                |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Nominal Frequency (Hz)                           | 50 / 60                                                  |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Frequency Range (Hz)                             | 45 ~ 55 / 55 ~ 65                                        |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Rated Current to Grid (A)                        | 7.6@380V<br>7.3@400V                                     | 9.1@380V<br>8.7@400V                          | 12.2@380V<br>11.6@400V                        | 15.2@380V<br>14.5@400V                         | 15.2@380V<br>14.5@400V                         | 18.2@380V<br>17.4@400V                       | 22.8@380V<br>21.8@400V                       | 30.4@380V<br>29.0@400V                         | 37.9@380V<br>36.3@400V                         | 45.5@380V<br>43.5@400V                         | 45.5@380V<br>43.5@400V                         |
| Rated Current from Grid (A)                      | 7.6@380V<br>7.3@400V                                     | 9.1@380V<br>8.7@400V                          | 12.2@380V<br>11.6@400V                        | 15.2@380V<br>14.5@400V                         | 15.2@380V<br>14.5@400V                         | 18.2@380V<br>17.4@400V                       | 22.8@380V<br>21.8@400V                       | 30.4@380V<br>29.0@400V                         | 37.9@380V<br>36.3@400V                         | 45.5@380V<br>43.5@400V                         | 45.5@380V<br>43.5@400V                         |
| Max. Current to Grid (A) <sup>5</sup>            | 7.6@380V<br>7.3@400V                                     | 9.1@380V<br>8.7@400V                          | 12.2@380V<br>11.6@400V                        | 15.2@380V<br>14.5@400V                         | 15.2@380V<br>14.5@400V                         | 18.2@380V<br>17.4@400V                       | 22.8@380V<br>21.8@400V                       | 30.4@380V<br>29.0@400V                         | 37.9@380V<br>36.3@400V                         | 45.5@380V<br>43.5@400V                         | 45.5@380V<br>43.5@400V                         |
| Max. Current from Grid (A) <sup>4,5</sup>        | 63                                                       | 63                                            | 63                                            | 63                                             | 63                                             | 63                                           | 63                                           | 63                                             | 80                                             | 80                                             | 80                                             |
| Power Factor                                     | 0.8 leading ... 0.8 lagging                              |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| THDi                                             | <3%                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| AC Side (Back-up Port)                           |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Rated Apparent Power (kVA)                       | 5                                                        | 6                                             | 8                                             | 10                                             | 10                                             | 12                                           | 15                                           | 20                                             | 25                                             | 30                                             | 30                                             |
| Max. Apparent Power (kVA) <sup>6</sup>           | Off-grid:<br>5.5 (10.0, 10s)<br>on-grid: 43.5            | Off-grid:<br>6.6 (12.0, 10s)<br>on-grid: 43.5 | Off-grid:<br>8.8 (16.0, 10s)<br>on-grid: 43.5 | Off-grid:<br>11.0 (20.0, 10s)<br>on-grid: 43.5 | Off-grid:<br>11.0 (20.0, 10s)<br>on-grid: 43.5 | Off-grid:<br>13.2 (24, 10s)<br>on-grid: 43.5 | Off-grid:<br>16.5 (30, 10s)<br>on-grid: 43.5 | Off-grid:<br>22.0 (30.0, 10s)<br>on-grid: 43.5 | Off-grid:<br>27.5 (45.0, 10s)<br>on-grid: 55.2 | Off-grid:<br>33.0 (45.0, 10s)<br>on-grid: 55.2 | Off-grid:<br>33.0 (45.0, 10s)<br>on-grid: 55.2 |
| Nominal Voltage (V)                              | 220 / 380, 230 / 400, 3L / N / PE                        |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Nominal Frequency (Hz)                           | 50 / 60                                                  |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Max. Current (A) <sup>6</sup>                    | Off-grid: 11.4,<br>on-grid: 63                           | Off-grid: 13.7,<br>on-grid: 63                | Off-grid: 18.2,<br>on-grid: 63                | Off-grid: 22.8,<br>on-grid: 63                 | Off-grid: 22.8,<br>on-grid: 63                 | Off-grid: 27.3,<br>on-grid: 63               | Off-grid: 33.4,<br>on-grid: 63               | Off-grid: 33.4,<br>on-grid: 63                 | Off-grid: 50.0,<br>on-grid: 80                 | Off-grid: 50.0,<br>on-grid: 80                 | Off-grid: 50.0,<br>on-grid: 80                 |
| THDv (@Linear Load)                              | <3%                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| On / Off-grid Switching Time (ms)                | <4                                                       |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Efficiency                                       |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Max. Efficiency                                  | 98.0%                                                    | 98.0%                                         | 98.0%                                         | 98.1%                                          | 98.1%                                          | 98.1%                                        | 98.1%                                        | 98.1%                                          | 98.2%                                          | 98.2%                                          | 98.2%                                          |
| European Efficiency                              | 96.4%                                                    | 96.9%                                         | 97.1%                                         | 97.2%                                          | 97.2%                                          | 97.2%                                        | 97.3%                                        | 97.3%                                          | 97.4%                                          | 97.4%                                          | 97.4%                                          |
| Max. Battery to AC Efficiency                    | 98.0%                                                    |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Protection                                       |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| PV String Current Monitoring                     | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| PV Insulation Resistance Detection               | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Residual Current Monitoring                      | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| PV Reverse Polarity Protection                   | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Battery Reverse Polarity Protection              | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Anti-islanding Protection                        | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| AC Overcurrent Protection                        | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| AC Short Circuit Protection                      | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| AC Overvoltage Protection                        | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| DC Switch                                        | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| DC Surge Protection                              | Type II (Type I + II optional)                           |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| AC Surge Protection                              | Type II                                                  |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Rapid Shutdown                                   | Optional                                                 |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| AFCI                                             | Optional                                                 |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Remote Shutdown                                  | Integrated                                               |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| General Data                                     |                                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Operating Temperature Range (°C)                 | -35 ~ +60                                                |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Relative Humidity                                | 0 ~ 100%                                                 |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Max. Operating Altitude (m)                      | 4000 (>2000 derating)                                    |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Cooling Method                                   | Smart Fan Cooling                                        |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| User Interface                                   | LED, WLAN + APP                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Communication with BMS                           | CAN                                                      |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Communication                                    | RS485, WiFi + LAN + Bluetooth, 4G + Bluetooth (Optional) |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Communication Protocols                          | Modbus-RTU, Modbus-TCP                                   |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Weight (kg)                                      | 34                                                       | 34                                            | 34                                            | 34                                             | 34                                             | 34                                           | 34                                           | 34                                             | 38                                             | 38                                             | 38                                             |
| Dimension (W x H x D mm)                         | 800 x 340 x 270                                          |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Ingress Protection Rating                        | IP66                                                     |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |
| Mounting Method                                  | Wall/Floor Mounted                                       |                                               |                                               |                                                |                                                |                                              |                                              |                                                |                                                |                                                |                                                |

\*1: When the input voltage ranges from 950V to 1000V, the inverter will enter the standby mode, and the voltage returns to 950V to enter the normal operation state.  
\*2: Please refer to the user manual for the MPPT Voltage Range at nominal Power.  
\*3: According to the local grid regulation.  
\*4: GOODWE ESA series has internal bypass 63A passthrough ability to support whole home backup solution. If the customer don't want to do any breaker upgrade, the main breaker size in SolarGo(or SEMS+) can be set as previous breaker size.

\*5: If the backup port is not used, select an appropriate circuit breaker based on the AC maximum output current.  
\*6: "Off grid" means the energy of backup output only comes from PV and battery. "On grid" means the energy of the backup output includes the energy from grid or generator(on-grid) side.  
\*: Please visit GoodWe website for the latest certificates.

| Technical Data                                       |                | GW5.1-BAT-D-G20                                                   | GW8.3-BAT-D-G20   | GW6.0-BAT-D-G20                                                                              | GW9.0-BAT-D-G20   |
|------------------------------------------------------|----------------|-------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------|-------------------|
| Battery Type                                         |                | LFP (LiFePO <sub>4</sub> )                                        |                   |                                                                                              |                   |
| Rated Energy (kWh)                                   |                | 5.12                                                              | 8.32              | 6.0                                                                                          | 9.0               |
| Usable Energy (kWh)                                  |                | 5.0 <sup>*1</sup>                                                 | 8.0 <sup>*1</sup> | 5.8 <sup>*2</sup>                                                                            | 8.7 <sup>*2</sup> |
| Operating Voltage Range (V)<br>(single phase system) |                | 350 ~ 550                                                         |                   |                                                                                              |                   |
| Operating Voltage Range (V)<br>(three phase system)  |                | 700 ~ 950                                                         |                   |                                                                                              |                   |
| Max. Input Current (System) (A)                      |                | 12.0                                                              | 19.0              | 7.1                                                                                          | 10.7              |
| Max. Output Current (System) (A)                     |                | 13.2                                                              | 21.0              | 7.9                                                                                          | 11.8              |
| Max. Input Power (System) (kW) <sup>*3</sup>         |                | 5.0                                                               | 8.0               | 3.0                                                                                          | 4.5               |
| Max. Output Power (System) (kW) <sup>*3</sup>        |                | 5.0                                                               | 8.0               | 3.0                                                                                          | 4.5               |
| Peak Output Power (System) (kW) <sup>*3</sup>        |                | 7.5 @10s                                                          | 12 @10s           | 4.5 @ 10s                                                                                    | 6.75 @ 10s        |
| Charging Temperature Range (°C)                      |                | -18 ~ +55                                                         | -18 ~ +55         | -20 ~ +55                                                                                    | -20 ~ +55         |
| Discharging Temperature Range (°C)                   |                | -20 ~ +55                                                         |                   |                                                                                              |                   |
| Relative Humidity                                    |                | 4 ~ 100%                                                          |                   |                                                                                              |                   |
| Max. Operating Altitude (m)                          |                | 4000                                                              |                   |                                                                                              |                   |
| Noise Emission (dB)                                  |                | ≤29                                                               | ≤29               | ≤27                                                                                          | ≤27               |
| Communication                                        |                | CAN                                                               | CAN               | CAN & 485                                                                                    | CAN & 485         |
| Weight (kg)                                          |                | 57.5 ± 1                                                          | 79 ± 1            | 61 ± 1                                                                                       | 77± 1             |
| Ingress Protection                                   |                | IP66                                                              |                   |                                                                                              |                   |
| Dimensions (W × H × D mm)                            |                | 800 × 326 × 270                                                   |                   |                                                                                              |                   |
| Function Configuration                               |                | Heating (Integrated); Aerosol fire extinguishing (Integrated)     |                   |                                                                                              |                   |
| Max. Storage time                                    |                | 12 months (-20°C ~ +35°C)<br>6 months (+35°C ~ +45°C)             |                   |                                                                                              |                   |
| Scalability <sup>*4</sup>                            |                | 12 pcs                                                            |                   |                                                                                              |                   |
| Mounting Method                                      |                | Floor stacked / Wall-mounted                                      |                   | Floor stacked / Wall-mounted / Grounded                                                      |                   |
| Cycle Life <sup>*5</sup>                             |                | ≥8000                                                             | ≥8000             | ≥10000                                                                                       | ≥10000            |
| Standard and Certification                           | Safety         | IEC62619, IEC60730, EN62477, IEC63056, IEC62040, CE, CEC, VDE2510 |                   | IEC62619, IEC60730, EN62477, IEC63056, IEC62040, CE, CEC, Regulation 2023 / 1542, VDE2510-50 |                   |
|                                                      | EMC            | CE, RCM                                                           |                   |                                                                                              |                   |
|                                                      | Transportation | UN38.3, ADR                                                       |                   |                                                                                              |                   |

\*1: Test conditions, 100% DOD (cell 2.85~3.6V voltage range), 0.2P charge & discharge at 25±2°C for battery system at the beginning of life. Usable energy is defined by its initial design value. Actual available energy may vary depending on charge/discharge rate, environmental conditions (e.g. temperature), transport and storage factors.

\*2: Test conditions, 100% DOD (cell 2.87~3.61V voltage range), 0.4P charge & discharge at 25±2°C for battery system at the beginning of life. Usable energy is defined by its initial design value. Actual available energy may vary depending on charge/discharge rate, environmental conditions (e.g. temperature), transport and storage factors.

\*3: Max. Input Power /Max. Output Power/Peak Output Power derating will occur related to Temperature and SOC.

\*4: For single-column stacked installations, the maximum number of parallel units is 6.

\*5: Based on test data under specific laboratory conditions.

\*: Based on Lynx D G2 Series technology

\*: Please visit GoodWe website for the latest certificates.

power in wire and cables



# KBE SOLAR DB+



★ H1Z2Z2-K / EN 50618

★ IEC 131 / IEC 62930

★ TÜV 2 PfG 1169/10.19

1.500 V<sub>DC</sub> / 1.800 V<sub>DC</sub> max.

UV-Stabilität / UV-stability

erdverlegbar / direct burial

höhere Wasserbeständigkeit/  
higher water resistance

Brandklasse D<sub>ca</sub> nach BauPVO/  
flammability class D<sub>ca</sub> acc. CPR



  
MADE IN GERMANY

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Die KBE Elektrotechnik GmbH ist Hersteller von Kabeln und Leitungen für die Automobil- und Hausgeräteindustrie sowie mit 40 GW installierter Leistung einer der führenden internationalen Anbieter von Solarleitungen.

Bei unserer verbesserten KBE Solar DB+ haben wir berücksichtigt, dass sich die Anforderungen in den letzten Jahren dramatisch erhöht haben. Aus diesem Grund ist die KBE Solar DB+ die erste 3-fach zertifizierte Solarleitung nach der europäischen Solarleitungsnorm EN 50618, sowie nach der internationalen Norm IEC 62930, als auch nach der TÜV Prüfnorm 2 PfG 1169/10.19 durch den TÜV zertifiziert.

Zusätzlich besitzt die KBE Solar DB+ Solarleitung eine ganze Reihe von Vorteilen gegenüber herkömmlichen Solarleitungen:

- TÜV Zertifizierung nach EN 50618 (H1Z2Z2-K)
- TÜV Zertifizierung nach IEC 62930 (62930 IEC 131)
- TÜV Zertifizierung nach 2 PfG 1169/10.19 (PV 1500-K)
- Ausgelegt für 1.500 V<sub>DC</sub> (max. 1.800 V<sub>DC</sub>)
- fortlaufende Metermarkierung
- Erdverlegbarkeit durch hochwertige Isolationsmaterialien
- Höhere UV-Beständigkeit
- Höhere Wasserbeständigkeit
- Höherer Isolationswiderstand
- Höhere mechanische Stabilität
- Brandklasse D<sub>ca</sub> nach BauPVO
- optimiert für Floating PV Anlagen (FPV)

Neben wettbewerbsfähigen Konditionen bietet KBE Ihnen:

- „Made in Germany“ mit Fertigung in Berlin
- Lieferung ab Lager, kurze Lieferzeit
- Kostengünstige Direktlieferung ins weltweite Ausland
- Hohe Qualität und lange Lebensdauer (25 Jahre nach EN 50618)
- Hohe Flexibilität und Biegeweichfähigkeit
- Kompatibilität zu allen gängigen Steckern
- Farben: Schwarz, Rot, Blau
- Aufmachung: 100m Ringe, 500m Spulen, 1.000m Spulen

*KBE Elektrotechnik GmbH is manufacturer for wires and cables for the automotive and household appliance industry as well as one of the leading international suppliers of solar cables with 40 GW installed capacity.*

*The advanced KBE Solar DB+ features the latest, significantly increased, technical requirements for solar cables. As a consequence KBE Solar DB+ is the first triple certified solar cable, which is TÜV certified according to the European standard for solar cables EN 50618 and the international standard IEC 62930 as well as the new TÜV test standard 2 PfG 1169/10.19.*

*KBE Solar DB+ provides a number of additional advantages in comparison to conventional solar cables:*

- TÜV certification acc. to EN 50618 (H1Z2Z2-K)
- TÜV certification acc. to IEC 62930 (62930 IEC 131)
- TÜV certification acc. to 2 PfG 1169/10.19 (PV 1500-K)
- Voltage rating 1.500 V<sub>DC</sub> (max. 1.800 V<sub>DC</sub>)
- Consecutive meter marking
- Direct burial due to high quality insulation materials
- Higher UV-stability
- Higher water resistance
- Higher insulation resistance
- Higher mechanical stability
- flammability class D<sub>ca</sub> acc. CPR
- optimized for floating PV systems (FPV)

*In addition to competitive conditions KBE offers:*

- “Made in Germany” with production in Berlin, Germany
- Delivery from stock, short lead time
- Worldwide deliveries at favourable terms
- High quality and long life time (25 years acc. to EN 50618)
- High flexibility and bending capability
- Compatibility to all common connectors
- Colors: black, red, blue
- Packaging: 100m rings, 500m spools, 1.000m spools



# KBE Solar DB+ Datenblatt / Technical Data Sheet

Stand: 01.08.2020

|                                                                                    |                                                                                                             | Anforderungsprofil - KBE Solar DB+                                                                                                                                                                                                                                     | Requirement Profile - KBE Solar DB+                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                    | Bezeichnung /<br>Product name                                                                               | KBE Solar DB+                                                                                                                                                                                                                                                          | KBE Solar DB+                                                                                                                                                                                                                                      |
|                                                                                    | Bauartkurzzeichen/ Leitungscode /<br>Code designation                                                       | H1Z2Z2-K / 62930 IEC 131 / PV 1500-K                                                                                                                                                                                                                                   | H1Z2Z2-K / 62930 IEC 131 / PV 1500-K                                                                                                                                                                                                               |
|                                                                                    | Verfügbare Querschnitte /<br>Cross selections available                                                     | 4,0 mm <sup>2</sup> - 10 mm <sup>2</sup>                                                                                                                                                                                                                               | 4,0 mm <sup>2</sup> - 10 mm <sup>2</sup>                                                                                                                                                                                                           |
|                                                                                    | Normen / Approbationen /<br>Standard / Approbations                                                         | DIN EN 50618; TÜV Zertifikat-Nr. R60147048;<br>IEC 62930<br>2 PFG 1169/10.19                                                                                                                                                                                           | DIN EN 50618; TÜV Certificate-No. R60147048;<br>IEC 62930<br>2 PFG 1169/10.19                                                                                                                                                                      |
|                                                                                    |                                                                                                             | Allgemeine Angaben                                                                                                                                                                                                                                                     | General Information                                                                                                                                                                                                                                |
|    | Leiter /<br>Conductor                                                                                       | E-Cu verzinkt nach IEC 60228 Klasse 5                                                                                                                                                                                                                                  | E-Cu tinned acc. IEC 60228 Class 5                                                                                                                                                                                                                 |
|                                                                                    | Isolation /<br>Insulation                                                                                   | Vernetztes Spezial Polyolefin                                                                                                                                                                                                                                          | Crosslinked special Polyolefin                                                                                                                                                                                                                     |
|                                                                                    | Mantel /<br>Sheathing                                                                                       | Vernetztes Spezial Polyolefin                                                                                                                                                                                                                                          | Crosslinked special Polyolefin                                                                                                                                                                                                                     |
|                                                                                    | Bedruckung /<br>Printing                                                                                    | KBE SOLAR DB+ X,XX mm <sup>2</sup> H1Z2Z2-K 62930 IEC 131 PV 1500-K HALOGEN FREE LOW SMOKE R60147048<br>MADE IN GERMANY CE EAC                                                                                                                                         | KBE SOLAR DB+ X,XX mm <sup>2</sup> H1Z2Z2-K 62930 IEC 131 PV 1500-K HALOGEN FREE LOW SMOKE R60147048<br>MADE IN GERMANY CE EAC                                                                                                                     |
|                                                                                    | Abstand der Bedruckung /<br>Continuity of marks                                                             | ≤ 550 mm                                                                                                                                                                                                                                                               | ≤ 550 mm                                                                                                                                                                                                                                           |
|    | Mantelfarbe /<br>Sheat colour                                                                               | rot, blau, schwarz (Verwendung der Farbe mit sehr hoher Lichtechtheit (BWS 8) nach ISO 4892)                                                                                                                                                                           | red, blue, black (Usage of colour with very high lighth fastness (BWS 8) according to ISO 4892)                                                                                                                                                    |
|                                                                                    | Erwartete Gebrauchsdauer /<br>Expected period of use                                                        | 25 Jahre                                                                                                                                                                                                                                                               | 25 years                                                                                                                                                                                                                                           |
|                                                                                    |                                                                                                             | Elektrische Anforderungen                                                                                                                                                                                                                                              | Electrical Specifications                                                                                                                                                                                                                          |
|    | Nennspannung /<br>Rated Voltage U <sub>0</sub> /U                                                           | 1,0/1,0 kV <sub>AC</sub><br>1,5/ 1,5 kV <sub>DC</sub>                                                                                                                                                                                                                  | 1,0/1,0 kV <sub>AC</sub><br>1,5/ 1,5 kV <sub>DC</sub>                                                                                                                                                                                              |
|                                                                                    | Höchstzulässige Betriebsspannung /<br>Max. permissible operating voltage                                    | 1,2/ 1,2 kV <sub>AC</sub><br>1,8/ 1,8 kV <sub>DC</sub><br>(Leiter-Leiter, Leiter-Erde)                                                                                                                                                                                 | 1,2/ 1,2 kV <sub>AC</sub><br>1,8/ 1,8 kV <sub>DC</sub><br>(conductor-conductor, conductor-ground)                                                                                                                                                  |
|                                                                                    | Strombelastbarkeit /<br>Current carrying capacity                                                           | gemäß EN 50618, Tabelle A-3                                                                                                                                                                                                                                            | acc. to EN 50618, table A-3                                                                                                                                                                                                                        |
|                                                                                    | Leiterwiderstand /<br>Resistance of the conductor                                                           | EN 50395 Abschnitt 5<br>gemäß EN 50618, Tabelle 2                                                                                                                                                                                                                      | EN 50395 clause 5<br>acc. to EN 50618, table 2                                                                                                                                                                                                     |
|  | Spannungsprüfung AC / DC an der vollständigen Leitung /<br>Voltage test on the complete cable with AC or DC | EN 50395 Abschnitt 6<br>(6,5 kV <sub>AC</sub> oder 15 kV <sub>DC</sub> ; 5 Minuten)                                                                                                                                                                                    | EN 50395 clause 6<br>(6,5 kV <sub>AC</sub> or 15 kV <sub>DC</sub> ; 5 min)                                                                                                                                                                         |
|                                                                                    | Oberflächenwiderstand /<br>Surface resistance                                                               | EN 50395 Abschnitt 11                                                                                                                                                                                                                                                  | EN 50395 clause 11                                                                                                                                                                                                                                 |
|                                                                                    | Isolationswiderstand /<br>Insulation resistance                                                             | EN 50395 Abschnitt 8.1<br>durchgeführt bei 20 °C & 90 °C in Wasser Ergebnisse<br>gemäß EN 50618, Tabelle 1<br>2 PFG 1169/10.19<br>durchgeführt bei 20 °C & 90 °C in Wasser<br>Ergebnisse gemäß 2 PFG 1169/10.19 mindestens:<br>1050 MΩ*km @ 20 °C<br>1,05MΩ*km @ 90 °C | EN 50395 clause 8.1<br>performed at 20 °C & 90 °C in water results acc. to EN 50618, table 1<br>2 PFG 1169/10.19<br>performed at 20 °C & 90 °C in water<br>results acc. to 2 PFG 1169/10.19 at minimum:<br>1050 MΩ*km @ 20 °C<br>1,05MΩ*km @ 90 °C |
|                                                                                    | Durchlaufspannungsprüfung /<br>Spark test                                                                   | EN 62230, Anhang A                                                                                                                                                                                                                                                     | EN 62230, Annex A                                                                                                                                                                                                                                  |
|  | Gleichspannungsbeständigkeit /<br>Long term resistance of insulation to DC                                  | EN 50395 Abschnitt 9<br>(10 Tage, 85 °C in NaCl 3 %, 1,8 kV <sub>DC</sub> )                                                                                                                                                                                            | EN 50395 clause 9<br>(10 days, 85 °C in NaCl 3 %, 1,8 kV <sub>DC</sub> )                                                                                                                                                                           |
|                                                                                    |                                                                                                             |                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                    |
|                                                                                    |                                                                                                             | Mechanische Anforderungen                                                                                                                                                                                                                                              | Mechanical Specifications                                                                                                                                                                                                                          |
|  | Eigenschaften vor Alterung /<br>Properties before ageing                                                    | EN 60811-1-1; EN 60811-1-2<br>(Zugfestigkeit Isolierung ≥ 8,0 N/mm <sup>2</sup><br>Zugfestigkeit Mantel ≥ 8,0 N/mm <sup>2</sup><br>Reißdehnung ≥ 125 %)                                                                                                                | EN 60811-1-1; EN 60811-1-2<br>(tensile strenth insulation ≥ 8,0 N/mm <sup>2</sup><br>tensile strenth jacket ≥ 8,0 N/mm <sup>2</sup><br>elongation at break ≥ 125 %)                                                                                |
|                                                                                    | Wärmedehnungsprüfung /<br>Hot Set test                                                                      | EN 60811-2-1<br>(200 °C; 15 Min. unter Last; 20 N/cm <sup>2</sup> Belastung)                                                                                                                                                                                           | EN 60811-2-1<br>(200 °C; 15 min. under load; 20 N/cm <sup>2</sup> stress)                                                                                                                                                                          |
|                                                                                    | Biegeradius /<br>Bending radius                                                                             | ≥ 4 x Aussendurchmesser                                                                                                                                                                                                                                                | ≥ 4 x outer diameter                                                                                                                                                                                                                               |
|                                                                                    | Dynamische Durchdringungsprüfung /<br>Dynamic penetration test                                              | gemäß EN 50618 - Anhang D                                                                                                                                                                                                                                              | acc. to EN 50618 - Annex D                                                                                                                                                                                                                         |
|                                                                                    |                                                                                                             | Thermische Anforderungen                                                                                                                                                                                                                                               | Thermal Specifications                                                                                                                                                                                                                             |
|  | Umgebungstemperatur im Betrieb /<br>Ambient temperature in operation                                        | -40 °C bis +90 °C                                                                                                                                                                                                                                                      | -40 °C to + 90 °C                                                                                                                                                                                                                                  |
|                                                                                    | Tiefste, zulässige Umgebungstemperatur zur Installation /<br>Min. ambient temperature for installation      | -25 °C                                                                                                                                                                                                                                                                 | -25 °C                                                                                                                                                                                                                                             |
|  | Tiefste, zulässige Umgebungstemperatur /<br>Min. allowable ambient temperature                              | -40 °C                                                                                                                                                                                                                                                                 | -40 °C                                                                                                                                                                                                                                             |
|                                                                                    | Höchste Temperatur am Leiter /<br>Max. temperature at conductor                                             | 120 °C, basierend auf der EN 60216-1<br>(20.000 h; 50 % Restdehnung)                                                                                                                                                                                                   | 120 °C, based on EN 60216-1<br>(20.000 h; 50 % residual elongation)                                                                                                                                                                                |
|  | Kurzschluss temperatur /<br>Short-circuit temperature                                                       | +250 °C (am Leiter max. 5 Sek.)                                                                                                                                                                                                                                        | +250 °C (max. 5 sec on conductor)                                                                                                                                                                                                                  |
|                                                                                    | Feuchte Wärme-Prüfung /<br>Damp heat test                                                                   | EN 60068-2-78<br>(1.000h bei 90 °C und 85 % Luftfeuchte)                                                                                                                                                                                                               | EN 60068-2-78<br>(1.000h at 90 °C and 85 % relative humidity)                                                                                                                                                                                      |
|  | Schrumpungsprüfung /<br>Shrinkage test                                                                      | EN 60811-503<br>(120°C, 1h, Schrumpfung <2,0%)                                                                                                                                                                                                                         | EN 60811-503<br>(120°C, 1h, shrinkage <2,0%)                                                                                                                                                                                                       |
|                                                                                    | Kältewickelpprüfung /<br>Cold bending test                                                                  | EN 60811-504<br>(-40 °C, Vorkonditionierung: 16 h)                                                                                                                                                                                                                     | EN 60811-504<br>(-40 °C, duration of conditioning: 16 h)                                                                                                                                                                                           |
|  | Kälte dehnungstest /<br>Cold elongation test                                                                | DIN EN 60811-505<br>(-40 ± 2°C, Vorkonditionierung: 16 h)                                                                                                                                                                                                              | DIN EN 60811-505<br>(-40 °C ± 2 °C, duration of conditioning: 16 h)                                                                                                                                                                                |
|                                                                                    | Kälteschlagprüfung /<br>Cold impact test                                                                    | EN 60811-506 und EN 50618, Anhang C<br>(-40 °C; Masse des Fallgewichts 1.000 g)                                                                                                                                                                                        | EN 60811-506 and EN 50618, Annex C<br>(-40 °C; mass of hammer 1.000 g)                                                                                                                                                                             |

# KBE Solar DB+ Datenblatt / Technical Data Sheet

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|                                                                         |                                                                                                                                                        | sicherheitsspezifische Anforderungen                                                                                                                                                                                                                                                             | specifications regarding safety                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BauPVO<br>Dca                                                           | Bauproduktenverordnung (BauPVO) /<br>Construction Product Regulation (CPR)                                                                             | Klasse D <sub>ca</sub> in Übereinstimmung mit EN 50575:2014                                                                                                                                                                                                                                      | class D <sub>ca</sub> in accordance with EN 50575:2014                                                                                                                                                                                                                                                 |
|                                                                         | Beständigkeit gegen Säuren und Laugen /<br>Resistance against acid and alkaline solution                                                               | EN 60811-404<br>7 Tage; 23 °C (N-Oxalsäure; N-Natronlauge)                                                                                                                                                                                                                                       | EN 60811-404<br>7 days; 23 °C (N-Oxalic-acid; N-Sodium hydroxide solution)                                                                                                                                                                                                                             |
| UV                                                                      | Prüfung der Ozonbeständigkeit der vollständigen Leitung /<br>Ozone resistance on completed cable                                                       | EN 50396 Abschnitt 8.1.3, Verfahren B                                                                                                                                                                                                                                                            | EN 50396 clause 8.1.3, method B                                                                                                                                                                                                                                                                        |
|                                                                         | Bewitterung/UV-Prüfung am Mantel /<br>Weathering/ UV-resistance on sheath                                                                              | entspricht EN 50618, Anhang E EN 50289-4-17,<br>Verfahren A (720h; 60 °C ± 3 °C; 50 ± 5 % Luftfeuchte)<br>entspricht 2 PFG 1169/10.19<br>mit Test von 2.000h und damit deutlich höher als 720h nach<br>EN 50618                                                                                  | meets EN 50618, Annex E EN 50289-4-17,<br>method A (720 h; 60 °C ± 3 °C; 50 ± 5 % relative humidity)<br>meets 2 PFG 1169/10.19<br>test with 2.000h and exceeds significantly the test of 720h<br>acc. EN 50618                                                                                         |
|                                                                         | Prüfung der vertikalen Flammenausbreitung an der vollständigen Leitung /<br>Test for vertical flame propagation on complete cable                      | EN 60332-1-2                                                                                                                                                                                                                                                                                     | EN 60332-1-2                                                                                                                                                                                                                                                                                           |
|                                                                         | Rauchentwicklung an der vollständigen Leitung /<br>Smoke emission of complete cable                                                                    | EN 61034-2<br>(Lichtdurchlässigkeit > 70 %)                                                                                                                                                                                                                                                      | EN 61034-2<br>(light transmittance > 70 %)                                                                                                                                                                                                                                                             |
|                                                                         | Prüfung auf Halogenfreiheit / Bestimmung von<br>Halogenen - Elementarprüfung<br>Assessment of halogens / Determination of<br>halogens - Elemental test | EN 50525-1, Anhang B                                                                                                                                                                                                                                                                             | EN 50525-1, Annex B                                                                                                                                                                                                                                                                                    |
|                                                                         |                                                                                                                                                        | Zusätzliche interne Tests der KBE                                                                                                                                                                                                                                                                | Additional internal tests of KBE                                                                                                                                                                                                                                                                       |
| ✓                                                                       | Erdverlegbar /<br>Direct burial                                                                                                                        | KBE-interne Prüfung gemäß UL 854:<br>- Abschnitt 23: Impact-Resistance Test<br>- Abschnitt 24: Crushing-Resistance Test                                                                                                                                                                          | KBE internal test acc. To UL 854:<br>-Section 23 Impact-resistance Test<br>-Section 24 Crushing-Resistance Test                                                                                                                                                                                        |
|                                                                         | Langzeitisolationswiderstand im Wasser /<br>Long-term insulation resistance in water                                                                   | KBE Test gemäß UL 44 Abschnitt 5.4 & UL 2556, Abschnitt 6.4:<br>90 °C ± 5 °C; 2000V (DC) ≥ 3 GΩ×m nach 12 Wochen<br>Testergebnis KBE: > 50 GΩ×m nach 12 Wochen                                                                                                                                   | KBE test acc. to UL 44 Section 5.4 & UL 2556, Section 6.4:<br>90 °C ± 5 °C; 2000V (DC) ≥ 3 GΩ×m after 12 weeks<br>test result KBE: > 50GΩ×m after 12 weeks                                                                                                                                             |
| Eingruppierung in Kategorie AD8 /<br>Classification to the category AD8 |                                                                                                                                                        | in Anlehnung an die EN 50525-21 - Anhang E geprüft:<br>- Spannungsprüfung im Wasser bei 1 kV AC, bei 50 °C über<br>100 Tage ohne Unterbrechung<br>- Wasseraufnahme des Mantels nach 100 Tage Wasserlage-<br>rung bei 50 °C < 40 %<br>- Isolationswiderstand von mindestens 10 <sup>11</sup> Ω·cm | Tested acc. to EN 50525-21 – Annex E:<br>- Voltage at 1 kV on cable in water at 50 °C during 100 days<br>without any break<br>- Water absorption on sheath after immersion 100 days at 50<br>°C less than 40 %<br>- Insulation resistance tests with a minimum resistivity of<br>10 <sup>11</sup> Ω·cm |
|                                                                         | Langzeitisolationswiderstand in der Luft /<br>Long-term insulation resistance in air                                                                   | KBE Test gemäß UL 44, Abschnitt 5.5 & UL 2556, Abschnitt 6.4:<br>120 °C; 2000V (DC) ≥ 50 GΩ×m nach 12 Wochen                                                                                                                                                                                     | KBE test acc. to UL 44, Section 5.5 & UL 2556, Section 6.4:<br>120 °C; 2000V (DC) ≥ 50 GΩ×m after 12 weeks                                                                                                                                                                                             |
|                                                                         | maximal zulässige Betriebsspannung mit KBE /<br>Max. permissible operating voltage by KBE                                                              | 2,0/ 2,0 kV <sub>DC</sub>                                                                                                                                                                                                                                                                        | 2,0/ 2,0 kV <sub>DC</sub>                                                                                                                                                                                                                                                                              |
|                                                                         | Durchschlagsfestigkeit /<br>Dielectrical strength                                                                                                      | 12 kV 60 Min.<br>Vergleich zur Anforderung von EN 50618: 6,5 kV; 5 Min.                                                                                                                                                                                                                          | 12 kV 60 min<br>Comparison to Requirement of EN 50618: 6,5 kV; 5 min                                                                                                                                                                                                                                   |
|                                                                         | Widerstand gegen Salzwasser /<br>Resistance against salt water                                                                                         | Lagerung bei 23 °C für 7 Tage in gesättigter Salzlösung<br>Änderung der Zugfestigkeit < 5 %                                                                                                                                                                                                      | storage at 23 °C for 7 days in saturated salt solution Change<br>of tensile strength < 5 %                                                                                                                                                                                                             |
| Widerstand gegen Ammoniak /<br>Resistance against Ammonia               |                                                                                                                                                        | 7 Tage bei 23 °C gesättigter Ammoniakatmosphäre<br>(interner Test)                                                                                                                                                                                                                               | 7 days at 23 °C saturated ammonia atmosphere (int. Test)                                                                                                                                                                                                                                               |
|                                                                         | Elektrische Kapazität und relative<br>Dielektrizitätskonstante /<br>Electrical capacitance and relative permittivity                                   | KBE Test gemäß UL 44, Abschnitt 5.6 & UL 2556, Abschnitt 6.5:<br>90 °C ± 5 °C Wassertemperatur; Untertauchen für 14<br>Tage Relative Permittivität nach 1 Tag Untertauchen ≤ 6 %<br>Kapazität nach 14 Tagen Untertauchen ≤ 10 % Kapazitätsun-<br>terschied von Tag 7 bis Tag 14 ≤ 4 %            | KBE test acc. to UL 44, Section 5.6 & UL 2556, Section 6.5:<br>90 °C ± 5 °C water temperature; immersion for 14 days<br>relative permittivity after 1 day immersion ≤ 6 %<br>capacitance after 14 days immersion ≤ 10 % difference in<br>capacitance from day 7 to day 14 ≤ 4 %                        |
| TÜV                                                                     | Richtlinien & Zertifikate /<br>Certificates & Guidelines                                                                                               | EN 50618, IEC 62930, 2 PFG 1169/10.19<br>TÜV Zertifikat-Nr. R60147048<br>RoHS 2011/65/EU + 2015/863/EU REACH 1907/2006                                                                                                                                                                           | EN 50618, IEC 62930, 2 PFG 1169/10.19<br>TÜV certificate-Nr. R60147048<br>RoHS 2011/65/EU + 2015/863/EU REACH 1907/2006                                                                                                                                                                                |

## Bedruckung / Printing:

**KBE SOLAR DB+ X,XX mm² H1Z2Z2-K 62930 IEC 131 PV 1500-K HALOGEN FREE LOW SMOKE MADE IN GERMANY CE EAC**

| Querschnitt /<br>cross section | Leiteraufbau /<br>conductor design | Widerstand /<br>resistance | min. Wandstärke<br>Isolation /<br>min. insulation<br>thickness | min. Wandstärke<br>Mantel /<br>min. jacket<br>thickness | Außen Ø /<br>outer Ø | Gewicht /<br>weight | Aufma-<br>chung /<br>packaging | KBE-Artikelnnummer /<br>KBE item no |                  |                  |
|--------------------------------|------------------------------------|----------------------------|----------------------------------------------------------------|---------------------------------------------------------|----------------------|---------------------|--------------------------------|-------------------------------------|------------------|------------------|
| [mm²]                          | n x max- Ø [mm]                    | Rmax. [mΩ/m]               | [mm]                                                           | [mm]                                                    | [mm]                 | [kg/km]             | [Meter]                        | schwarz / black                     | rot / red        | blau / blue      |
| 4,0                            | 56 x 0,310                         | 5,09                       | 0,53                                                           | 0,58                                                    | 5,4                  | 55                  | 500 / 1.000                    | 730400015060QUSW                    | 730400015060QURT | 730400015060QUBL |
| 4,0                            | 56 x 0,310                         | 5,09                       | 0,53                                                           | 0,58                                                    | 5,4                  | 55                  | 100 Ring                       | 820400015060QUSW                    | 820400015060QURT | 820400015060QUBL |
| 6,0                            | 80 x 0,310                         | 3,39                       | 0,53                                                           | 0,58                                                    | 6,0                  | 75                  | 500 / 1.000                    | 730600015060QUSW                    | 730600015060QURT | 730600015060QUBL |
| 6,0                            | 80 x 0,310                         | 3,39                       | 0,53                                                           | 0,58                                                    | 6,0                  | 75                  | 100 Ring                       | 820600015060QUSW                    | 820600015060QURT | 820600015060QUBL |
| 10,0                           | 80 x 0,410                         | 1,95                       | 0,53                                                           | 0,58                                                    | 7,1                  | 115                 | 500                            | 731000015060QUSW                    | 731000015060QURT | 731000015060QUBL |
| 10,0                           | 80 x 0,410                         | 1,95                       | 0,53                                                           | 0,58                                                    | 7,1                  | 115                 | 100 Ring                       | 821000015060QUSW                    | 821000015060QURT | 821000015060QUBL |

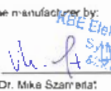
power in wire and cables

# KBE Solar DB+ Zertifikate / certificates

Stand: 01.08.2020

| Zertifikat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                     | Certificate                                                                                                      |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--|
| Zertifikat Nr. / Certificate No.<br>R 60147048                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Blatt / Sheet<br>0001                               | TÜVRheinland                                                                                                     |  |
| Ihr Zeichen / Client Reference<br>1837/19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Unser Zeichen / Our Reference<br>0010--60193773 002 | Anstellungsdatum / Date of Issue<br>03.03.2020                                                                   |  |
| Genehmigungsinhaber / License Holder<br>KBE Elektrotechnik GmbH<br>Symeonstr. 8<br>12279 Berlin<br>Deutschland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                     | Fertigungsstätte / Manufacturing Plant<br>KBE Elektrotechnik GmbH<br>Symeonstr. 8<br>12279 Berlin<br>Deutschland |  |
| Prüfzeichen / Test Mark<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Geprüft nach / Tested acc. to<br>EN 50618:2014      |                                                                                                                  |  |
| Zertifiziertes Produkt (Geräteidentifikation)<br>Certified Product (Product Identification)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     | Lizenzentgelte - Einheit<br>License Fee - Unit                                                                   |  |
| PV Components for BOS - electrical / PV cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     | 13                                                                                                               |  |
| <p>Type Designation: KBE Solar DB+<br/>Code designation: H12222-K<br/>Cross section: 4,0mm<sup>2</sup> ; 6,0mm<sup>2</sup> ; 10,0mm<sup>2</sup><br/>Rated voltage: AC UD/U 1,0 / 1,0kV<br/>DC 1,5kV<br/>max. voltage: DC 1,8kV (conductor/conductor and conductor/earth)<br/>Ambient temperature range ta: -40°C to +90°C<br/>max. temperature at conductor: +120°C @ 20,00h<br/>Colour insulation: white<br/>Colour sheath: black<br/>Material insulation: crosslinked Polyolefine<br/>Material sheath: crosslinked Polyolefine</p>                                                                                                                                                                                                                          |                                                     |                                                                                                                  |  |
| <p>Remark:<br/>Sheath also in red and blue when requested</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     |                                                                                                                  |  |
| <p>Der Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.<br/>This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.</p> |                                                     |                                                                                                                  |  |
| TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg<br>Tel.: +49 221 806-1371 e-mail: cert-validity@tdv.com<br>Fax: +49 221 806-3535 http://www.tuv.com/safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                     | Zertifizierungsstelle<br>TÜV Rheinland LGA Products GmbH<br>Guido Volberg                                        |  |

| Zertifikat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                     | Certificate                                                                                                      |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--|
| Zertifikat Nr. / Certificate No.<br>R 60147048                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Blatt / Sheet<br>0002                               | TÜVRheinland                                                                                                     |  |
| Ihr Zeichen / Client Reference<br>1837/19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Unser Zeichen / Our Reference<br>0010--60193773 003 | Anstellungsdatum / Date of Issue<br>03.03.2020                                                                   |  |
| Genehmigungsinhaber / License Holder<br>KBE Elektrotechnik GmbH<br>Symeonstr. 8<br>12279 Berlin<br>Deutschland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                     | Fertigungsstätte / Manufacturing Plant<br>KBE Elektrotechnik GmbH<br>Symeonstr. 8<br>12279 Berlin<br>Deutschland |  |
| Prüfzeichen / Test Mark<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Geprüft nach / Tested acc. to<br>IEC 62930:2017     |                                                                                                                  |  |
| Zertifiziertes Produkt (Geräteidentifikation)<br>Certified Product (Product Identification)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     | Lizenzentgelte - Einheit<br>License Fee - Unit                                                                   |  |
| PV Components for BOS - electrical / PV cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     | 1                                                                                                                |  |
| <p>Type Designation: KBE Solar DB+<br/>Code designation: 62930 IEC 131<br/>Cross section: 4,0mm<sup>2</sup> ; 6,0mm<sup>2</sup> ; 10,0mm<sup>2</sup><br/>Rated voltage: AC UD/U 1,0 / 1,0kV<br/>DC 1,5kV<br/>max. voltage: DC 1,8kV (conductor/conductor and conductor/earth)<br/>Ambient temperature range ta: -40°C to +90°C<br/>max. temperature at conductor: +120°C @ 20,00h<br/>Colour insulation: white<br/>Colour sheath: black<br/>Material insulation: crosslinked Polyolefine<br/>Material sheath: crosslinked Polyolefine</p>                                                                                                                                                                                                                     |                                                     |                                                                                                                  |  |
| <p>Remark:<br/>Sheath also in red and blue when requested</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     |                                                                                                                  |  |
| <p>Der Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.<br/>This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.</p> |                                                     |                                                                                                                  |  |
| TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg<br>Tel.: +49 221 806-1371 e-mail: cert-validity@tdv.com<br>Fax: +49 221 806-3535 http://www.tuv.com/safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                     | Zertifizierungsstelle<br>TÜV Rheinland LGA Products GmbH<br>Guido Volberg                                        |  |

| Declaration of Performance: DoP 0225                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                         | KBE<br>BERLIN                 |  |                           |             |                               |                  |                |                         |                      |     |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--|---------------------------|-------------|-------------------------------|------------------|----------------|-------------------------|----------------------|-----|---|
| According to Annex II of regulation (EU) no. 305/2011                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                         |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 1. Unique identification code of the product type:                                                                                                                                                                                                                                                                                                                                                                   | H12222-K                                                                                                                                                                                                                                                                                                                                                |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 2. Product name                                                                                                                                                                                                                                                                                                                                                                                                      | KBE Solar DB+                                                                                                                                                                                                                                                                                                                                           |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 3. Usage:                                                                                                                                                                                                                                                                                                                                                                                                            | Cables for general applications in construction works subject to reaction to fire                                                                                                                                                                                                                                                                       |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 4. Manufacturer:                                                                                                                                                                                                                                                                                                                                                                                                     | KBE Elektrotechnik GmbH<br>Symeonstraße 8<br>12279 Berlin                                                                                                                                                                                                                                                                                               |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 5. System of assessment and verification of constancy of performance:                                                                                                                                                                                                                                                                                                                                                | System 3                                                                                                                                                                                                                                                                                                                                                |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 6. Product certification body:                                                                                                                                                                                                                                                                                                                                                                                       | ISSEP - Institut scientifique de service public<br>No. 2659                                                                                                                                                                                                                                                                                             |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 7. In case of declaration of performance concerning a construction product covered by a harmonized standard:                                                                                                                                                                                                                                                                                                         | <p>The product certification body performed the type testing under system 3 subject to reaction to fire and issued:</p> <ul style="list-style-type: none"> <li>Test report no. 0626-1 up to -4/2020</li> <li>Test report no. 0527-3 up to -4/2020</li> <li>Test report no. 0871-1 up to -2/2020</li> <li>Classification report no. 1012/2020</li> </ul> |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| 8. Declared performance:                                                                                                                                                                                                                                                                                                                                                                                             | <table border="1"> <thead> <tr> <th>Essential characteristics</th> <th>performance</th> <th>Harmonized technical standard</th> </tr> </thead> <tbody> <tr> <td>Reaction to fire</td> <td>Dca-s2, d2, a1</td> <td>EN 50575:2014 + A1:2016</td> </tr> <tr> <td>Hazardous substances</td> <td>NPD</td> <td>-</td> </tr> </tbody> </table>                  |                               |  | Essential characteristics | performance | Harmonized technical standard | Reaction to fire | Dca-s2, d2, a1 | EN 50575:2014 + A1:2016 | Hazardous substances | NPD | - |
| Essential characteristics                                                                                                                                                                                                                                                                                                                                                                                            | performance                                                                                                                                                                                                                                                                                                                                             | Harmonized technical standard |  |                           |             |                               |                  |                |                         |                      |     |   |
| Reaction to fire                                                                                                                                                                                                                                                                                                                                                                                                     | Dca-s2, d2, a1                                                                                                                                                                                                                                                                                                                                          | EN 50575:2014 + A1:2016       |  |                           |             |                               |                  |                |                         |                      |     |   |
| Hazardous substances                                                                                                                                                                                                                                                                                                                                                                                                 | NPD                                                                                                                                                                                                                                                                                                                                                     | -                             |  |                           |             |                               |                  |                |                         |                      |     |   |
| <p>9. The performance of the product identified in points 1 &amp; 2 is in conformity with the declared performance in point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.</p>                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                         |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| <p>Signed for and on behalf of the manufacturer by:</p> <p>Berlin, 29.05.2020<br/>(Place, Date)</p> <p><br/>Dr. Mike Szamrat<br/>Executive Director R &amp; D KBE / DLB Group</p>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                         |                               |  |                           |             |                               |                  |                |                         |                      |     |   |
| <p>power in wire and cables</p> <p>Die Leistungsbewertung der Überstromschmelze ist durch eine Zuerkennung von E gekennzeichnet und ist in der Normung festgelegt. Die Sicherheitsanforderungen der Produktkennzeichnung sind zu beachten.</p> <p>4100 Elektrotechnik GmbH<br/>Symeonstr. 8<br/>12279 Berlin, Deutschland</p> <p>Tel.: +49 (0) 30 25208-100<br/>Fax: +49 (0) 30 25208-140<br/>info@kbe-berlin.de</p> |                                                                                                                                                                                                                                                                                                                                                         |                               |  |                           |             |                               |                  |                |                         |                      |     |   |

| Zertifikat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                     | Certificate                                                                                                      |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--|
| Zertifikat Nr. / Certificate No.<br>R 60147048                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Blatt / Sheet<br>0003                               | TÜVRheinland                                                                                                     |  |
| Ihr Zeichen / Client Reference<br>448/20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Unser Zeichen / Our Reference<br>0010--60193773 004 | Anstellungsdatum / Date of Issue<br>09.07.2020                                                                   |  |
| Genehmigungsinhaber / License Holder<br>KBE Elektrotechnik GmbH<br>Symeonstr. 8<br>12279 Berlin<br>Deutschland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                     | Fertigungsstätte / Manufacturing Plant<br>KBE Elektrotechnik GmbH<br>Symeonstr. 8<br>12279 Berlin<br>Deutschland |  |
| Prüfzeichen / Test Mark<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Geprüft nach / Tested acc. to<br>2 PEG 1169/10.19   |                                                                                                                  |  |
| Zertifiziertes Produkt (Geräteidentifikation)<br>Certified Product (Product Identification)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     | Lizenzentgelte - Einheit<br>License Fee - Unit                                                                   |  |
| PV Components for BOS - electrical / PV - Cables                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                     | as page 0201 - 0202/                                                                                             |  |
| <p>Supplement:<br/>Product complies also with the above mentioned standard.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                     |                                                                                                                  |  |
| <p>Additional Code designation: PV 1500-K</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     |                                                                                                                  |  |
| <p>Der Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.<br/>This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.</p> |                                                     |                                                                                                                  |  |
| TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg<br>Tel.: +49 221 806-1371 e-mail: cert-validity@tdv.com<br>Fax: +49 221 806-3535 http://www.tuv.com/safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                     | Zertifizierungsstelle<br>TÜV Rheinland LGA Products GmbH<br>Guido Volberg                                        |  |

power in wire and cables

power in wire and cables



**>40 GW weltweit / >40 GW worldwide**

# Original MC4-Evo 2

**Renewable Energy | Solar Photovoltaics**

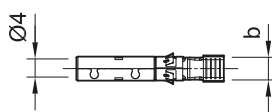
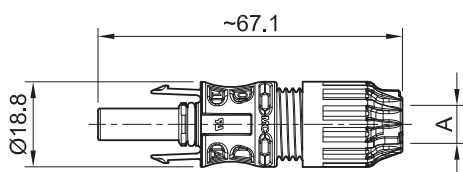
EN



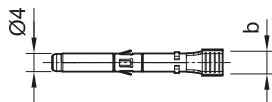
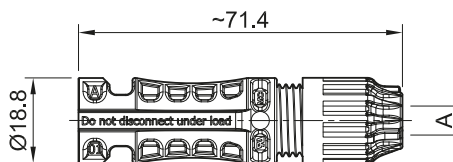
# Female and male cable coupler MC4-Evo 2

Female and male cable coupler as individual part (including insulating part)

**PV-KBT4-EVO 2A/...**



**PV-KST4-EVO 2A/...**



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

[www.staubli.com/re-downloads.html](http://www.staubli.com/re-downloads.html) → English → Catalog → Tools and accessories



Assembly instructions see MA298

[www.staubli.com/re-downloads.html](http://www.staubli.com/re-downloads.html) → English → Assembly info → MA298

Internationally certified with IEC, UL, JET, cTÜVus. Approved for DC 1500 V (IEC, JET), DC 1500 V (UL) unrestricted access. MULTILAM Technology, has proven the

quality and durability several 100 million times since 2004. Suited for all climatic environments due to UV resistance, ammonia and high IP degree. Available as a field and

preassembled connector, standard crimping tools can be used. Mating compatibility with MC4 connector family.

| Technical data                                                             |                              |
|----------------------------------------------------------------------------|------------------------------|
| Connector system                                                           | Ø 4 mm                       |
| Ambient temperature range                                                  | -40 °C ... +85 °C (IEC/UL)   |
| Transportation/storage temperature range                                   | -30 °C/+60 °C                |
| Transportation/storage relative humidity                                   | < 70 %                       |
| Upper limiting temperature                                                 | 115 °C (IEC)                 |
| Degree of protection, mated                                                | IP65/IP68 (1 m, 1 h)         |
| Degree of protection, unmated                                              | IP2X                         |
| Overvoltage category                                                       | III                          |
| Contact resistance of plug connectors                                      | < 0.2 mΩ                     |
| Locking system                                                             | Locking type                 |
| Class (IEC)                                                                | II                           |
| Contact system                                                             | MULTILAM                     |
| Type of termination                                                        | Crimping                     |
| Warning                                                                    | Do not disconnect under load |
| Contact material                                                           | Copper, tin plated           |
| Insulation material                                                        | PA                           |
| Flame class                                                                | UL94-V0                      |
| Ammonia resistance<br>(TÜV Rheinland certified acc. to 2 PFG 1911/03.2011) | Q60139020-0001               |
| TÜV-Rheinland certified according to<br>IEC 62852:2014+Amd.1:2020          | R 60127169                   |
| UL recognized component in accordance with UL6703                          | E343181                      |
| Maximum altitude above sea level for operation                             | 5000 m                       |
| Temperature Level according to IEC TS 63126                                | Level 2                      |

# Female and male cable coupler MC4-Evo 2

Female and male cable coupler as individual part (including insulating part)

| Order No.    | Type                 | Socket | Plug | Outer diameter of cable | Width of crimp opening | IEC 62852       |      |    | UL 6703 |      |    | Approvals     |    |
|--------------|----------------------|--------|------|-------------------------|------------------------|-----------------|------|----|---------|------|----|---------------|----|
|              |                      |        |      |                         |                        | mm <sup>2</sup> | DC V | A  | AWG     | DC V | A  | TÜV Rheinland | UR |
| 32.0310P0001 | PV-KBT4-EVO 2A/2.5I  | x      |      | 4.7-6.4                 | 4                      | 2.5             | 1500 | 39 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        |                 |      |    | 14      | 1500 | 30 |               |    |
| 32.0311P0001 | PV-KST4-EVO 2A/2.5I  |        | x    | 4.7-6.4                 | 4                      | 2.5             | 1500 | 39 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        |                 |      |    | 14      | 1500 | 30 |               |    |
| 32.0312P0001 | PV-KBT4-EVO 2A/2.5X  | x      |      | 5.9-7.3                 | 4                      | 2.5             | 1500 | 39 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        |                 |      |    | 14      | 1500 | 30 |               |    |
| 32.0313P0001 | PV-KST4-EVO 2A/2.5X  |        | x    | 5.9-7.3                 | 4                      | 2.5             | 1500 | 39 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        |                 |      |    | 14      | 1500 | 30 |               |    |
| 32.0314P0001 | PV-KBT4-EVO 2A/2.5II | x      |      | 6.4-8.4                 | 4                      | 2.5             | 1500 | 39 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        |                 |      |    | 14      | 1500 | 30 |               |    |
| 32.0315P0001 | PV-KST4-EVO 2A/2.5II |        | x    | 6.4-8.4                 | 4                      | 2.5             | 1500 | 39 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        |                 |      |    | 14      | 1500 | 30 |               |    |
| 32.0316P0001 | PV-KBT4-EVO 2A/6I    | x      |      | 4.7-6.4                 | 5.8                    | 4               | 1500 | 45 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |               |    |
| 32.0317P0001 | PV-KST4-EVO 2A/6I    |        | x    | 4.7-6.4                 | 5.8                    | 4               | 1500 | 45 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |               |    |
| 32.0318P0001 | PV-KBT4-EVO 2A/6X    | x      |      | 5.9-7.3                 | 5.8                    | 4               | 1500 | 45 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |               |    |
| 32.0319P0001 | PV-KST4-EVO 2A/6X    |        | x    | 5.9-7.3                 | 5.8                    | 4               | 1500 | 45 |         |      |    | x             | x  |
|              |                      |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |               |    |
|              |                      |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |               |    |

## Note:

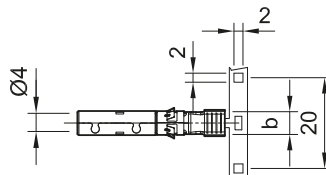
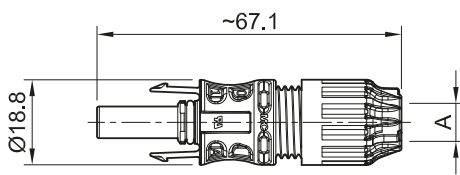
For detailed information concerning the suitable cable gland range, please consult MA298.

| Order No.    | Type                | Socket | Plug | Outer diameter of cable | Width of crimp opening | IEC 62852       |      |    | UL 6703 |      |    | Approvals     |    |
|--------------|---------------------|--------|------|-------------------------|------------------------|-----------------|------|----|---------|------|----|---------------|----|
|              |                     |        |      | A (mm)                  | b (mm)                 | mm <sup>2</sup> | DC V | A  | AWG     | DC V | A  | TÜV Rheinland | UR |
| 32.0320P0001 | PV-KBT4-EVO 2A/6II  | x      |      | 6.4-8.4                 | 5.8                    | 4               | 1500 | 45 |         |      |    | x             | x  |
|              |                     |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |               |    |
| 32.0321P0001 | PV-KST4-EVO 2A/6II  |        | x    | 6.4-8.4                 | 5.8                    | 4               | 1500 | 45 |         |      |    | x             | x  |
|              |                     |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |               |    |
| 32.0322P0001 | PV-KBT4-EVO 2A/10X  | x      |      | 5.9-7.3                 | 6.5                    | 10              | 1500 | 69 |         |      |    | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |               |    |
| 32.0323P0001 | PV-KST4-EVO 2A/10X  |        | x    | 5.9-7.3                 | 6.5                    | 10              | 1500 | 69 |         |      |    | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |               |    |
| 32.0324P0001 | PV-KBT4-EVO 2A/10II | x      |      | 6.4-8.4                 | 6.5                    | 10              | 1500 | 69 |         |      |    | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |               |    |
| 32.0325P0001 | PV-KST4-EVO 2A/10II |        | x    | 6.4-8.4                 | 6.5                    | 10              | 1500 | 69 |         |      |    | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |               |    |

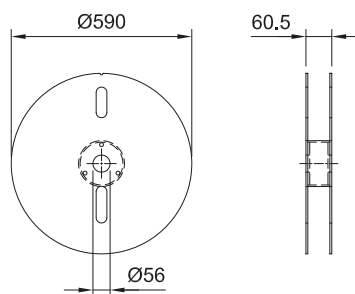
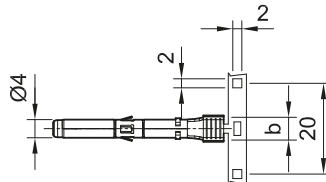
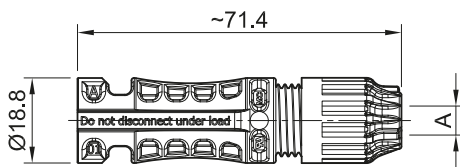
# Female and male cable coupler MC4-Evo 2

Contacts on carrier band (including insulating part)

**PV-KBT4-EVO 2A/...**



**PV-KST4-EVO 2A/...**



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

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Assembly instructions see MA298

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Internationally certified with IEC, UL, JET, cTÜVus. Approved for DC 1500 V (IEC, JET), DC 1500 V (UL) unrestricted access. MULTILAM Technology has proven the qual-

ity and durability several 100 million times since 2004. Suited for all climatic environments due to UV resistance, ammonia and high IP degree. Available as a field and pre-

assembled connector; standard crimping tools can be used. Mating compatibility with MC4 connector family.

| Technical data                                                             |                                                   |
|----------------------------------------------------------------------------|---------------------------------------------------|
| Connector system                                                           | Ø 4 mm                                            |
| Ambient temperature range                                                  | -40 °C ... +85 °C (IEC)<br>-40 °C ... +90 °C (UL) |
| Transportation/storage temperature range                                   | -30 °C/+60 °C                                     |
| Transportation/storage relative humidity                                   | < 70 %                                            |
| Upper limiting temperature                                                 | 115 °C                                            |
| Degree of protection, mated                                                | IP65/IP68 (1 m, 1 h)                              |
| Degree of protection, unmated                                              | IP2X                                              |
| Overvoltage category                                                       | III                                               |
| Contact resistance of plug connectors                                      | < 0.2 mΩ                                          |
| Locking system                                                             | Locking type                                      |
| Class (IEC)                                                                | II                                                |
| Contact system                                                             | MULTILAM                                          |
| Type of termination                                                        | Crimping                                          |
| Warning                                                                    | Do not disconnect under load                      |
| Contact material                                                           | Copper, tin plated                                |
| Insulation material                                                        | PA                                                |
| Flame class                                                                | UL94-V0                                           |
| Ammonia resistance<br>(TÜV Rheinland certified acc. to 2 PFG 1911/03.2011) | Q60139020-0001                                    |
| TÜV-Rheinland certified according to<br>IEC 62852:2014+Amd.1:2020          | R 60127169                                        |
| UL recognized component in accordance with UL6703                          | E343181                                           |
| Maximum altitude above sea level for operation                             | 5000 m                                            |
| Temperature Level according to IEC TS 63126                                | Level 2                                           |

# Female and male cable coupler MC4-Evo 2

Contacts on carrier band (including insulating part)

| Order No.    | Type                 | Socket | Plug | Outer diameter of cable | Width of crimp opening | IEC 62852 |      |    | UL 6703 |      |    | Contacts per reel | Approvals     |    |
|--------------|----------------------|--------|------|-------------------------|------------------------|-----------|------|----|---------|------|----|-------------------|---------------|----|
|              |                      |        |      |                         |                        | mm²       | DC V | A  | AWG     | DC V | A  |                   | TÜV Rheinland | UR |
| 32.0310P2000 | PV-KBT4-EVO 2A/2.5I  | x      |      | 4.7-6.4                 | 4.0                    | 2.5       | 1500 | 39 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        |           |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0311P2000 | PV-KST4-EVO 2A/2.5I  |        | x    | 4.7-6.4                 | 4.0                    | 2.5       | 1500 | 39 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        |           |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0312P2000 | PV-KBT4-EVO 2A/2.5X  | x      |      | 5.9-7.3                 | 4.0                    | 2.5       | 1500 | 39 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        |           |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0313P2000 | PV-KST4-EVO 2A/2.5X  |        | x    | 5.9-7.3                 | 4.0                    | 2.5       | 1500 | 39 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        |           |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0314P2000 | PV-KBT4-EVO 2A/2.5II | x      |      | 6.4-8.4                 | 4.0                    | 2.5       | 1500 | 39 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        |           |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0315P2000 | PV-KST4-EVO 2A/2.5II |        | x    | 6.4-8.4                 | 4.0                    | 2.5       | 1500 | 39 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        |           |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0316P2000 | PV-KBT4-EVO 2A/6I    | x      |      | 4.7-6.4                 | 5.8                    | 4         | 1500 | 45 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        | 6         | 1500 | 53 |         |      |    |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0317P2000 | PV-KST4-EVO 2A/6I    |        | x    | 4.7-6.4                 | 5.8                    | 4         | 1500 | 45 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        | 6         | 1500 | 53 |         |      |    |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0318P2000 | PV-KBT4-EVO 2A/6X    | x      |      | 5.9-7.3                 | 5.8                    | 4         | 1500 | 45 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        | 6         | 1500 | 53 |         |      |    |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0319P2000 | PV-KST4-EVO 2A/6X    |        | x    | 5.9-7.3                 | 5.8                    | 4         | 1500 | 45 |         |      |    | 2000              | x             | x  |
|              |                      |        |      |                         |                        | 6         | 1500 | 53 |         |      |    |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                      |        |      |                         |                        |           |      |    | 10      | 1500 | 50 |                   |               |    |

## Note:

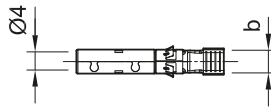
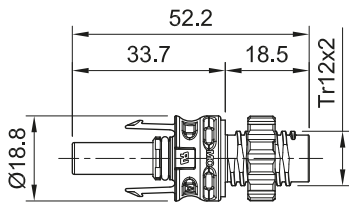
For more detailed information concerning the suitable cable gland range, please consult MA298.

| Order No.    | Type                | Socket | Plug | Outer diameter of cable | Width of crimp opening | IEC 62852       |      |    | UL 6703 |      |    | Contacts per reel | Approvals     |    |
|--------------|---------------------|--------|------|-------------------------|------------------------|-----------------|------|----|---------|------|----|-------------------|---------------|----|
|              |                     |        |      | A (mm)                  | b (mm)                 | mm <sup>2</sup> | DC V | A  | AWG     | DC V | A  |                   | TÜV Rheinland | UR |
| 32.0320P2000 | PV-KBT4-EVO 2A/6II  | x      |      | 6.4-8.4                 | 5.8                    | 4               | 1500 | 45 |         |      |    | 2000              | x             | x  |
|              |                     |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |                   |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0321P2000 | PV-KST4-EVO 2A/6II  |        | x    | 6.4-8.4                 | 5.8                    | 4               | 1500 | 45 |         |      |    | 2000              | x             | x  |
|              |                     |        |      |                         |                        | 6               | 1500 | 53 |         |      |    |                   |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                     |        |      |                         |                        |                 |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0322P1500 | PV-KBT4-EVO 2A/10X  | x      |      | 5.9-7.3                 | 6.5                    | 10              | 1500 | 69 |         |      |    | 1500              | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |                   |               |    |
| 32.0323P1500 | PV-KST4-EVO 2A/10X  |        | x    | 5.9-7.3                 | 6.5                    | 10              | 1500 | 69 |         |      |    | 1500              | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |                   |               |    |
| 32.0324P1500 | PV-KBT4-EVO 2A/10II | x      |      | 6.4-8.4                 | 6.5                    | 10              | 1500 | 69 |         |      |    | 1500              | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |                   |               |    |
| 32.0325P1500 | PV-KST4-EVO 2A/10II |        | x    | 6.4-8.4                 | 6.5                    | 10              | 1500 | 69 |         |      |    | 1500              | x             | x  |
|              |                     |        |      |                         |                        |                 |      |    | 8       | 1500 | 70 |                   |               |    |

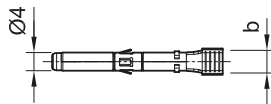
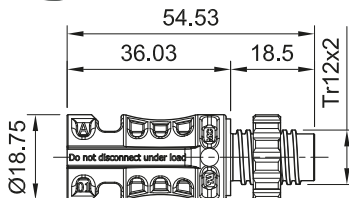
# Female and male panel receptacle MC4-Evo 2

Female and male panel receptacles as individual part (including insulating part)

**PV-ADB4-EVO 2A/...**



**PV-ADS4-EVO 2A/...**



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

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Assembly instructions see MA713

[www.staubli.com/re-downloads.html](http://www.staubli.com/re-downloads.html) → English → Assembly info → MA713

MC4-Evo 2 panel-receptacle connectors are the interface between the inverter or the distributor housing and string. Assembly directly via the threads or in the perforated plate with the plastic nut (contained in

scope of delivery). Thanks to the D-shape thread the connection is secured against twisting. For 1500 DC V (IEC), 1500 DC V (UL) approved without constraints. Degree of protection IP65/IP68 (1 m, 1 h) guarantees

highest connection safety. Fast and clean connection. Plug compatible with the original MC4 plug connector family. With preassembled flat seal.

| Technical data                                                 |                                               |
|----------------------------------------------------------------|-----------------------------------------------|
| Connector system                                               | Ø 4 mm                                        |
| Ambient temperature range                                      | -40 °C...+85 °C (IEC)<br>-40 °C...+90 °C (UL) |
| Upper limiting temperature                                     | 115 °C                                        |
| Degree of protection, mated                                    | IP65/IP68 (1 m, 1 h)                          |
| Degree of protection, unmated                                  | IP2X                                          |
| Overvoltage category                                           | III                                           |
| Locking system                                                 | Locking type                                  |
| Contact system                                                 | MULTILAM                                      |
| Type of termination                                            | Crimping                                      |
| Contact material                                               | Copper, tin plated                            |
| Insulation material                                            | PA                                            |
| Flame class                                                    | UL94-V0                                       |
| TÜV Rheinland certified according to IEC 62852:2014+Amd.1:2020 | R 60127171                                    |
| UL recognized component in accordance with UL6703              | E343181                                       |
| Maximum altitude above sea level for operation                 | 5000 m                                        |
| Temperature level according to IEC TS 63126                    | Level 2                                       |

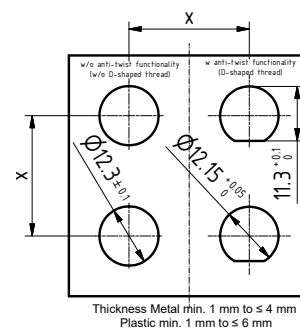
| Order No.    | Type               | Socket | Plug | Width of crimp opening | IEC 62852 |      |    | UL 6703 |      |    | Approvals     |    |
|--------------|--------------------|--------|------|------------------------|-----------|------|----|---------|------|----|---------------|----|
|              |                    |        |      | b (mm)                 | mm²       | DC V | A  | AWG     | DC V | A  | TÜV Rheinland | UR |
| 32.0344P0001 | PV-ADB4-EVO 2A/2.5 | x      |      | 4.0                    | 2.5       | 1500 | 32 |         |      |    | x             | x  |
|              |                    |        |      |                        |           |      |    | 14      | 1500 | 30 |               |    |
| 32.0345P0001 | PV-ADS4-EVO 2A/2.5 |        | x    | 4.0                    | 2.5       | 1500 | 32 |         |      |    | x             | x  |
|              |                    |        |      |                        |           |      |    | 14      | 1500 | 30 |               |    |
| 32.0346P0001 | PV-ADB4-EVO 2A/6   | x      |      | 5.8                    | 4         | 1500 | 42 |         |      |    | x             | x  |
|              |                    |        |      |                        | 6         | 1500 | 47 |         |      |    |               |    |
|              |                    |        |      |                        |           |      |    | 12      | 1500 | 35 |               |    |
|              |                    |        |      |                        |           |      |    | 10      | 1500 | 50 |               |    |
| 32.0347P0001 | PV-ADS4-EVO 2A/6   |        | x    | 5.8                    | 4         | 1500 | 42 |         |      |    | x             | x  |
|              |                    |        |      |                        | 6         | 1500 | 47 |         |      |    |               |    |
|              |                    |        |      |                        |           |      |    | 12      | 1500 | 35 |               |    |
|              |                    |        |      |                        |           |      |    | 10      | 1500 | 50 |               |    |
| 32.0352P0001 | PV-ADB4-EVO 2A/10  | x      |      | 6.5                    | 10        | 1500 | 62 |         |      |    | x             | x  |
|              |                    |        |      |                        |           |      |    | 8       | 1500 | 70 |               |    |
| 32.0353P0001 | PV-ADS4-EVO 2A/10  |        | x    | 6.5                    | 10        | 1500 | 62 |         |      |    | x             | x  |
|              |                    |        |      |                        |           |      |    | 8       | 1500 | 70 |               |    |

#### Note:

For more detailed information concerning the suitable cable gland range, please consult MA713

#### Note

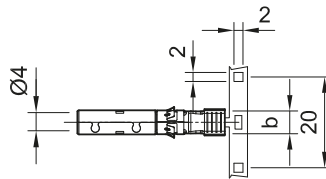
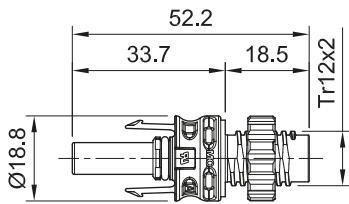
When using panel receptacles in housings (e.g. inverter maker) confirm that the minimum plastic wall thickness shall be between 1 mm and 6 mm; on metal housings, wall thickness shall be between 1 mm and 4 mm. In case of wall thickness undercut or exceedance, the panel receptacle usage in the end-application has to be verified by the installer.



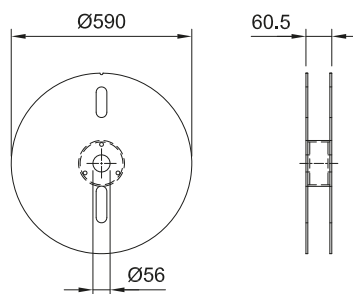
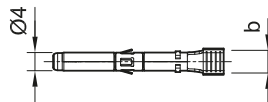
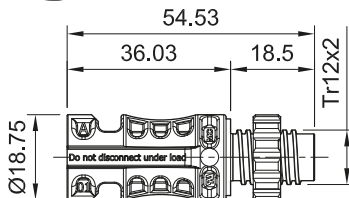
# Female and male panel receptacle MC4-Evo 2

Contacts on carrier band (including insulating part)

**PV-ADB4-EVO 2A/...**



**PV-ADS4-EVO 2A/...**



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

[www.staubli.com/re-downloads.html](http://www.staubli.com/re-downloads.html) → English → Catalog → Tools and accessories



Assembly instructions see MA713

[www.staubli.com/re-downloads.html](http://www.staubli.com/re-downloads.html) → English → Assembly info → MA713

MC4-Evo 2 panel-receptacle connectors are the interface between the inverter or the distributor housing and string. Assembly directly via the threads or in the perforated plate with the plastic nut (contained in

scope of delivery). Thanks to the D-shape thread the connection is secured against twisting. For 1500 DC V(IEC), 1500 DC V (UL) approved without constraints. Degree of protection IP65/IP68 (1 m, 1 h) guarantees

highest connection safety. Fast and clean connection. Plug compatible with the original MC4 plug connector family. With preassembled flat seal.

| Technical data                                                 |                                               |
|----------------------------------------------------------------|-----------------------------------------------|
| Connector system                                               | Ø 4 mm                                        |
| Ambient temperature range                                      | -40 °C...+85 °C (IEC)<br>-40 °C...+90 °C (UL) |
| Upper limiting temperature                                     | 115 °C                                        |
| Degree of protection, mated                                    | IP65/IP68 (1 m, 1 h)                          |
| Degree of protection, unmated                                  | IP2X                                          |
| Overvoltage category                                           | III                                           |
| Locking system                                                 | Locking type                                  |
| Contact system                                                 | MULTILAM                                      |
| Type of termination                                            | Crimping                                      |
| Contact material                                               | Copper, tin plated                            |
| Insulation material                                            | PA                                            |
| Flame class                                                    | UL94-V0                                       |
| TÜV Rheinland certified according to IEC 62852:2014+Amd.1:2020 | R 60127171                                    |
| UL recognized component in accordance with UL6703              | E343181                                       |
| Maximum altitude above sea level for operation                 | 5000 m                                        |
| Temperature level according to IEC TS 63126                    | Level 2                                       |

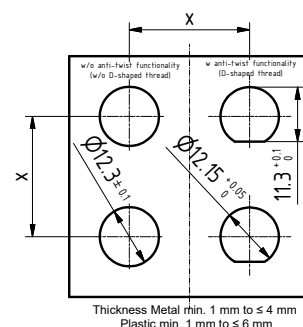
| Order No.    | Type               | Socket | Plug | Width of crimp opening | IEC 62852       |      |    | UL 6703 |      |    | Contacts per reel | Approvals     |    |
|--------------|--------------------|--------|------|------------------------|-----------------|------|----|---------|------|----|-------------------|---------------|----|
|              |                    |        |      |                        | mm <sup>2</sup> | DC V | A  | AWG     | DC V | A  |                   | TÜV Rheinland | UR |
| 32.0344P2000 | PV-ADB4-EVO 2A/2.5 | x      |      | 4.0                    | 2.5             | 1500 | 32 |         |      |    | 2000              | x             | x  |
|              |                    |        |      |                        |                 |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0345P2000 | PV-ADS4-EVO 2A/2.5 |        | x    | 4.0                    | 2.5             | 1500 | 32 |         |      |    | 2000              | x             | x  |
|              |                    |        |      |                        |                 |      |    | 14      | 1500 | 30 |                   |               |    |
| 32.0346P2000 | PV-ADB4-EVO 2A/6   | x      |      | 5.8                    | 4               | 1500 | 42 |         |      |    | 2000              | x             | x  |
|              |                    |        |      |                        | 6               | 1500 | 47 |         |      |    |                   |               |    |
|              |                    |        |      |                        |                 |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                    |        |      |                        |                 |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0347P2000 | PV-ADS4-EVO 2A/6   |        | x    | 5.8                    | 4               | 1500 | 42 |         |      |    | 2000              | x             | x  |
|              |                    |        |      |                        | 6               | 1500 | 47 |         |      |    |                   |               |    |
|              |                    |        |      |                        |                 |      |    | 12      | 1500 | 35 |                   |               |    |
|              |                    |        |      |                        |                 |      |    | 10      | 1500 | 50 |                   |               |    |
| 32.0352P1500 | PV-ADB4-EVO 2A/10  | x      |      | 6.5                    | 10              | 1500 | 62 |         |      |    | 1500              | x             | x  |
|              |                    |        |      |                        |                 |      |    | 8       | 1500 | 70 |                   |               |    |
| 32.0353P1500 | PV-ADS4-EVO 2A/10  |        | x    | 6.5                    | 10              | 1500 | 62 |         |      |    | 1500              | x             | x  |
|              |                    |        |      |                        |                 |      |    | 8       | 1500 | 70 |                   |               |    |

#### Note:

For more detailed information concerning the suitable cable gland range, please consult MA713

#### Note

When using panel receptacles in housings (e.g. inverter maker) confirm that the minimum plastic wall thickness shall be between 1 mm and 6 mm; on metal housings, wall thickness shall be between 1 mm and 4 mm. In case of wall thickness undercut or exceedance, the panel receptacle usage in the end-application has to be verified by the installer.





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