

# Certificate of Conformity

No. ESY 086470 0225 Rev. 00

**Holder of Certificate:** **Ginlong Technologies Co., Ltd.**

No.57 Jintong Road  
Binhai Industrial Park, Xiangshan  
315712 Ningbo, Zhejiang  
PEOPLE'S REPUBLIC OF CHINA

**Product:** **Converter  
Hybrid Inverter**

**Model(s):** **S6-EH1P3K-L-PLUS, S6-EH1P3.6K-L-PLUS,  
S6-EH1P4.6K-L-PLUS, S6-EH1P5K-L-PLUS,  
S6-EH1P6K-L-PLUS, S6-EH1P8K-L-PLUS**

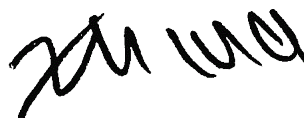
**Parameters:** See next pages.

**Applicable standards:** EN 50549-1:2019  
EN 50549-10:2022

This Certificate of Conformity confirms the compliance with the above listed standards on a voluntary basis. It refers only to the sample submitted to TÜV SÜD Product Service GmbH and does not certify the quality or safety of the serial products. It was issued according to TÜV SÜD Product Service certification program Photovoltaics and Grid Integration. For details see: [www.tuvsud.com/ps-cert](http://www.tuvsud.com/ps-cert)

**Test report no.:** 7040924037115-00

**Date,** 2024-09-30



( Zhengdong Ma )

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| Models                            | S6-EH1P3K-L-PLUS        | S6-EH1P3.6K-L-PLUS | S6-EH1P4.6K-L-PLUS |
|-----------------------------------|-------------------------|--------------------|--------------------|
| PV-Input:                         |                         |                    |                    |
| Max. input voltage                | DC 500 V                |                    |                    |
| Mppt voltage range                | DC 90 V, ..., 435 V     |                    |                    |
| Max. input current                | AC 16/16 A              | AC 16/16 A         | AC 16/16 A         |
| Isc PV (absolute maximum)         | AC 20/20 A              | AC 20/20 A         | AC 20/20 A         |
| Battery Input / Output:           |                         |                    |                    |
| Battery Type                      | Li-ion/Lead-acid        |                    |                    |
| Battery Voltage range             | DC 40, ..., 60 V        |                    |                    |
| Max. Charge / discharge current   | DC 70 A/ 70 A           | DC 80 A/ 80 A      | DC 105 A/ 105 A    |
| AC-Output (Grid side):            |                         |                    |                    |
| Rated output voltage              | 1/N/PE AC 230 V         |                    |                    |
| Rated output frequency            | 50 Hz                   |                    |                    |
| Max. /Rated apparent output power | 3000 VA                 | 3600 VA            | 4600 VA            |
| Max. /Rated output current        | AC 13.1 A               | AC 15.7 A          | AC 20 A            |
| Power factor range                | -0.8, ..., 1, ..., +0.8 |                    |                    |

| Models                            | S6-EH1P5K-L-PLUS        | S6-EH1P6K-L-PLUS | S6-EH1P8K-L-PLUS |
|-----------------------------------|-------------------------|------------------|------------------|
| PV-Input:                         |                         |                  |                  |
| Max. input voltage                | DC 500 V                |                  |                  |
| Mppt voltage range                | DC 90 V, ..., 435 V     |                  |                  |
| Max. input current                | AC 16/16 A              | AC 16/16 A       | AC 32/32 A       |
| Isc PV (absolute maximum)         | AC 20/20 A              | AC 20/20 A       | AC 40/40 A       |
| Battery Input / Output:           |                         |                  |                  |
| Battery Type                      | Li-ion/Lead-acid        |                  |                  |
| Battery Voltage range             | DC 40, ..., 60 V        |                  |                  |
| Max. Charge / discharge current   | DC 112 A/ 112 A         | DC 135 A/ 135 A  | DC 190 A/ 190 A  |
| AC-Output (Grid side):            |                         |                  |                  |
| Rated output voltage              | 1/N/PE AC 230 V         |                  |                  |
| Rated output frequency            | 50 Hz                   |                  |                  |
| Max. /Rated apparent output power | 5000 VA                 | 6000 VA          | 8000 VA          |
| Max. /Rated output current        | AC 21.8 A               | AC 26.1 A        | AC 34.8 A        |
| Power factor range                | -0.8, ..., 1, ..., +0.8 |                  |                  |

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## Evaluated protection function and operational capabilities

| Clause(s) / subclause(s) of EN 50549-1:2019                               | Applicable clause(s) / subclause (s) of this document  | Remarks, optional modes and constraints       | Verdict |
|---|--|---|---------|
| 4.4.2 Operating frequency range   | 5.2.1 Frequency operating range  | --  | Pass    |
| 4.4.3 Minimal requirement for active power delivery at underfrequency     | 5.2.1 Frequency operating range  | --  | Pass    |
| 4.4.4 Continuous operating voltage range                                  | 5.2.2 Voltage operating range  | --  | Pass    |
| 4.5.2 Rate of change of frequency (ROCOF) immunity                        | 5.3.1 Immunity to disturbances – Rated of change of frequency (ROCOF)  | --  | Pass    |
| 4.5.3.2 Generating plant with non-synchronous generating technology       | 5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)  | --  | Pass    |
| 4.5.4 Over-voltage ride through (OVRT)                                    | 5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)  | --  | Pass    |
| 4.6.1 Power response to overfrequency                                     | 5.4 Active response to frequency deviation   | --  | Pass    |
| 4.6.2 Power response to underfrequency                                    | 5.4 Active response to frequency deviation   | --  | Pass    |
| 4.7.2.2 Voltage support by reactive power, Capabilities                   | 5.5.1 Power capabilities assessment  | --  | Pass    |
| 4.7.2.3 Voltage support by reactive power, Control modes                  | 5.5.2 Voltage support by reactive power - test to determine the reactive power control modes   | Q setp.<br>Q(U)<br>Cos φ setp.<br>Cos φ (P)   | Pass    |
| 4.7.2.3.2 Set point control modes   | 5.5.2.3 Verification procedure for set point control   | Q setp.<br>Cos φ setp.                        | Pass    |
| 4.7.2.3.3 Voltage related control modes                                   | 5.5.2.5 Verification procedure for power related control modes for reactive power  | Q(U)  | Pass    |
| 4.7.2.3.4 Power related control mode                                      | 5.5.2.5 Verification procedure for power related control modes for reactive power  | Cos φ (P)                                     | Pass    |
| 4.7.3 Voltage related active power reduction                              | 5.6 Voltage related active power reduction - P(U)  | P(U)  | Pass    |
| 4.7.4.2.2 Zero current mode for converter connected generating technology | 5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)  | --  | Pass    |
| 4.9.3 Requirements on voltage and frequency protection                    | 5.8.3 Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as internal device | --  | Pass    |
| 4.9.4 Means to detect island situation                                    | 5.8.6 Islanding detection  | Active methods tested with a resonant circuit | Pass    |

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|   |  |  |      |
|---|--|--|------|
|   |  | according to EN 62116  |      |
| 4.10.2 Automatic reconnection after tripping                                    | 5.9.3 Automatic reconnection after tripping  | --   | Pass |
| 4.10.3 Starting to generate electrical power                                    | 5.9.4 Starting to generate electrical power  | --   | Pass |
| 4.11.1 Ceasing active power   | 5.10 Active power reduction on set point   | --   | Pass |
| 4.11.2 Reduction of active power on set point                                   | 5.10 Active power reduction on set point   | --   | Pass |
| 4.12 Remote information exchange  | 5.11 Remote information exchange   | Standardized communication protocol not provided by manufacturer | N/A  |
| 4.13 single fault tolerance of interface protection system and interface switch | 5.12 Requirements regarding single fault tolerance of interface protection system and interface switch | --   | Pass |

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## Evaluated parameter and parameter range

| Specific technical requirement (e.g. grid codes)  |  | EN 50549-1:2019                 |   |  |              |
|---|--|---------------------------------|---|--|--------------|
| Clause(s) / subclause(s) of EN 50549-1:2019   | Parameter  | Remarks/ additional information | Configurable value range                                  | Default value                          |              |
| 4.4.2 Operating frequency range   | 47.0 – 47.5 Hz Duration  | --                              | 0 – 20 s  | Unlimited with protection setting only |              |
|   | 47.5 – 48.5 Hz Duration  | --                              | 30 – 90 min   | Unlimited with protection setting only |              |
|   | 48.5 – 49.0 Hz Duration  | --                              | 30 – 90 min   | Unlimited                              |              |
|   | 49.0 – 51.0 Hz Duration  | --                              | not configurable  | Unlimited                              |              |
|   | 51.0 – 51.5 Hz Duration  | --                              | 30 – 90 min   | Unlimited with protection setting only |              |
|   | 51.5 – 52 Hz Duration  | --                              | 0 – 15 min  | Unlimited with protection setting only |              |
|   | 4.4.3 Minimal requirement for active power delivery at underfrequency            | Reduction threshold             | --  | not configurable                       | No reduction |
| Maximum reduction rate  |  | --                              | not configurable  | N/A                                    |              |
| 4.4.4 Continuous operating voltage range  | Upper limit  | --                              | not configurable  | 110% U <sub>n</sub>                    |              |
|   | Lower limit  | --                              | not configurable  | 85% U <sub>n</sub>                     |              |
| 4.5.2 Rate of change of frequency (ROCOF) immunity  | ROCOF withstand capability (defined with a sliding measurement window of 500 ms) | --                              | not configurable  | 2 Hz/s                                 |              |
| 4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology | Maximum power resumption time  | --                              | not configurable  | 1 s                                    |              |
|   | Voltage-Time-Diagram   | --                              | See figure 6 default requirement curve of EN 50549-1:2019 | Time [s]                               | U [p.u.]     |
|   |  |                                 |   | 0.0                                    | 0.2          |
|   |  |                                 |   | 0.15                                   | 0.2          |
|   |  |                                 | 1.5   | 0.85                                   |              |
| 4.5.4 Over-voltage ride through (OVRT)  | Voltage-Time-Diagram   | --                              | not configurable See figure 8 of EN 50549-1:2019          | Time [s]                               | U [p.u.]     |
|   |  |                                 |   | 0.0                                    | 1.25         |
|   |  |                                 |   | 0.1                                    | 1.25         |
|   |  |                                 |   | 0.1                                    | 1.20         |
|   |  |                                 |   | 5.0                                    | 1.20         |
|   |  |                                 |   | 5.0                                    | 1.15         |
|   |  |                                 |   | 60                                     | 1.15         |
|   |  |                                 |   | 60                                     | 1.10         |
| 4.6.1 Power response to overfrequency   | Threshold frequency f <sub>1</sub>   | --                              | 50.2 Hz – 52 Hz   | 50.2 Hz                                |              |
|   | Droop  | --                              | 2 % – 12 %  | 5 %                                    |              |
|   | Power reference  | --                              | P <sub>M</sub>   P <sub>max</sub>                         | P <sub>max</sub> for ESS               |              |
|   | Intentional delay  | --                              | 0 – 2 s   | 0s                                     |              |
|   | Deactivation threshold f <sub>stop</sub>   | --                              | 50.0 Hz – f <sub>1</sub>                                  | deactivated                            |              |
|   | Deactivation time t <sub>stop</sub>  | --                              | 0 – 600 s   | -                                      |              |
|   | Acceptance of  | --                              | yes   no  | No                                     |              |

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|---|---|----|---|---------------------------------|
|   | staged disconnection                                    |    |   |                                 |
| 4.6.2 Power response to underfrequency                                      | Threshold frequency $f_1$                               | -- | 49.8 Hz – 46 Hz   | 49.8 Hz                         |
|   | Droop   | -- | 2 – 12 %  | 5 %                             |
|   | Power reference   | -- | $P_M   P_{max}$   | $P_{max}$                       |
|   | Intentional delay                                       | -- | 0 – 2 s   | 0 s                             |
| 4.7.2.2 Voltage support by reactive power - Capabilities                    | Active factor / Reactive power (%Pd) range overexcited  | -- | 0.8 – 1 / 60 % $P_D$ – 0                                    | 0.9 – 1 / 48.4 % $P_D$ – 0      |
|   | Active factor / Reactive power (%Pd) range underexcited | -- | 0.8 – 1 / 60 % $P_D$ – 0                                    | 0.9 – 1 / 48.4 % $P_D$ – 0      |
| 4.7.2.3 Voltage support by reactive power - Control modes                   | Enabled control mode                                    | -- | Q setp.<br>Q(U)<br>Cos $\varphi$ setp.<br>Cos $\varphi$ (P) | Q setp.                         |
| 4.7.2.3.2 Voltage support by reactive power - Setpoint control modes        | Q setpoint and excitation                               | -- | 0 – 60 % $P_D$  | 0                               |
|   | cos $\varphi$ setpoint and excitation                   | -- | 1 – 0.8   | 1                               |
| 4.7.2.3.3 Voltage support by reactive power - Voltage related control modes | Characteristic curve – Q (U)                            | -- | --  | Indicate default characteristic |
|   | Point a   | -- | 50% $U_n$ – 100% $U_n$                                      | 93 % $U_n$                      |
|   | Point b   | -- | 50% $U_n$ – 100% $U_n$                                      | 94 % $U_n$                      |
|   | Point c   | -- | 100% $U_n$ – 120% $U_n$                                     | 106% $U_n$                      |
|   | Point d   | -- | 100% $U_n$ – 120% $U_n$                                     | 108 % $U_n$                     |
|   | Min. reactive power                                     | -- | 0 – 60 %Pd<br>( $Q_{max}$ under)                            | 48.4 %Pd                        |
|   | Max. reactive power                                     | -- | 0 – 60 %Pd<br>( $Q_{max}$ over)                             | 48.4 %Pd                        |
|   | Time constant   | -- | 3 s – 60 s  | 3.0 s                           |
|   | Min cos $\varphi$                                       | -- | 0.0 – 1   | 0.4                             |
|   | Lock in power   | -- | 0 % – 20 %  | 20%                             |
|   | Lock out power  | -- | 0 % – 20 %  | 5%                              |
| 4.7.2.3.4 Voltage support by reactive power - Power related control mode    | Characteristic curve – Cos $\varphi$ (P)                | -- | --  | Indicate default characteristic |
|   | Point a   | -- | 0 – 100% $P_n$ /<br>PF:-0.8, ..., +0.8                      | 15% $P_n$ /<br>PF=0.8           |
|   | Point b   | -- | 0 – 100% $P_n$ /<br>PF:-0.8, ..., +0.8                      | 20% $P_n$ /<br>PF=1             |
|   | Point c   | -- | 0 – 100% $P_n$ /<br>PF:-0.8, ..., +0.8                      | 80% $P_n$ /<br>PF=1             |
|   | Point d   | -- | 0 – 100% $P_n$ /<br>PF:-0.8, ..., +0.8                      | 90% $P_n$ /<br>PF=-0.9          |
|   | Cos $\varphi$   | -- | 0.8 – 1   | 0.8                             |
|   | Time constant   | -- | 3 s – 60 s  | 3.33 s                          |
|   | Lock in voltage   | -- | 105 % $U_n$   | deactivated                     |
|   | Lock out voltage  | -- | 100 % $U_n$   | deactivated                     |
| 4.7.3 Voltage related active power reduction                                | Characteristic curve - P (U)                            | -- | --  | Indicate default characteristic |
|   | Point a   | -- | 0 – 100% $P_n$ /<br>U:0 V, ..., 264.5 V                     | 100% $P_n$ /<br>U=207 V         |
|   | Point b   | -- | 0 – 100% $P_n$ /<br>U:0 V, ..., 264.5 V                     | 100% $P_n$ /<br>U=230 V         |
|   | Point c   | -- | 0 – 100% $P_n$ /<br>U:0 V, ..., 264.5 V                     | 100% $P_n$ /<br>U=253 V         |

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|   | Point d   | --              | 0 – 100%P <sub>n</sub> /<br>U:0 V, ...,264.5 V | 5%P <sub>n</sub> /<br>U=257.6 V                  |         |
|   | Time constant   | --              | 3 s – 60 s                                     | 3.33 s   |         |
| 4.7.4.2.2 Zero current mode for<br>converter connected<br>generating technology | Enabling  | --              | enable   disable                               | disabled   |         |
|   | Static voltage<br>range overvoltage                                     | --              | 100 %U <sub>n</sub> – 120 %U <sub>n</sub>      | 120 %U <sub>n</sub>                              |         |
|   | Static voltage<br>range<br>undervoltage                                 | --              | 20 %U <sub>n</sub> – 100 %U <sub>n</sub>       | 50 %U <sub>n</sub>                               |         |
| 4.9.3 Requirements on voltage<br>and frequency protection                       | Threshold for<br>protection as<br>dedicated device<br>[in A or kW. kVA] | --              | 16 A – 250 kVA                                 | Not specified, inverter<br>integrated as default |         |
|   | Undervoltage<br>threshold stage 1                                       | --              | 0.2 U <sub>n</sub> – 1 U <sub>n</sub>          | 0.85U <sub>n</sub>                               |         |
|   | Undervoltage<br>operate time stage<br>1                                 | --              | 0.1 s – 100 s                                  | 100 s  |         |
|   | Undervoltage<br>threshold stage 2                                       | --              | 0.2 U <sub>n</sub> – 1 U <sub>n</sub>          | 0.5U <sub>n</sub>                                |         |
|   | Undervoltage<br>operate time stage<br>2                                 | --              | 0.1 s – 5 s                                    | 5 s  |         |
|   | Overvoltage<br>threshold stage 1  | --              | 1.0 U <sub>n</sub> – 1.2 U <sub>n</sub>        | 1.2U <sub>n</sub>                                |         |
|   | Overvoltage<br>operate time stage<br>1                                  | --              | 0.1 s – 100 s                                  | 100 s  |         |
|   | Overvoltage<br>threshold stage 2  | --              | 1.0 U <sub>n</sub> – 1.3 U <sub>n</sub>        | 1.3U <sub>n</sub>                                |         |
|   | Overvoltage<br>operate time stage<br>2                                  | --              | 0.1 s – 5 s                                    | 5 s  |         |
|   | Overvoltage<br>threshold 10 min<br>mean protection                      | --              | 1.0 U <sub>n</sub> – 1.15 U <sub>n</sub>       | 1.1U <sub>n</sub>                                |         |
|   | Underfrequency<br>threshold stage 1                                     | --              | 47.0 Hz – 50.0 Hz                              | 47.5 Hz  |         |
|   | Underfrequency<br>operate time stage<br>1                               | --              | 0.1 s – 100 s                                  | 100 s  |         |
|   | Underfrequency<br>threshold stage 2                                     | --              | 47.0 Hz – 50.0 Hz                              | 47 Hz  |         |
|   | Underfrequency<br>operate time stage<br>2                               | --              | 0.1 s – 5 s                                    | 5 s  |         |
|   | Overfrequency<br>threshold stage 1                                      | --              | 50.0 Hz – 52.0 Hz                              | 51.5Hz   |         |
|   | Overfrequency<br>operate time stage<br>1                                | --              | 0.1 s – 100 s                                  | 100 s  |         |
|   | Overfrequency<br>threshold stage 2                                      | --              | 50.0 Hz – 52.0 Hz                              | 52Hz   |         |
|   | Overfrequency<br>operate time stage<br>2                                | --              | 0.1 s – 5 s                                    | 5 s  |         |
|   | 4.10.2 Automatic reconnection<br>after tripping                         | Lower frequency | --   | 47.0 Hz – 50.0 Hz                                | 49.5 Hz |
|   |   | Upper frequency | --   | 50.0 Hz – 52.0 Hz                                | 50.2 Hz |
| Lower voltage   |   | --              | 50 %U <sub>n</sub> – 100 %U <sub>n</sub>       | 85 %U <sub>n</sub>                               |         |
| Upper voltage   |   | --              | 100 %U <sub>n</sub> – 120 %U <sub>n</sub>      | 110 %U <sub>n</sub>                              |         |

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|---|-----------------------------------|----|--|---------------------|
|   | Observation time                  | -- | 10 s – 600 s   | 60 s                |
|   | Active power increase gradient    | -- | 5% – 3000%/min   | 10 %/min            |
| 4.10.3 Starting to generate electrical power  | Lower frequency                   | -- | 47.0 Hz – 50.0 Hz  | 49.5 Hz             |
|   | Upper frequency                   | -- | 50.0 Hz – 52.0 Hz  | 50.1 Hz             |
|   | Lower voltage                     | -- | 50 %U <sub>n</sub> – 100 %U <sub>n</sub>   | 85 %U <sub>n</sub>  |
|   | Upper voltage                     | -- | 100 %U <sub>n</sub> – 120 %U <sub>n</sub>  | 110 %U <sub>n</sub> |
|   | Observation time                  | -- | 10 s – 600 s   | 60 s                |
|   | Active power increase gradient    | -- | 5% – 3000 %/min  | disabled            |
| 4.11.1 Ceasing active power                   | Activation option                 | -- | Can be achieved by Modbus communication protocol, APP or Solis cloud, acceptance should be made by the DSO and responsible party |                     |
| 4.11.2 Reduction of active power on set point | Activation option                 | -- | Can be achieved by Modbus communication protocol, APP or Solis cloud, acceptance should be made by the DSO and responsible party |                     |
| 4.12 Remote information exchange              | Available communication standards | -- | Standardized communication protocol not provided by manufacturer   |                     |