

# Certificate of compliance

**Applicant:** NingBo Deye Inverter Technology Co., Ltd.  
No. 26 South YongJiang Road, Daqi, Beilun, NingBo  
China

**Product:** Photovoltaic and battery inverter (Hybrid-Inverter)

**Model:** SUN-3.6K-SG05LP1-EU-AM2-P, SUN-5K-SG05LP1-EU-AM2-P,  
SUN-6K-SG05LP1-EU-AM2-P, SUN-7K-SG05LP1-EU-AM2-P,  
SUN-7.6K-SG05LP1-EU-AM2-P, SUN-8K-SG05LP1-EU-AM2-P,  
SUN-10K-SG05LP1-EU-AM2-P, SUN-3.6K-SG05LP1-EU,  
SUN-5K-SG05LP1-EU, SUN-6K-SG05LP1-EU, SUN-7K-SG05LP1-EU,  
SUN-7.6K-SG05LP1-EU, SUN-8K-SG05LP1-EU, SUN-10K-SG05LP1-EU,  
AI-W5.1-3.6P1-EU-B, AI-W5.1-5P1-EU-B, AI-W5.1-6P1-EU-B,  
AI-W5.1-7P1-EU-B, AI-W5.1-7.6P1-EU-B, AI-W5.1-8P1-EU-B, AI-W5.1-10P1-EU-B

**The device is designed to work as a generation unit of the type:** A

Inverter for single-phase parallel connection to the public grid. The network monitoring and disconnection device is an integral part of the above-mentioned model.

**Applied rules and standards:**

**EN 50549-1:2019/A1:2023**

Requirements for parallel connection of installations with distribution networks - Part 1: Connection to an LV distribution network - Production of installations up to and including Type B

- 4.4 Normal operating range
- 4.5 Immunity to disturbances
- 4.6 Active response to frequency deviation
- 4.7 Power response to voltage variations and voltage changes
- 4.8 EMC and power quality
- 4.9 Interface protection
- 4.10 Connection and starting to generate electrical power
- 4.11 Ceasing and reduction of active power on set point
- 4.13 Requirements regarding single fault tolerance of interface protection system and interface switch

**EN 50549-10:2022**

Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units

**Compliance with the parameters in Annex C of the standard**

(see appendix parameter table)

**Commission Regulation (EU) 2016/631 of 14 April 2016**

Establishing a network code on requirements for grid connection of generators (NC RFG).  
Type approval for generation units to use in Type A plants.

At the time of issue of this certificate, the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

**Report number:** ASUE-ESH-P25031592

**Certification Program:** NSOP-0032-DEU-ZE-V10

**Certificate number:** U25-0559

**Date of issue:** 2025-07-07

**Certification body**

**Accreditation**



Domenik Koll  
Head of Energy Systems Germany



Accredited certification body by Deutsche Akkreditierungsstelle GmbH (DAkKS) according to ISO/IEC 17065. The accreditation is valid only for the scope listed in the annex of the accreditation certificate D-ZE-12024-01-00. The Deutsche Akkreditierungsstelle GmbH (DAkKS) is signatory of the multilateral arrangements of EA, ILAC and IAF for mutual recognition.

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**Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016**

|                                           |                                                                                                                       |                    |                    |                    |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|
| <b>Manufacturer</b>                       | <b>NingBo Deye Inverter Technology Co., Ltd.</b><br>No. 26 South YongJiang Road, Daqi, Beilun, NingBo<br><b>China</b> |                    |                    |                    |
| <b>Product type</b>                       | Photovoltaic and battery inverter (Hybrid-Inverter)                                                                   |                    |                    |                    |
| <b>Static converter model</b>             | SUN-3.6K-SG05LP1-EU                                                                                                   | SUN-5K-SG05LP1-EU  | SUN-6K-SG05LP1-EU  | SUN-7K-SG05LP1-EU  |
| <b>Input DC (photovoltaic)</b>            |                                                                                                                       |                    |                    |                    |
| MPP voltage range [V]                     | 150-425                                                                                                               | 150-425            | 150-425            | 150-425            |
| Max. input voltage [V]                    | 500                                                                                                                   | 500                | 500                | 500                |
| Max. input current per MPPT [A]           | 13+13                                                                                                                 | 13+13              | 13+13              | 26+26              |
| <b>Input DC (battery)</b>                 |                                                                                                                       |                    |                    |                    |
| DC voltage range [V]                      | 40-60                                                                                                                 | 40-60              | 40-60              | 40-60              |
| Max. DC voltage [V]                       | 60                                                                                                                    | 60                 | 60                 | 60                 |
| Max. DC current per DC input [A]          | 90                                                                                                                    | 120                | 135                | 175                |
| <b>Output AC</b>                          |                                                                                                                       |                    |                    |                    |
| Rated AC voltage [V]                      | L/N/PE, 230V, 50Hz                                                                                                    | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz |
| Rated output current [A]                  | 15,7                                                                                                                  | 21,7               | 26,1               | 30,5               |
| Max. output current [A]                   | 17,2                                                                                                                  | 23,9               | 28,7               | 33,5               |
| Nom. converter output ( $P_{NINV}$ ) [kW] | 3,60                                                                                                                  | 5,00               | 6,00               | 7,00               |
| Max. apparent power [kVA]                 | 3,96                                                                                                                  | 5,50               | 6,60               | 7,70               |
| <b>Static converter model</b>             | SUN-7.6K-SG05LP1-EU                                                                                                   | SUN-8K-SG05LP1-EU  | SUN-10K-SG05LP1-EU | -                  |
| <b>Input DC (photovoltaic)</b>            |                                                                                                                       |                    |                    |                    |
| MPP voltage range [V]                     | 150-425                                                                                                               | 150-425            | 150-425            | -                  |
| Max. input voltage [V]                    | 500                                                                                                                   | 500                | 500                | -                  |
| Max. input current per MPPT [A]           | 26+26                                                                                                                 | 26+26              | 26+26              | -                  |
| <b>Input DC (battery)</b>                 |                                                                                                                       |                    |                    |                    |
| DC voltage range [V]                      | 40-60                                                                                                                 | 40-60              | 40-60              | -                  |
| Max. DC voltage [V]                       | 60                                                                                                                    | 60                 | 60                 | -                  |
| Max. DC current per DC input [A]          | 190                                                                                                                   | 190                | 210                | -                  |
| <b>Output AC</b>                          |                                                                                                                       |                    |                    |                    |
| Rated AC voltage [V]                      | L/N/PE, 230V, 50Hz                                                                                                    | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz | -                  |
| Rated output current [A]                  | 33,0                                                                                                                  | 34,8               | 43,5               | -                  |
| Max. output current [A]                   | 36,3                                                                                                                  | 38,3               | 47,9               | -                  |
| Nom. converter output ( $P_{NINV}$ ) [kW] | 7,60                                                                                                                  | 8,00               | 10,00              | -                  |
| Max. apparent power [kVA]                 | 8,36                                                                                                                  | 8,80               | 11,00              | -                  |

|                                                 |                           |                         |                          |                         |
|-------------------------------------------------|---------------------------|-------------------------|--------------------------|-------------------------|
| <b>Static converter model</b>                   | SUN-3.6K-SG05LP1-EU-AM2-P | SUN-5K-SG05LP1-EU-AM2-P | SUN-6K-SG05LP1-EU-AM2-P  | SUN-7K-SG05LP1-EU-AM2-P |
| <b>Input DC (photovoltaic)</b>                  |                           |                         |                          |                         |
| MPP voltage range [V]                           | 150-425                   | 150-425                 | 150-425                  | 150-425                 |
| Max. input voltage [V]                          | 500                       | 500                     | 500                      | 500                     |
| Max. input current per MPPT [A]                 | 18+18                     | 18+18                   | 18+18                    | 32+32                   |
| <b>Input DC (battery)</b>                       |                           |                         |                          |                         |
| DC voltage range [V]                            | 40-60                     | 40-60                   | 40-60                    | 40-60                   |
| Max. DC voltage [V]                             | 60                        | 60                      | 60                       | 60                      |
| Max. DC current per DC input [A]                | 90                        | 120                     | 135                      | 175                     |
| <b>Output AC</b>                                |                           |                         |                          |                         |
| Rated AC voltage [V]                            | L/N/PE, 230V, 50Hz        | L/N/PE, 230V, 50Hz      | L/N/PE, 230V, 50Hz       | L/N/PE, 230V, 50Hz      |
| Rated output current [A]                        | 15,7                      | 21,7                    | 26,1                     | 30,5                    |
| Max. output current [A]                         | 17,2                      | 23,9                    | 28,7                     | 33,5                    |
| Nom. converter output (P <sub>NINV</sub> ) [kW] | 3,60                      | 5,00                    | 6,00                     | 7,00                    |
| Max. apparent power [kVA]                       | 3,96                      | 5,50                    | 6,60                     | 7,70                    |
| <b>Static converter model</b>                   | SUN-7.6K-SG05LP1-EU-AM2-P | SUN-8K-SG05LP1-EU-AM2-P | SUN-10K-SG05LP1-EU-AM2-P | -                       |
| <b>Input DC (photovoltaic)</b>                  |                           |                         |                          |                         |
| MPP voltage range [V]                           | 150-425                   | 150-425                 | 150-425                  | -                       |
| Max. input voltage [V]                          | 500                       | 500                     | 500                      | -                       |
| Max. input current per MPPT [A]                 | 32+32                     | 32+32                   | 32+32                    | -                       |
| <b>Input DC (battery)</b>                       |                           |                         |                          |                         |
| DC voltage range [V]                            | 40-60                     | 40-60                   | 40-60                    | -                       |
| Max. DC voltage [V]                             | 60                        | 60                      | 60                       | -                       |
| Max. DC current per DC input [A]                | 190                       | 190                     | 210                      | -                       |
| <b>Output AC</b>                                |                           |                         |                          |                         |
| Rated AC voltage [V]                            | L/N/PE, 230V, 50Hz        | L/N/PE, 230V, 50Hz      | L/N/PE, 230V, 50Hz       | -                       |
| Rated output current [A]                        | 33,0                      | 34,8                    | 43,5                     | -                       |
| Max. output current [A]                         | 36,3                      | 38,3                    | 47,9                     | -                       |
| Nom. converter output (P <sub>NINV</sub> ) [kW] | 7,60                      | 8,00                    | 10,00                    | -                       |
| Max. apparent power [kVA]                       | 8,36                      | 8,80                    | 11,00                    | -                       |

|                                           |                    |                    |                    |                    |
|-------------------------------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Static converter model</b>             | AI-W5.1-3.6P1-EU-B | AI-W5.1-5P1-EU-B   | AI-W5.1-6P1-EU-B   | AI-W5.1-7P1-EU-B   |
| <b>Input DC (photovoltaic)</b>            |                    |                    |                    |                    |
| MPP voltage range [V]                     | 150-425            | 150-425            | 150-425            | 150-425            |
| Max. input voltage [V]                    | 500                | 500                | 500                | 500                |
| Max. input current per MPPT [A]           | 18+18              | 18+18              | 18+18              | 32+32              |
| <b>Input DC (battery)</b>                 |                    |                    |                    |                    |
| DC voltage range [V]                      | 40-60              | 40-60              | 40-60              | 40-60              |
| Max. DC voltage [V]                       | 60                 | 60                 | 60                 | 60                 |
| Max. DC current per DC input [A]          | 90                 | 120                | 135                | 175                |
| <b>Output AC</b>                          |                    |                    |                    |                    |
| Rated AC voltage [V]                      | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz |
| Rated output current [A]                  | 15,7               | 21,7               | 26,1               | 30,5               |
| Max. output current [A]                   | 17,2               | 23,9               | 28,7               | 33,5               |
| Nom. converter output ( $P_{NINV}$ ) [kW] | 3,6                | 5,00               | 6,00               | 7,00               |
| Max. apparent power [kVA]                 | 3,96               | 5,50               | 6,60               | 7,70               |
| <b>Static converter model</b>             | AI-W5.1-7.6P1-EU-B | AI-W5.1-8P1-EU-B   | AI-W5.1-10P1-EU-B  | -                  |
| <b>Input DC (photovoltaic)</b>            |                    |                    |                    |                    |
| MPP voltage range [V]                     | 150-425            | 150-425            | 150-425            | -                  |
| Max. input voltage [V]                    | 500                | 500                | 500                | -                  |
| Max. input current per MPPT [A]           | 32+32              | 32+32              | 32+32              | -                  |
| <b>Input DC (battery)</b>                 |                    |                    |                    |                    |
| DC voltage range [V]                      | 40-60              | 40-60              | 40-60              | -                  |
| Max. DC voltage [V]                       | 60                 | 60                 | 60                 | -                  |
| Max. DC current per DC input [A]          | 190                | 190                | 210                | -                  |
| <b>Output AC</b>                          |                    |                    |                    |                    |
| Rated AC voltage [V]                      | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz | L/N/PE, 230V, 50Hz | -                  |
| Rated output current [A]                  | 33,0               | 34,8               | 43,5               | -                  |
| Max. output current [A]                   | 36,3               | 38,3               | 47,9               | -                  |
| Nom. converter output ( $P_{NINV}$ ) [kW] | 7,60               | 8,00               | 10,00              | -                  |
| Max. apparent power [kVA]                 | 8,36               | 8,80               | 11,00              | -                  |

| Interface protection system and interface switch (Network and system protection "NS-protection")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type of protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | integrated NS-protection                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Assigned to generation unit type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SUN-3.6K-SG05LP1-EU-AM2-P, SUN-5K-SG05LP1-EU-AM2-P, SUN-6K-SG05LP1-EU-AM2-P, SUN-7K-SG05LP1-EU-AM2-P, SUN-7.6K-SG05LP1-EU-AM2-P, SUN-8K-SG05LP1-EU-AM2-P, SUN-10K-SG05LP1-EU-AM2-P, SUN-3.6K-SG05LP1-EU, SUN-5K-SG05LP1-EU, SUN-6K-SG05LP1-EU, SUN-7K-SG05LP1-EU, SUN-7.6K-SG05LP1-EU, SUN-8K-SG05LP1-EU, SUN-10K-SG05LP1-EU, AI-W5.1-3.6P1-EU-B, AI-W5.1-5P1-EU-B, AI-W5.1-6P1-EU-B, AI-W5.1-7P1-EU-B, AI-W5.1-7.6P1-EU-B, AI-W5.1-8P1-EU-B, AI-W5.1-10P1-EU-B |
| Integrated interface switch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Type of switching equipment 1: Relay (Model ME109-S-1A-JF)<br>Type of switching equipment 2: Relay (Model ME109-S-1A-JF)<br><br>These relays are used by the following models:<br>SUN-3.6K-SG05LP1-EU-AM2-P, SUN-5K-SG05LP1-EU-AM2-P, SUN-6K-SG05LP1-EU-AM2-P, SUN-3.6K-SG05LP1-EU, SUN-5K-SG05LP1-EU, SUN-6K-SG05LP1-EU, AI-W5.1-3.6P1-EU-B, AI-W5.1-5P1-EU-B, AI-W5.1-6P1-EU-B)                                                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Type of switching equipment 1: Relay (Model ME121-S-1A-F)<br>Type of switching equipment 2: Relay (Model ME121-S-1A-F)<br><br>These relays are used by the following models:<br>SUN-7K-SG05LP1-EU-AM2-P, SUN-7.6K-SG05LP1-EU-AM2-P, SUN-8K-SG05LP1-EU-AM2-P, SUN-10K-SG05LP1-EU-AM2-P, SUN-7K-SG05LP1-EU, SUN-7.6K-SG05LP1-EU, SUN-8K-SG05LP1-EU, SUN-10K-SG05LP1-EU, AI-W5.1-7P1-EU-B, AI-W5.1-7.6P1-EU-B, AI-W5.1-8P1-EU-B, AI-W5.1-10P1-EU-B)                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Note: The output is switched off by the inverter bridge and two relay in series in each line and neutral.                                                                                                                                                                                                                                                                                                                                                       |
| Firmware version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | B388                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Note</b><br>The settings of the product are password protected adjustable.<br>In case the generators are used with an external protection device, the protection settings of the inverters are to be adjusted according to the manufacturer's declaration.<br>The above stated generators are tested according to the requirements in the EN 50549-1 and the Commission Regulation (EU) 2016/631 of 14 April 2016. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

**Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016**

| <b>Name of parameter set</b>                                          |                                                                                                                                                                          | EN50549-1&EN50549-10                                       |                                                             |                                                               |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------|
| <b>specific technical requirement (e.g. grid codes)</b>               |                                                                                                                                                                          | EN50549-10                                                 |                                                             |                                                               |
| <b>Clause(s) / subclause(s) of EN 50549-1:2019</b>                    | <b>Parameter<sup>a</sup></b>                                                                                                                                             | <b>Remarks/<br/>additional<br/>information<sup>b</sup></b> | <b>configurable value<br/>range</b>                         | <b>default value</b>                                          |
| 4.3.2 Interface switch                                                | Single fault tolerance for interface switch                                                                                                                              |                                                            | yes   no                                                    | yes                                                           |
| 4.4.2 Operating frequency range                                       | 47,0 – 47,5 Hz Duration                                                                                                                                                  |                                                            | 0 s – 20 s                                                  | 0s                                                            |
|                                                                       | 47,5 – 48,5 Hz Duration                                                                                                                                                  |                                                            | 30 – 90 min                                                 | 30 min                                                        |
|                                                                       | 48,5 – 49,0 Hz Duration                                                                                                                                                  |                                                            | 30 – 90 min                                                 | 30 min                                                        |
|                                                                       | 49,0 – 51,0 Hz Duration                                                                                                                                                  |                                                            | not configurable                                            | unlimited                                                     |
|                                                                       | 51,0 – 51,5 Hz Duration                                                                                                                                                  |                                                            | 30 – 90 min                                                 | 30 min                                                        |
|                                                                       | 51,5 – 52,0 Hz Duration                                                                                                                                                  |                                                            | 0 – 15 min                                                  | 0 s                                                           |
| 4.4.3 Minimal requirement for active power delivery at underfrequency | Reduction threshold                                                                                                                                                      |                                                            | not configurable<br>49,0 Hz – 49,5 Hz                       | Electronic inverter, no power reduction take place<br>49,5 Hz |
|                                                                       | Maximum reduction rate                                                                                                                                                   |                                                            | not configurable<br>2 – 10% P <sub>M</sub> /Hz              | ≤ 2 %<br>10% P <sub>M</sub> /Hz                               |
| 4.4.4 Continuous operating voltage range                              | Upper limit                                                                                                                                                              |                                                            | not configurable<br>1,0 U <sub>n</sub> – 2,0 U <sub>n</sub> | 1,15 U <sub>n</sub><br>1,10 U <sub>n</sub>                    |
|                                                                       | Lower limit                                                                                                                                                              |                                                            | not configurable<br>0,9 U <sub>n</sub> – 1,0 U <sub>n</sub> | 0,85 U <sub>n</sub> , 0,90 U <sub>c</sub>                     |
| 4.5.2 Rate of change of frequency (ROCOF) immunity                    | ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology (inverter):<br>synchronous generating technology: |                                                            | not configurable<br>0 – 10 Hz/s                             | 2 Hz/s                                                        |
|                                                                       |                                                                                                                                                                          |                                                            | yes<br><br>no                                               |                                                               |

4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology (inverter)

|                                                                                         |  |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
|-----------------------------------------------------------------------------------------|--|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Voltage-Time- Diagram                                                                   |  | see Figure 6 of EN 50549-1:2019 | Time [s]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | U [p.u.] |
|                                                                                         |  |                                 | 0,00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0,20     |
|                                                                                         |  |                                 | 0,15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0,20     |
|                                                                                         |  |                                 | 1,50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0,85     |
|                                                                                         |  |                                 | 180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0,85     |
|                                                                                         |  |                                 | 180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0,90     |
| Fast fault current                                                                      |  | Rated value                     | SUN-3.6K-SG05LP1-EU-AM2-P:15,7A<br>SUN-5K-SG05LP1-EU-AM2-P:21,7A<br>SUN-6K-SG05LP1-EU-AM2-P:26,1A<br>SUN-7K-SG05LP1-EU-AM2-P:30,5A<br>SUN-7.6K-SG05LP1-EU-AM2-P:33,0A<br>SUN-8K-SG05LP1-EU-AM2-P:34,8A<br>SUN-10K-SG05LP1-EU-AM2-P:43,5A<br>SUN-3.6K-SG05LP1-EU:15,7A<br>SUN-5K-SG05LP1-EU:21,7A<br>SUN-6K-SG05LP1-EU:26,1A<br>SUN-7K-SG05LP1-EU:30,5A<br>SUN-7.6K-SG05LP1-EU:33,0A<br>SUN-8K-SG05LP1-EU:34,8A<br>SUN-10K-SG05LP1-EU:43,5 A<br>AI-W5.1-3.6P1-EU-B:15,7A<br>AI-W5.1-5P1-EU-B:21,7A<br>AI-W5.1-6P1-EU-B:26,1A<br>AI-W5.1-7P1-EU-B:30,5A<br>AI-W5.1-7.6P1-EU-B:33,0 A<br>AI-W5.1-8P1-EU-B:34,8 A<br>AI-W5.1-10P1-EU-B:43,5 A<br>(rated current) |          |
| Active power recovery after a short circuit                                             |  | configurable                    | Start at 90% U <sub>n</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| Fault recovery of active power (times calculated from the removal of the short circuit) |  | configurable                    | ≤ 5 s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |



|                                        |                                                                                         |  |                                                  |                    |          |
|----------------------------------------|-----------------------------------------------------------------------------------------|--|--------------------------------------------------|--------------------|----------|
|                                        | Value for recovered active power                                                        |  | configurable                                     | $\geq 90 \%$       |          |
|                                        | Accuracy for recovery of active power                                                   |  | not configurable                                 | $\leq 10 \%$       |          |
|                                        | Reactive power contribution has priority                                                |  | yes   no                                         | Yes                |          |
| 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     |
|                                        |                                                                                         |  |                                                  | 60,0               | 1,15     |
|                                        |                                                                                         |  |                                                  | 60,0               | 1,10     |
|                                        | Active power recovery after a short circuit                                             |  | configurable                                     | Start at 90% $U_n$ |          |
|                                        | Fault recovery of active power (times calculated from the removal of the short circuit) |  | configurable                                     | $\leq 5 \text{ s}$ |          |
|                                        | Value for recovered active power                                                        |  | configurable                                     | $\geq 90\%$        |          |
|                                        | Accuracy for recovery of active power                                                   |  | not configurable                                 | $\leq 10\%$        |          |



|                                                                             |                                                              |  |                                                                       |                                                                                                                                               |
|-----------------------------------------------------------------------------|--------------------------------------------------------------|--|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 4.6.1 Power response to overfrequency                                       | Threshold frequency $f_1$                                    |  | 50,2 Hz – 52,0 Hz                                                     | 50,2 Hz                                                                                                                                       |
|                                                                             | Droop                                                        |  | 2% – 12%                                                              | 5%                                                                                                                                            |
|                                                                             | Power reference                                              |  | $P_M   P_{max}$                                                       | $P_M$ for other nonsynchronous<br>Generating technology                                                                                       |
|                                                                             | Intentional delay                                            |  | 0 s – 2 s                                                             | 0 s                                                                                                                                           |
|                                                                             | Deactivation threshold $f_{stop}$                            |  | 50,0 Hz – $f_1$                                                       | deactivated                                                                                                                                   |
|                                                                             | Deactivation time $t_{stop}$                                 |  | 0 s – 600 s                                                           | -                                                                                                                                             |
|                                                                             | Acceptance of staged disconnection                           |  | yes   no                                                              | yes                                                                                                                                           |
| 4.6.2 Power response to underfrequency                                      | Threshold frequency $f_1$                                    |  | 49,8 Hz – 46,0 Hz                                                     | 49,8 Hz                                                                                                                                       |
|                                                                             | Droop                                                        |  | 2 % – 12%                                                             | 5%                                                                                                                                            |
|                                                                             | Power reference                                              |  | $P_M   P_{max}$                                                       | $P_{max}$                                                                                                                                     |
|                                                                             | Intentional delay                                            |  | 0 s – 2 s                                                             | 0 s                                                                                                                                           |
| 4.7.2.2 voltage support by reactive power - Capabilities                    | Active factor / Reactive power (% $P_d$ ) range overexcited  |  | 0,90 – 1 / 48% $P_d$ - 0<br>0,95 – 1 / 33% $P_d$ - 0                  | 0,95 – 1 / 33% $P_d$ - 0                                                                                                                      |
|                                                                             | Active factor / Reactive power (% $P_d$ ) range underexcited |  | 0,90 – 1 / 48% $P_d$ - 0<br>0,95 – 1 / 33% $P_d$ - 0                  | 0,95 – 1 / 33% $P_d$ - 0                                                                                                                      |
| 4.7.2.3 voltage support by reactive power - Control modes                   | Enabled control mode                                         |  | Q setp.<br>Q(U)<br>Q(P)<br>$\cos \varphi$ setp.<br>$\cos \varphi$ (P) | activated<br>deactivated<br>deactivated<br>deactivated<br>deactivated                                                                         |
| 4.7.2.3.2 voltage support by reactive power - Set point control modes       | Q set point and excitation                                   |  | 0% – 48% $P_D$ ,<br>0% – 33% $P_D$                                    | 0                                                                                                                                             |
|                                                                             | $\cos \varphi$ set point and excitation                      |  | 1,0 – 0,9                                                             | 1                                                                                                                                             |
| 4.7.2.3.3 voltage support by reactive power - Voltage related control modes | Characteristic curve                                         |  | $\cos \varphi$ (P)<br>Q(P)                                            | indicate default characteristic                                                                                                               |
|                                                                             | Time constant                                                |  | 3 s – 60 s                                                            | 10 s                                                                                                                                          |
|                                                                             | Min $\cos \varphi$                                           |  | 0,0 – 1                                                               | 0,9                                                                                                                                           |
|                                                                             | Lock-in power                                                |  | 0% – 20%                                                              | deactivated                                                                                                                                   |
|                                                                             | Lock-out power                                               |  | 0% – 20%                                                              | deactivated                                                                                                                                   |
| 4.7.2.3.4 voltage support by reactive power - Power related control mode    | Characteristic curve                                         |  | Q(U)<br>P(U)                                                          | Q(U) (three-phase inverter)<br>0,00...-0,436<br>0,92...-0,436<br>0,94...0,0<br>1,06...0,0<br>1,08...0,436<br>1,20...0,436<br>P(U) deactivated |
| 4.7.4.2.2 Zero current mode for converter connected generating technology / | Enabling                                                     |  | enable   disable                                                      | disable                                                                                                                                       |
|                                                                             | Static voltage range overvoltage                             |  | 100% $U_n$ – 120% $U_n$                                               | 120% $U_n$                                                                                                                                    |

|                                                        |                                                                 |  |                                                                                           |                                            |
|--------------------------------------------------------|-----------------------------------------------------------------|--|-------------------------------------------------------------------------------------------|--------------------------------------------|
| Generating Plant with non-synchronous generator        | Static voltage range undervoltage                               |  | 20% $U_n$ – 100% $U_n$                                                                    | 50% $U_n$                                  |
| 4.9.3 Requirements on voltage and frequency protection | Threshold for protection as dedicated device [ in A or kW, kVA] |  | ME109-S-1A-JF: 50A<br>ME121-S-1A-F: 66A<br>Note: Rated current of internal safety device! | Internal safety device                     |
|                                                        | Undervoltage threshold stage 1                                  |  | 0,2 $U_n$ – 1 $U_n$                                                                       | 0,85 $U_n$                                 |
|                                                        | Undervoltage operate time stage 1                               |  | 0,1 s – 100 s                                                                             | 1,2 – 1,5 s                                |
|                                                        | Undervoltage threshold stage 2                                  |  | 0,2 $U_n$ – 1 $U_n$                                                                       | N/A                                        |
|                                                        | Undervoltage operate time stage 2                               |  | 0,1 s – 5 s                                                                               | N/A                                        |
|                                                        | Overvoltage threshold stage 1                                   |  | 1,0 $U_n$ – 1,2 $U_n$                                                                     | 1,15 $U_n$                                 |
|                                                        | Overvoltage operate time stage 1                                |  | 0,1 s – 100 s                                                                             | 0,1 – 0,2 s                                |
|                                                        | Overvoltage threshold stage 2                                   |  | 1,0 $U_n$ – 1,3 $U_n$                                                                     | 1,25 $U_n$ (N/A)                           |
|                                                        | Overvoltage operate time stage 2                                |  | 0,1 s – 5 s                                                                               | 0,1 s (N/A)                                |
|                                                        | Overvoltage threshold 10 min mean protection                    |  | 1,0 $U_n$ – 1,15 $U_n$                                                                    | 1,10 $U_n$                                 |
|                                                        | Overvoltage operate time 10 min mean protection                 |  | 0,04 s – 10,00 s                                                                          | 10 min (update every 3s)                   |
|                                                        | Underfrequency threshold stage 1                                |  | 47,0 Hz – 50,0 Hz                                                                         | 47,5 Hz                                    |
|                                                        | Underfrequency operate time stage 1                             |  | 0,1 s – 100 s                                                                             | 0,3 s – 0,5 s                              |
|                                                        | Underfrequency threshold stage 2                                |  | 47,0 Hz – 50,0 Hz                                                                         | N/A                                        |
|                                                        | Underfrequency operate time stage 2                             |  | 0,1 s – 5 s                                                                               | N/A                                        |
|                                                        | Overfrequency threshold stage 1                                 |  | 50,0 Hz – 52,0 Hz                                                                         | 52,0 Hz                                    |
|                                                        | Overfrequency operate time stage 1                              |  | 0,1 s – 100 s                                                                             | 0,3 s – 0,5 s                              |
|                                                        | Overfrequency threshold stage 2                                 |  | 50,0 Hz – 52,0 Hz                                                                         | N/A                                        |
|                                                        | Overfrequency operate time stage 2                              |  | 0,1 s – 5,0 s                                                                             | N/A                                        |
|                                                        | Loss of mains according EN 62116 (LoM)                          |  | 0 s – 6000 s                                                                              | ROCOF 2,5 Hz/s (0,5 s)<br>active 2 s (5 s) |
| 4.10.2 Automatic reconnection 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% $U_n$ – 100 % $U_n$                                                                   | 85% $U_n$ , 90% $U_c$                      |
|                                                        | Upper voltage                                                   |  | 100% $U_n$ – 120% $U_n$                                                                   | 110% $U_n$                                 |
|                                                        | Observation time                                                |  | 10 s – 600 s                                                                              | 60 s                                       |

|                                                                                                                        |                                   |  |                            |                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--|----------------------------|-----------------------------------------|
|                                                                                                                        | Active power increase gradient    |  | 6% – 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% – 100% U <sub>n</sub>  | 85% U <sub>n</sub> , 90% U <sub>c</sub> |
|                                                                                                                        | Upper voltage                     |  | 100% – 120% U <sub>n</sub> | 110% U <sub>n</sub>                     |
|                                                                                                                        | Observation time                  |  | 10 s – 600 s               | 60 s                                    |
|                                                                                                                        | Active power increase gradient    |  | 6% – 3000% / min           | disabled                                |
| 4.11.1 Ceasing active power                                                                                            | activation option                 |  | RS485, WiFi, local         |                                         |
| 4.11.2 Reduction of active power on set point                                                                          | activation option                 |  | RS485, WiFi, local         |                                         |
| 4.12 Remote information exchange                                                                                       | available communication standards |  | N/A                        |                                         |
| a If additional parameters have been evaluated during the test, these shall be added as additional lines in the table. |                                   |  |                            |                                         |
| b This column should be used for manufacturer specific parameter descriptions.                                         |                                   |  |                            |                                         |