



EQUIPMENT CERTIFICATE

Certificate No.:	Issued:	Valid until:	GCC class
TC-GCC-DNV-SE-0124-09419-2	2024-06-25	Unlimited	TC ₁

Issued for:

PV Inverters SUN2000-[12-25]KTL-M5, SUN2000-[12-25]K-MB0 and SUN5000-[17-25]K-MB0 (PPM Type A)

With specifications and software version as listed in Annex 2

Issued to:

Huawei Digital Power Technologies Co.,Ltd.

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According to:

DNV-SE-0124, 2021-10: Certification of Grid Code Compliance

PTPIREE, 2021-04: Conditions and procedures for using certificates in the process of connecting power generating modules to power networks

32016R0631, 2016-04: Requirements for Generators (NC RfG)

PSE, 2018-12: Requirements of general application resulting from Commission Regulation (EU) 2016/631 of 14 April 2016

detailed in Annex 1

Based on the document:

CR-GCC-DNV-SE-0124-09419-A072-2

Network Code Requirements for a PGU of Type A - Poland, Certification Report, dated 2024-06-25

Further assessment information, including scope and conditions, is found in Annex 1. Description of the PV inverters and type tests performed is found in Annex 2 and Annex 3 respectively. Annexes are an explicit and inseparable part of the certificate. The certificate shall only be distributed with all annexes.

Hamburg, 2024-06-25

For DNV Renewables Certification

Hamburg, 2024-06-25

For DNV Renewables Certification



Bente Vestergaard

Service Line Leader for Type Certification

By DAKKS according DIN EN IEC/ISO 17065 accredited Certification Body for products. The accreditation is valid for the fields of certification listed in the certificate.

Rui Cai

Project Manager

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Conditions, assessment criteria and scope of assessment

Provided that the conditions listed in section 1 are considered at project level, the PV inverters as further specified in Annex 2 comply with the requirements within scope of this certification, as specified in section 3.

1 Conditions

- Changes of the system design, hardware or the software of the certified PV inverters are to be approved by DNV.
- Inverter settings must finally be agreed and checked at project level to ensure grid code compliance, based on the requirements of relevant System Operator (SO). For the functionalities within scope of this certification, more information about the settings assessed is found in Control Settings in section 4.2 as well as the corresponding assessment sections 5.1 - 5.4 of the certification report CR-GCC-DNV-SE-0124-09419-A072-2.
- The capability of remote control has been shown on unit level but must finally be ensured at project level, considering any further requirements of relevant System Operator (SO) and the full communication network. For the functionalities within scope of this certification, this concerns remote cessation of active power (see section 5.3) and remote blocking and control of LFSM-O (see section 5.4) of the certification report CR-GCC-DNV-SE-0124-09419-A072-2.

2 Assessment criteria and normative references for this certificate:

- /A/ Service Specification DNV-SE-0124: Certification of Grid Code Compliance, DNV, October 2021
- /B/ Conditions and procedures for using certificates in the process of connecting power generating modules to power networks, Warunki i procedury wykorzystania certyfikatów w procesie przyłączenia modułów wytwarzania energii do sieci elektroenergetycznych, version 1.2, PTPiREE, dated 2021-04-28, (in the following: PTPiREE 2021-04)
- /C/ Requirements of general application resulting from Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (NC RfG) – as approved by the decision of the President of the Energy Regulatory Office DRE.WOSE.7128.550.2.2018.ZJ dated January 2nd 2019, Wymogi ogólnego stosowania wynikające z Rozporządzenia Komisji (UE) 2016/631 z dnia 14 kwietnia 2016 r. ustanawiającego kodeks sieci dotyczący wymogów w zakresie przyłączenia jednostek wytwórczych do sieci (NC RfG), PSE S.A., dated 2018-12-18 zatwierdzone Decyzją Prezesa Urzędu Regulacji Energetyki DRE.WOSE.7128.550.2.2018.ZJ z dnia 2 stycznia 2019 r, (in the following: PSE 2018-12)
- /D/ Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators, published in the Official Journal of the European Union L112/1, The European Commission, 27/04/2016. Document 32016R0631, (in the following: NC RfG)

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3 Scope of assessment and results

The following functionalities have been assessed based on the rules for the use of equipment certificates for Power Park Modules (PPMs), as specified in chapter 7 and 9 of the PTPIREE 2021-04 /B/. The functions denoted “Not Applicable” in the table of chapter 7 has not been included.

Capability	NC RfG /D/	PSE 2018-12 /C/	Type A	Assessment result (*)
Frequency range	13.1 (a)	13.1 (a)(i)	x	Compliant
Rate of Change of Frequency (RoCoF) withstand capability, df/dt	13.1 (b)	13.1 (b)	x	Compliant
Remote cessation of active power	13.6	13.6	x	Compliant
Limited Frequency Sensitive Mode – Over Frequency (LFSM-O)	13.2	13.2 (a), (b), (f)	x	Compliant

(*) Please note also the corresponding conditions for compliance, as stated in section 1.

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Schematic description and technical data of the generating units

1 Schematic description of the generating unit

The HUAWEI solar inverter family SUN2000-[12-25]KTL-M5, SUN2000-[12-25]K-MB0 and SUN5000-[17-25]K-MB0, consisting of: SUN2000-12KTL-M5, SUN2000-15KTL-M5, SUN2000-17KTL-M5, SUN2000-20KTL-M5, SUN2000-25KTL-M5, SUN2000-12K-MB0, SUN2000-15K-MB0, SUN2000-17K-MB0, SUN2000-20K-MB0, SUN2000-25K-MB0, SUN5000-17K-MB0, SUN5000-25K-MB0 convert electrical energy generated by photovoltaic modules (DC) to three-phase alternating current (AC).

They run at 400 V rated output voltage with a rated active power output of 12 kW to 25 kW (corresponding Max. apparent power from 13.2 kVA to 27.5 kVA). Compared to SUN2000-[12-25]KTL-M5, SUN2000-[12-25]K-MB0 have one more pair of additional DC input terminals which allows them to connect to more primary side energy, SUN5000-[17-25]K-MB0 have an accessory connected to the DC side input port for the current from the PV panel, these will have no influence on the electrical behaviour tested and certified, as confirmed by the manufacturer. The different power variants are realized via adapting the current in the software control. There is no further difference in the hardware or software used.

The electrical data of the generating unit is summarized in the following section.

2 Technical data of main components

According to the documents provided by the manufacturer, the following components are used.

2.1 General Specifications

Generating Unit	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5
No. of phases	3	3	3
Max. apparent power	13.2 kVA	16.5 kVA	18.7 kVA
Rated active power	12 kW	15 kW	17 kW
Rated AC-voltage (phase to phase)	400 V	400 V	400 V
Rated frequency	50 Hz	50 Hz	50 Hz
Contribution to short circuit current	47.7 A	47.7 A	47.7 A
Generating Unit	SUN2000-20KTL-M5	SUN2000-25KTL-M5	
No. of phases	3	3	
Max. AC power	22 kVA	27.5 kVA	
Rated active power	20 kW	25 kW	
Rated AC-voltage (phase to phase)	400 V	400 V	
Rated frequency	50 Hz	50 Hz	
Contribution to short circuit current	47.7 A	47.7 A	
Generating Unit	SUN2000-12K-MB0	SUN2000-15K-MB0	SUN2000-17K-MB0
No. of phases	3	3	3
Max. apparent power	13.2 kVA	16.5 kVA	18.7 kVA
Rated active power	12 kW	15 kW	17 kW
Rated AC-voltage (phase to phase)	400 V	400 V	400 V
Rated frequency	50 Hz	50 Hz	50 Hz
Contribution to short circuit current	47.7 A	47.7 A	47.7 A

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Generating Unit	SUN2000-20K-MB0	SUN2000-25K-MB0
No. of phases	3	3
Max. AC power	22 kVA	27.5 kVA
Rated active power	20 kW	25 kW
Rated AC-voltage (phase to phase)	400 V	400 V
Rated frequency	50 Hz	50 Hz
Contribution to short circuit current	47.7 A	47.7 A
Generating Unit	SUN5000-17K-MB0	SUN5000-25K-MB0
No. of phases	3	3
Max. AC power	18.7 kVA	27.5 kVA
Rated active power	17 kW	25 kW
Rated AC-voltage (phase to phase)	400 V	400 V
Rated frequency	50 Hz	50 Hz
Contribution to short circuit current	47.7 A	47.7 A

2.2 DC Input

Generating Unit	SUN2000-12KTL-M5, SUN2000-15KTL-M5, SUN2000-17KTL-M5, SUN2000-20KTL-M5, SUN2000-25KTL-M5, SUN2000-12K-MB0, SUN2000-15K-MB0, SUN2000-17K-MB0, SUN2000-20K-MB0, SUN2000-25K-MB0, SUN5000-17K-MB0, SUN5000-25K-MB0
Min. MPPT voltage	200 V
Max. MPPT voltage	1000 V
Max. DC input voltage	1100 V
Max. DC input current	30 A × 2

2.3 Software Version

Firmware version	V200R022C10
Software version	V200R022C10SPC100

2.4 Unit transformer

The transformer is not part of the generating unit and consequently has not been part of the assessment.

2.5 Grid Protection

The protection is not part of certification scope

2.6 Control settings

The control interface allows for the selection of different parameter sets via the “Grid code” field, which provide default settings based on specific grid codes and national requirements. For this certification report the parameter set called “EN50549-PL” in the display interface, was assessed for the functionalities within scope of this certification.

It should be noted that compliance can be achieved also with other parameter sets and control settings, but that changes to control settings will affect the inverter control behavior which can thus affect compliance. It should be noted the final settings must be agreed on project level in agreement with relevant system operator.

Protection settings has not been part of the assessment. Since these could intervene with and affect the compliance of the assessed functionalities, this must be further assessed at project level.

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Type tests

1 Type tests

Tests were performed between 2022-12-26 and 2023-01-30 in the HUAWEI lab in Xi'an in P.R. China. All tests were performed under ISO-17025 accreditation and they were performed on the SUN2000-25KTL-M5 unit.

The results used for assessment are documented in the measurement report(s) as specified below:

Scope	Reference
Frequency range	3.1 of /1/
Rate of Change of Frequency (RoCoF) withstand capability, df/dt	3.2 of /1/
Remote cessation of active power	3.3 of /1/
Limited Frequency Sensitive Mode – over frequency (LFSM-O)	3.4 of /1/

Test report(s)	Document number	Content
/1/	10332709-SHA-TR-07-A	Measurement of power control characteristics capability of a PV inverter of the type SUN2000-25KTL-M5 according to FGW TG3 Rev. 25

The tests results have been assessed against the requirements of PSE 2018-12 /C/ and NC RfG /D/. Further details are described in the corresponding certification report CR-GCC-DNV-SE-0124-09419-A072-2.