



**BUREAU
VERITAS**

Certificate of compliance

Applicant: Huawei Technologies Co., Ltd.
Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129
P.R. China

Product: Grid-tied photovoltaic (PV) inverter

Model: SUN2000L-2KTL
SUN2000L-3KTL
SUN2000L-3.68KTL
SUN2000L-4KTL
SUN2000L-4.6KTL
SUN2000L-5KTL

Use in accordance with regulations:

Automatic disconnection device with single-phase mains surveillance in accordance with Engineering Recommendation G59/3 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter. This serves as a replacement for the disconnection device with isolating function that can access the distribution network provider at any time.

Applied rules and standards:

Engineering Recommendation G59/3:2013, G59/3-1:2014, G59/3-2:2015

Recommendation for the Connection of Generating Plant to the Distribution Systems of licensed Distribution Network Operators.

DIN V VDE V 0126-1-1:2006-02 (Functional safety)

Automatic disconnection device between a generator and the public low-voltage grid

The SUN2000L-4KTL, SUN2000L-4.6KTL and SUN2000L-5KTL are rated >16A per phase and ≤ 17kW. The default values for "Small Power Stations" on the low-voltage grid were verified.

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: PVUK 170214N067-2
Certificate number: U17-0432
Date of issue: 2017-09-07

Certification body



Holger Schaffer

Certification body of Bureau Veritas Consumer Products Services Germany GmbH
Accredited according to DIN EN ISO/IEC 17065



Appendix E Type Verification Test Report

Extract from test report according to the Engineering Recommendation G59/3

Nr. PVUK 170214N067-2

Type Approval and declaration of compliance with the requirements of Engineering Recommendation G59/3.

| | | | | | | |
|-----------------------------------|--|---------------|------------------|---------------|-----------------|---------------|
| Manufacturer / applicant: | Huawei Technologies Co., Ltd. Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R. China | | | | | |
| Generating Unit technology | Grid-tied photovoltaic inverter | | | | | |
| Rated values | SUN2000L-2KTL | SUN2000L-3KTL | SUN2000L-3.68KTL | SUN2000L-4KTL | SUN2000L-4.6KTL | SUN2000L-5KTL |
| Maximum rated capacity | 2 kW | 3 kW | 3,68 kW | 4 kW | 4,6 kW | 5 kW |
| Rated voltage | 230V | 230V | 230V | 230V | 230V | 230V |
| Firmware version | V100R001 | | | | | |
| Measurement period: | 2017-02-14 to 2017-08-07 | | | | | |

Description of the structure of the power generation unit (Figure 1):

The power generation unit is equipped with a PV and line-side EMC filter. The power generation unit has no galvanic isolation between DC input and AC output. Output switch-off is performed with single-fault tolerance based on two series-connected relays in line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.

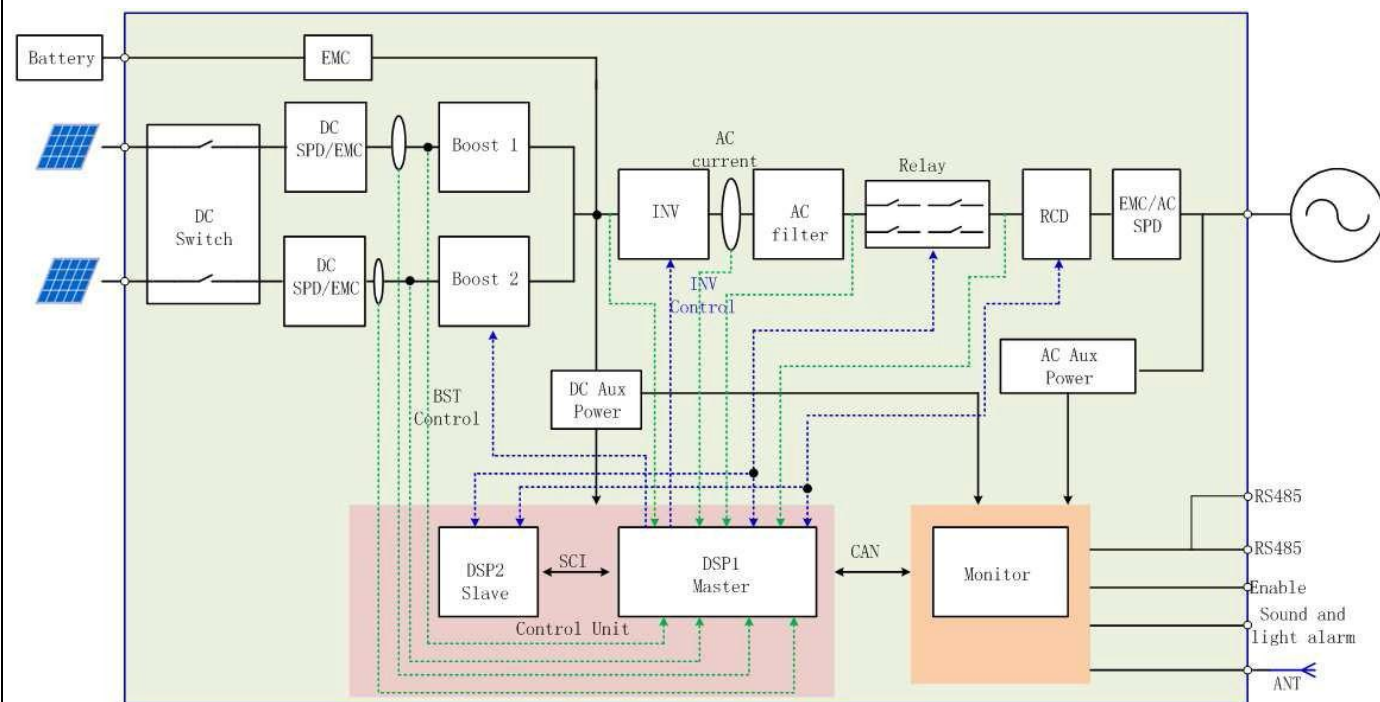


Figure 1 – Schematic structure of the power generation unit

The above stated Generating Units are tested according the requirements in the Engineering Recommendation G59/3. 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 of the Engineering Recommendation G59/3.

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Extract from test report according to the Engineering Recommendation G59/3

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| Protection. Voltage tests. | | | | | | |
|----------------------------|---------|------------|-----------|------------|------------------|-----------------|
| 230Vac | | | | | | |
| Function | Setting | | Trip test | | No trip test | |
| | Voltage | Time delay | Voltage | Time delay | Voltage / time | Confirm no trip |
| U/V stage 1 | 200,1V | 2,5s | 200,4V | 2,572s | 204,1V / 3,5s | No trip |
| U/V stage 2 | 184V | 0,5s | 184,7V | 0,576s | 188V / 2,48s | No trip |
| | | | | | 180V / 0,48s | No trip |
| O/V stage 1 | 262,2V | 1,0s | 262,6V | 1,077s | 258,2V 2,0s | No trip |
| O/V stage 2 | 273,7V | 0,5s | 274,4V | 0,571s | 269,7V 0,98s | No trip |
| | | | | | 277,7V 0,48s | No trip |

| Protection. Voltage tests. | | | | | | |
|----------------------------|---------|------------|-----------|------------|------------------|-----------------|
| 240Vac | | | | | | |
| Function | Setting | | Trip test | | No trip test | |
| | Voltage | Time delay | Voltage | Time delay | Voltage / time | Confirm no trip |
| U/V stage 1 | 208,8 | 2,5s | 208,9V | 2,580s | 212,8V / 3,5s | No trip |
| U/V stage 2 | 192V | 0,5s | 191,4V | 0,576s | 196V / 2,48s | No trip |
| | | | | | 188V / 0,48s | No trip |
| O/V stage 1 | 273,6V | 1,0s | 273,8V | 1,078s | 269,6V 2,0s | No trip |
| O/V stage 2 | 285,6V | 0,5s | 285,5V | 0,577s | 281,6V 0,98s | No trip |
| | | | | | 289,6V 0,48s | No trip |

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| Protection. Frequency tests. | | | | | | |
|------------------------------|-----------|------------|-----------|------------|------------------|-----------------|
| Function | Setting | | Trip test | | No trip test | |
| | Frequency | Time delay | Frequency | Time delay | Frequency / time | Confirm no trip |
| U/F stage 1 | 47,5Hz | 20s | 47,58Hz | 20,050s | 47,7Hz / 25s | No trip |
| U/F stage 2 | 47Hz | 0,5s | 46,99Hz | 0,582s | 47,2Hz / 19,98s | No trip |
| | | | | | 46,8Hz / 0,48s | No trip |
| O/F stage 1 | 51,5Hz | 90s | 51,52Hz | 90,025s | 51,3Hz / 95s | No trip |
| O/F stage 2 | 52Hz | 0,5s | 52,02Hz | 0,575s | 51,8Hz / 89,98s | No trip |
| | | | | | 52,2Hz / 0,48s | No trip |

Note. For Frequency Trip tests the Frequency required to trip is the setting $\pm 0,1$ Hz. In order to measure the time delay a larger deviation than the minimum required to operate the projection can be used. The "No-trip tests" need to be carried out at the setting $\pm 0,2$ Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

| Protection. Loss of Mains. | | | | | | |
|---|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|
| Note as an alternative, inverters can be tested to BS EN 62116. The following sub set of tests should be recorded in the following table. | | | | | | |
| Balancing load on islanded network | 33% of -5% Q Test 22 | 66% of -5% Q Test 12 | 100% of -5% P Test 5 | 33% of +5% Q Test 31 | 66% of +5% Q Test 21 | 100% of +5% P Test 10 |
| Trip time. Ph1 fuse removed | 167 | 230 | 420 | 248 | 275 | 449 |

Note for technologies which have a substantial shut down time this can be added to the 0,5 seconds in establishing that the trip occurred in less than 0,5s. Maximum shut down time could therefore be up to 1,0 seconds for these technologies.

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| Protection. Re-connection timer. | | | | |
|---|---|-----------------------|-----------------|-----------------|
| The requirement is specified in section 5.3.4 Automatic Reconnection, test procedure in Annex A or B 1.3.5 | | | | |
| Test should prove that the reconnection sequence starts after a minimum delay of 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 1. | | | | |
| 230Vac | | | | |
| Voltage | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 69,6s | | |
| Frequency | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 71,0s | | |
| | Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1. | | | |
| | At 266,2V | At 196,1V | At 47,4Hz | At 51,6Hz |
| Confirmation that the SSEG does not re-connect. | No reconnection | No reconnection | No reconnection | No reconnection |
| 240Vac | | | | |
| Voltage | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 69,4s | | |
| Frequency | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 71,0s | | |
| | Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1. | | | |
| | At 277,6V | At 204,8V | At 47,4Hz | At 51,6Hz |
| Confirmation that the SSEG does not re-connect. | No reconnection | No reconnection | No reconnection | No reconnection |

| Protection. Frequency change, Stability test. | | | | |
|--|------------------------|---------------|----------------------|------------------------|
| | Start Frequency | Change | End Frequency | Confirm no trip |
| Positive Vector Shift | 49,5Hz | +9 degrees | | No trip |
| Negative Vector Shift | 50,5Hz | - 9 degrees | | No trip |
| Positive Frequency drift | 49,5Hz | +0,19Hz/sec | 51,5Hz | No trip |
| Negative Frequency drift | 50,5Hz | -0,19Hz/sec | 47,5Hz | No trip |



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Annex to the G59/3 certificate of compliance No. U17-0432

Appendix E Type Verification Test Report

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| Power Quality. Harmonics. | | | | | | |
|---|-----------------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|---|
| The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1 | | | | | | |
| SSEG rating per phase (rpp) | | | SUN2000L-2KTL | | NV=MV*3,68/rpp | |
| | At 45-55% of rated output 1 kW | | 100% of rated output 2 kW | | | |
| Harmonic | Measured Value (MV) in Amps | Normalised Value (NV) in Amps | Measured Value (MV) in Amps | Normalised Value (NV) in Amps | Limit in BS EN61000-3-2 in Amps | Higher limit for odd harmonics 21 and above |
| 2nd | 0.0062 | 0.0114 | 0.0110 | 0.0202 | 1,080 | |
| 3rd | 0.1076 | 0.1980 | 0.2541 | 0.4675 | 2,300 | |
| 4th | 0.0035 | 0.0064 | 0.0081 | 0.0149 | 0,430 | |
| 5th | 0.0310 | 0.0570 | 0.0346 | 0.0637 | 1,140 | |
| 6th | 0.0032 | 0.0059 | 0.0070 | 0.0129 | 0,300 | |
| 7th | 0.0185 | 0.0340 | 0.0286 | 0.0526 | 0,770 | |
| 8th | 0.0029 | 0.0053 | 0.0038 | 0.0070 | 0,230 | |
| 9th | 0.0093 | 0.0171 | 0.0249 | 0.0458 | 0,400 | |
| 10th | 0.0029 | 0.0053 | 0.0034 | 0.0063 | 0,184 | |
| 11th | 0.0059 | 0.0109 | 0.0192 | 0.0353 | 0,330 | |
| 12th | 0.0029 | 0.0053 | 0.0029 | 0.0053 | 0,153 | |
| 13th | 0.0106 | 0.0195 | 0.0084 | 0.0155 | 0,210 | |
| 14th | 0.0032 | 0.0059 | 0.0032 | 0.0059 | 0,131 | |
| 15th | 0.0178 | 0.0328 | 0.0082 | 0.0151 | 0,150 | |
| 16th | 0.0036 | 0.0066 | 0.0036 | 0.0066 | 0,115 | |
| 17th | 0.0216 | 0.0397 | 0.0079 | 0.0145 | 0,132 | |
| 18th | 0.0037 | 0.0068 | 0.0039 | 0.0072 | 0,102 | |
| 19th | 0.0203 | 0.0374 | 0.0092 | 0.0169 | 0,118 | |
| 20th | 0.0039 | 0.0072 | 0.0037 | 0.0068 | 0,092 | |
| 21th | 0.0161 | 0.0296 | 0.0131 | 0.0241 | 0,107 | 0,160 |
| 22th | 0.0038 | 0.0070 | 0.0045 | 0.0083 | 0,084 | |
| 23th | 0.0105 | 0.0193 | 0.0106 | 0.0195 | 0,098 | 0,147 |
| 24th | 0.0034 | 0.0063 | 0.0034 | 0.0063 | 0,077 | |
| 25th | 0.0050 | 0.0092 | 0.0132 | 0.0243 | 0,090 | 0,135 |
| 26th | 0.0037 | 0.0068 | 0.0037 | 0.0068 | 0,071 | |
| 27th | 0.0040 | 0.0074 | 0.0117 | 0.0215 | 0,083 | 0,124 |
| 28th | 0.0040 | 0.0074 | 0.0034 | 0.0063 | 0,066 | |
| 29th | 0.0065 | 0.0120 | 0.0149 | 0.0274 | 0,078 | 0,117 |
| 30th | 0.0035 | 0.0064 | 0.0039 | 0.0072 | 0,061 | |
| 31th | 0.0096 | 0.0177 | 0.0131 | 0.0241 | 0,073 | 0,109 |
| 32th | 0.0043 | 0.0079 | 0.0046 | 0.0085 | 0,058 | |
| 33th | 0.0127 | 0.0234 | 0.0094 | 0.0173 | 0,068 | 0,102 |
| 34th | 0.0047 | 0.0086 | 0.0042 | 0.0077 | 0,054 | |
| 35th | 0.0132 | 0.0243 | 0.0061 | 0.0112 | 0,064 | 0,096 |
| 36th | 0.0053 | 0.0098 | 0.0039 | 0.0072 | 0,051 | |
| 37th | 0.0083 | 0.0153 | 0.0069 | 0.0127 | 0,061 | 0,091 |
| 38th | 0.0052 | 0.0096 | 0.0043 | 0.0079 | 0,048 | |
| 39th | 0.0155 | 0.0285 | 0.0081 | 0.0149 | 0,058 | 0,087 |
| 40th | 0.0053 | 0.0098 | 0.0063 | 0.0116 | 0,046 | |

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



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| Power Quality. Harmonics. | | | | | | |
|--|-------------------------------------|-----------------------------|--------------------------------|-----------------------------|-------------------------------|---------|
| Generating Unit tested to BS EN 61000-3-12 | | | | | | |
| Generating Unit rating per phase (rpp) | | | SUN2000L-5KTL | | | |
| | At 45-55% of rated output 2,5 kW | | 100% of rated output 5,0 kW | | | |
| Harmonic | Measured Value (MV) in Amps | Measured Value (MV) in % | Measured Value (MV) in Amps | Measured Value (MV) in % | Limit in BS EN61000-3-12 in % | |
| | | | | | 1 phase | 3 phase |
| 2nd | 0.012 | 0.05 | 0.012 | 0.06 | 8% | 8% |
| 3rd | 0.251 | 1.15 | 0.446 | 2.05 | 21,6% | N/A |
| 4th | 0.007 | 0.03 | 0.012 | 0.06 | 4% | 4% |
| 5th | 0.028 | 0.13 | 0.026 | 0.12 | 10,7% | 10,7% |
| 6th | 0.006 | 0.03 | 0.010 | 0.05 | 2,67% | 2,67% |
| 7th | 0.018 | 0.08 | 0.020 | 0.09 | 7,2% | 7,2% |
| 8th | 0.006 | 0.03 | 0.009 | 0.04 | 2% | 2% |
| 9th | 0.026 | 0.12 | 0.030 | 0.14 | 3,8% | N/A |
| 10th | 0.005 | 0.02 | 0.008 | 0.04 | 1,6% | 1,6% |
| 11th | 0.015 | 0.07 | 0.029 | 0.13 | 3,1% | 3,1% |
| 12th | 0.005 | 0.02 | 0.007 | 0.03 | 1,33% | 1,33% |
| 13th | 0.012 | 0.06 | 0.024 | 0.11 | 2% | 2% |
| 14th | 0.006 | 0.03 | 0.007 | 0.03 | N/A | N/A |
| 15th | 0.013 | 0.06 | 0.027 | 0.12 | N/A | N/A |
| 16th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 17th | 0.007 | 0.03 | 0.026 | 0.12 | N/A | N/A |
| 18th | 0.004 | 0.02 | 0.008 | 0.03 | N/A | N/A |
| 19th | 0.010 | 0.05 | 0.026 | 0.12 | N/A | N/A |
| 20th | 0.005 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 21th | 0.011 | 0.05 | 0.024 | 0.11 | N/A | N/A |
| 22th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 23th | 0.010 | 0.05 | 0.023 | 0.11 | N/A | N/A |
| 24th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 25th | 0.010 | 0.05 | 0.023 | 0.11 | N/A | N/A |
| 26th | 0.004 | 0.02 | 0.006 | 0.03 | N/A | N/A |
| 27th | 0.011 | 0.05 | 0.019 | 0.09 | N/A | N/A |
| 28th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 29th | 0.013 | 0.06 | 0.020 | 0.09 | N/A | N/A |
| 30th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 31th | 0.009 | 0.04 | 0.021 | 0.10 | N/A | N/A |
| 32th | 0.004 | 0.02 | 0.006 | 0.03 | N/A | N/A |
| 33th | 0.006 | 0.03 | 0.015 | 0.07 | N/A | N/A |
| 34th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 35th | 0.008 | 0.04 | 0.016 | 0.08 | N/A | N/A |
| 36th | 0.006 | 0.03 | 0.007 | 0.03 | N/A | N/A |
| 37th | 0.010 | 0.05 | 0.016 | 0.07 | N/A | N/A |
| 38th | 0.004 | 0.02 | 0.007 | 0.03 | N/A | N/A |
| 39th | 0.006 | 0.03 | 0.012 | 0.06 | N/A | N/A |
| 40th | 0.004 | 0.02 | 0.006 | 0.03 | N/A | N/A |
| THD ₄₀ | 2.38% | | 2.10% | | 23% | 13% |
| PWHD | 0.35% | | 0.37% | | 23% | 22% |

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| Power Quality. Power factor. | | | | |
|--|---------|---------|---------|---|
| The requirement is specified in section 5.6, test procedure in Annex A or B 1.4.2 | | | | |
| SUN2000L-5KTL – 230Vac | | | | |
| | 216,2V | 230V | 253V | Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. |
| Measured value | 0,9995i | 0,9996i | 0,9996i | |
| Limit | >0,95 | >0,95 | >0,95 | |
| SUN2000L-3.68KTL – 230Vac | | | | |
| | 216,2V | 230V | 253V | Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. |
| Measured value | 0,9998i | 0,9998i | 0,9998i | |
| Limit | >0,95 | >0,95 | >0,95 | |
| SUN2000L-2KTL – 230Vac | | | | |
| | 216,2V | 230V | 253V | Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. |
| Measured value | 0,9995i | 0,9996i | 0,9995i | |
| Limit | >0,95 | >0,95 | >0,95 | |
| SUN2000L-5KTL – 240Vac | | | | |
| | 216,2V | 230V | 253V | Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. |
| Measured value | 0,9996i | 0,9996i | 0,9996i | |
| Limit | >0,95 | >0,95 | >0,95 | |
| SUN2000L-3.68KTL – 240Vac | | | | |
| | 225.4V | 240V | 264V | Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. |
| Measured value | 0,9995i | 0,9994i | 0,9993i | |
| Limit | >0,95 | >0,95 | >0,95 | |
| SUN2000L-2KTL – 240Vac | | | | |
| | 225.4V | 240V | 264V | Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. |
| Measured value | 0,9994i | 0,9995 | 0,9994i | |
| Limit | >0,95 | >0,95 | >0,95 | |

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| Power Quality. Voltage fluctuation and Flicker. | | | | | | | | |
|---|----------|---------------|---------------|----------|----------------|---------------|---------|-------------|
| SUN2000L-5KTL | Starting | | | Stopping | | | Running | |
| | dmax | dc | d(t) | dmax | dc | d(t) | Pst | Plt 2 hours |
| Measured values at test impedance | 1,97% | 1,82% | 0,00% | 2,30% | 1,95% | 0,00% | 0,18 | 0,18 |
| Limits set under BS EN 61000-3-11 | 4% | 3,3% | 3,3% 500ms | 4% | 3,3% | 3,3% 500ms | 1,0 | 0,65 |
| SUN2000L-3.68KTL | Starting | | | Stopping | | | Running | |
| | dmax | dc | d(t) | dmax | dc | d(t) | Pst | Plt 2 hours |
| Measured values at test impedance | 0,63% | 0,59% | 0,00% | 1,30% | 1,15% | 0,00% | 0,14 | 0,12 |
| Limits set under BS EN 61000-3-11 | 4% | 3,3% | 3,3% 500ms | 4% | 3,3% | 3,3% 500ms | 1,0 | 0,65 |
| Test impedance | R | 0,24* 0,4^ | Ω | XI | 0,15* 0,25 | Ω | | |
| Standard impedance | R | 0,24* 0,4^ | Ω | XI | 0,15* 0,25^ | Ω | | |

| Power Quality. DC injection. | | | |
|------------------------------|---------|---------|---------|
| SUN2000L-5KTL | | | |
| Test level power | 10% | 55% | 100% |
| Recorded value | 0,025 A | 0,016 A | 0,033 A |
| As % of rated AC current | 0,12 % | 0,07 % | 0,15 % |
| Limit | 0,25% | 0,25% | 0,25% |
| SUN2000L-3.68KTL | | | |
| Test level power | 10% | 55% | 100% |
| Recorded value | 0,038 A | 0,028 A | 0,027 A |
| As % of rated AC current | 0,24 % | 0,18 % | 0,17 % |
| Limit | 0,25% | 0,25% | 0,25% |
| SUN2000L-2KTL | | | |
| Test level power | 10% | 55% | 100% |
| Recorded value | 0,015 A | 0,019 A | 0,018 A |
| As % of rated AC current | 0,17 % | 0,22 % | 0,21 % |
| Limit | 0,25% | 0,25% | 0,25% |

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| Fault level Contribution. | | | | | |
|--|----------|-------|---------------------|-------|------------|
| SUN2000L-5KTL | | | | | |
| For a directly coupled SSEG | | | For a Inverter SSEG | | |
| Parameter | Symbol | Value | Time after fault | Volts | Amps |
| Peak Short Circuit current | I_p | N/A | 20ms | 33 | 22,9 |
| Initial Value of aperiodic current | A | N/A | 100ms | 32 | 18,1 |
| Initial symmetrical short-circuit current* | I_k | N/A | 250ms | 32 | --- |
| Decaying (aperiodic) component of short circuit current* | i_{DC} | N/A | 500ms | 32 | --- |
| Reactance/Resistance Ratio of source* | X/R | N/A | Time to trip | 0,068 | In seconds |
| SUN2000L-3.68KTL | | | | | |
| For a directly coupled SSEG | | | For a Inverter SSEG | | |
| Parameter | Symbol | Value | Time after fault | Volts | Amps |
| Peak Short Circuit current | I_p | N/A | 20ms | 32 | 16,4 |
| Initial Value of aperiodic current | A | N/A | 100ms | 32 | 14,0 |
| Initial symmetrical short-circuit current* | I_k | N/A | 250ms | 32 | --- |
| Decaying (aperiodic) component of short circuit current* | i_{DC} | N/A | 500ms | 32 | --- |
| Reactance/Resistance Ratio of source* | X/R | N/A | Time to trip | 0,081 | In seconds |

For rotating machines and linear piston machines the test should produce a 0s – 2s plot of the short circuit current as seen at the Generating Unit terminals.

* Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot.

| Self Monitoring – Solid state switching. | N/A |
|---|-----|
| It has been verified that in the event of the solid state switching device failing to disconnect the Generating Unit, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0,5 seconds. | |
| Note. Unit do not provide solid state switching relays. In case the semiconductor bridge is switched off, then the voltage on the output drops to 0. In this case the relays on the output will also open. | |