ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

DAkkS Deutsche Akkreditierungsstelle D-ZE-11321-01-00

TÜV SÜD Product Service

# Certificate of Conformity

## No. ESY 115067 0045 Rev. 00

**Holder of Certificate:** **Xiamen Kehua Digital Energy Tech Co., Ltd.**
Room 208-38, Hengye Building
No. 100 Xiangxing Road
Torch High-tech Zone
(Xiangan) Industrial Zone
361115 Xiamen
PEOPLE'S REPUBLIC OF CHINA

**Product:** **Converter (Hybrid Inverter)**

**Model(s):** **iStoragE 3600, iStoragE 5000**
**iStoragE 3600E, iStoragE 5000E**
**iStoragE1 3600, iStoragE1 5000**

**Parameters:** See page 2

**Applicable standards:** VDE-AR-N 4105:2018
DIN VDE V 0124-100 (VDE V 0124-100):2020

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

**Test report no.:** 64290223121701

**Date,** 2022-11-28

( Billy Qiu )


TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

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**Parameters**

| | |
|---|---|
| Max. Input Voltage: | 580 Vd.c. |
| Min. MPP Voltage: | 100 Vd.c. |
| Max. MPP Voltage: | 550 Vd.c. |
| Max. DC Current: | 2*15 Ad.c. |
| Isc PV: | 2*18.75 Ad.c. |
| Battery Voltage Range | 85 ~ 450 Vd.c. ( iStoragE 3600, iStoragE 5000, iStoragE 3600E, iStoragE 5000E )<br>360V~500 Vd.c. ( iStoragE1 3600, iStoragE1 5000) |
| Maximum Battery Charge/Discharge current: | 32 Ad.c. ( iStoragE 3600, iStoragE 5000, iStoragE 3600E, iStoragE 5000E )<br>25 Ad.c. ( iStoragE1 3600, iStoragE1 5000) |
| Maximum Battery Charge/Discharge Power: | 4600 W ( iStoragE 5000, iStoragE 5000E, iStoragE1 5000)<br>3600 W ( iStoragE 3600, iStoragE 3600E, iStoragE1 3600) |
| Rated Grid Voltage: | 230 Va.c. |
| Rated Grid Frequency: | 50 Hz |
| Max. Current Output to Grid: | 20.0 Aa.c. ( iStoragE 5000, iStoragE 5000E, iStoragE1 5000)<br>15.6 Aa.c. ( iStoragE 3600, iStoragE 3600E, iStoragE1 3600) |
| Rated Active Power to Grid: | 4600 W ( iStoragE 5000, iStoragE 5000E, iStoragE1 5000)<br>3600 W ( iStoragE 3600, iStoragE 3600E, iStoragE1 3600) |
| Max. Apparent Power to Grid: | 4600 VA ( iStoragE 5000, iStoragE 5000E, iStoragE1 5000)<br>3600 VA ( iStoragE 3600, iStoragE 3600E, iStoragE1 3600) |
| Max. Apparent Power from Grid: | 4600 VA ( iStoragE 5000, iStoragE 5000E, iStoragE1 5000)<br>3600 VA ( iStoragE 3600, iStoragE 3600E, iStoragE1 3600) |
| Power Factor Range: | 0.9 leading to 0.9 lagging |

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### E.4 Unit certificate

| Unit Certificate | | |
|---|---|---|
| **Manufacturer** | Xiamen Kehua Digital Energy Tech Co., Ltd. | |
| **Power generation unit type** | [Inverter]: iStoragE 3600, iStoragE 5000, iStoragE 3600E, iStoragE 5000E, iSorageE1 3600, iStoragE1 5000.<br>Remark: certified on representative model iStoragE 5000 of family design products, results of the measurement of iStoragE 5000 can be transferred to other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020. | |
| **Technical data** | Max. active power $P_{Emax}$ | 4600 W (iStoragE 5000) |
| | Max. apparent power $S_{Emax}$ | 4600 VA (iStoragE 5000) |
| | Rated voltage | 230 Va.c. |
| | Rated current (AC) Ir | 20.0 A (iStoragE 5000) |
| | Initial short-circuit AC current $I''_k$ | 20.0 A (iStoragE 5000) |
| **Network connection rule** | **VDE-AR-N 4105 “Generators connected to the low-voltage distribution network”**<br>Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network | |
| **Test requirement** | **DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage”**<br>Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network | |
| **Test report** | 64.290.22.31217.01 from 2022.11.14 | |
| The above designated power generation unit meets the requirements of VDE-AR-N 4105 | | |

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### E.5 Test report "Network interactions" for generating units with an input current >75 A

| Extract from test report for unit certificate “Determination of electrical properties” | | |
|---|---|---|
| Generation unit manufacturer: | Xiamen Kehua Digital Energy Tech Co., Ltd. | |
| Manufacturer indications: | Type of system | Energy Storage Inverter for PV system |
| | Max. active power $P_{Emax}$ | 3600 W (iStoragE 3600, iStoragE 3600E, iStoragE1 3600)<br>4600 W (iStoragE 5000, iStoragE 5000E, iStoragE1 5000) |
| | Rated voltage | 230 Va.c. |
| Period of measurement: | From 2021-09-09 to 2022-01-21, 2022-10-09 to 2022-10-31 | |

| Rapid voltage changes | |
|---|---|
| Connection without provisions (regarding the primary energy carrier) | $K_i$=0.50 |
| Most adverse case when switching between generator levels | $K_i$=0.99 |
| Connection at nominal conditions (of the primary energy carrier) | $K_i$=0.99 |
| Disconnection at rated power | $K_i$=0.99 |
| Worst value of all switching operations | $k_{imax}$=0.99 |

| Voltage fluctuations and flicker (iStoragE 5000) | | | |
|---|---|---|---|
| Simulated network frequency (Hz) | 50 Hz | Short circuit power Sk (VA) | 33 x 4.6 k |
| Plt (Maximum measured Pst) | 0.14 | EZE nominal power (Pn) | 4.6 kVA |
| Maximum flicker coefficient Cφk | 4.62 | -- | -- |

| Pst | #1 | #2 | #3 | #4 | #5 | #6 |
|---|---|---|---|---|---|---|
| L1-N | 0.13 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| Pst | #7 | #8 | #9 | #10 | #11 | #12 |
| L1-N | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |

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| Harmonics-DIN EN 61000-3-12(>16 A and ≤75 A) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | Permissible individual harmonic current $I_h/I_{ref}$ % (minimum Rsce=33) | | | | | | | | | | | | Permissible harmonics Parameter (%) | |
| Harmonics | $I_2$ | $I_3$ | $I_4$ | $I_5$ | $I_6$ | $I_7$ | $I_8$ | $I_9$ | $I_{10}$ | $I_{11}$ | $I_{12}$ | $I_{13}$ | THC/ $I_{ref}$ | PWHC/ $I_{ref}$ |
| Limit value | 8.0 | 21.6 | 4.0 | 10.7 | 2.67 | 7.2 | 2.0 | 3.8 | 1.6 | 3.1 | 1.33 | 2.0 | 23 | 23 |
| Actual value | 1.669 | 0.186 | 1.289 | 0.181 | 0.764 | 0.165 | 0.445 | 0.175 | 0.458 | 0.19 | 0.314 | 1.669 | 6.172 | 1.032 |

| Harmonics-DIN EN 61000-3-2(≤16 A) (iStoragE 3600) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Active power P/Pn[%] | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | Limit value |
| Ordinal number | A | A | A | A | A | A | A | A | A | A | A | A |
| 2 | 0.010 | 0.011 | 0.035 | 0.028 | 0.036 | 0.040 | 0.040 | 0.038 | 0.034 | 0.030 | 0.024 | 1.080 |
| 3 | 0.272 | 0.097 | 0.224 | 0.164 | 0.195 | 0.240 | 0.257 | 0.273 | 0.291 | 0.313 | 0.339 | 2.300 |
| 4 | 0.007 | 0.005 | 0.032 | 0.024 | 0.032 | 0.038 | 0.037 | 0.037 | 0.032 | 0.028 | 0.022 | 0.430 |
| 5 | 0.174 | 0.270 | 0.211 | 0.128 | 0.105 | 0.112 | 0.111 | 0.111 | 0.118 | 0.130 | 0.146 | 1.140 |
| 6 | 0.004 | 0.005 | 0.036 | 0.026 | 0.035 | 0.041 | 0.041 | 0.039 | 0.035 | 0.031 | 0.025 | 0.300 |
| 7 | 0.105 | 0.136 | 0.122 | 0.092 | 0.082 | 0.090 | 0.088 | 0.088 | 0.092 | 0.100 | 0.112 | 0.770 |
| 8 | 0.001 | 0.003 | 0.037 | 0.023 | 0.030 | 0.036 | 0.037 | 0.036 | 0.032 | 0.029 | 0.024 | 0.230 |
| 9 | 0.067 | 0.070 | 0.052 | 0.048 | 0.054 | 0.069 | 0.073 | 0.076 | 0.082 | 0.089 | 0.098 | 0.400 |
| 10 | 0.002 | 0.002 | 0.035 | 0.020 | 0.027 | 0.032 | 0.034 | 0.034 | 0.031 | 0.027 | 0.022 | 0.184 |
| 11 | 0.044 | 0.046 | 0.063 | 0.015 | 0.032 | 0.053 | 0.061 | 0.065 | 0.071 | 0.078 | 0.086 | 0.330 |
| 12 | 0.001 | 0.002 | 0.032 | 0.024 | 0.030 | 0.034 | 0.035 | 0.035 | 0.032 | 0.029 | 0.024 | 0.153 |
| 13 | 0.026 | 0.018 | 0.068 | 0.007 | 0.012 | 0.038 | 0.050 | 0.056 | 0.062 | 0.069 | 0.079 | 0.210 |
| 14 | 0.002 | 0.002 | 0.029 | 0.016 | 0.023 | 0.026 | 0.027 | 0.027 | 0.024 | 0.022 | 0.018 | 0.131 |
| 15 | 0.014 | 0.011 | 0.049 | 0.009 | 0.013 | 0.025 | 0.040 | 0.048 | 0.056 | 0.064 | 0.072 | 0.150 |
| 16 | 0.002 | 0.003 | 0.030 | 0.013 | 0.020 | 0.023 | 0.024 | 0.025 | 0.024 | 0.022 | 0.018 | 0.115 |
| 17 | 0.008 | 0.012 | 0.033 | 0.006 | 0.019 | 0.019 | 0.033 | 0.041 | 0.048 | 0.055 | 0.063 | 0.132 |
| 18 | 0.001 | 0.002 | 0.029 | 0.011 | 0.019 | 0.023 | 0.024 | 0.024 | 0.023 | 0.021 | 0.018 | 0.102 |
| 19 | 0.003 | 0.014 | 0.038 | 0.008 | 0.022 | 0.020 | 0.026 | 0.035 | 0.042 | 0.049 | 0.057 | 0.118 |
| 20 | 0.001 | 0.003 | 0.025 | 0.011 | 0.018 | 0.022 | 0.023 | 0.023 | 0.022 | 0.020 | 0.018 | 0.092 |
| 21 | 0.006 | 0.017 | 0.033 | 0.012 | 0.019 | 0.020 | 0.020 | 0.029 | 0.036 | 0.043 | 0.051 | 0.107 |
| 22 | 0.001 | 0.003 | 0.022 | 0.008 | 0.015 | 0.019 | 0.020 | 0.020 | 0.019 | 0.018 | 0.015 | 0.084 |
| 23 | 0.007 | 0.021 | 0.021 | 0.014 | 0.015 | 0.021 | 0.018 | 0.024 | 0.031 | 0.038 | 0.045 | 0.098 |
| 24 | 0.002 | 0.003 | 0.022 | 0.005 | 0.012 | 0.016 | 0.017 | 0.017 | 0.016 | 0.015 | 0.013 | 0.077 |
| 25 | 0.009 | 0.021 | 0.019 | 0.011 | 0.011 | 0.020 | 0.017 | 0.020 | 0.026 | 0.033 | 0.039 | 0.090 |
| 26 | 0.001 | 0.003 | 0.019 | 0.006 | 0.012 | 0.015 | 0.016 | 0.016 | 0.015 | 0.014 | 0.012 | 0.071 |
| 27 | 0.009 | 0.020 | 0.019 | 0.006 | 0.009 | 0.016 | 0.014 | 0.015 | 0.021 | 0.027 | 0.033 | 0.083 |
| 28 | 0.001 | 0.002 | 0.017 | 0.005 | 0.011 | 0.013 | 0.015 | 0.014 | 0.013 | 0.013 | 0.012 | 0.066 |
| 29 | 0.011 | 0.021 | 0.015 | 0.006 | 0.010 | 0.014 | 0.015 | 0.014 | 0.019 | 0.024 | 0.030 | 0.078 |
| 30 | 0.001 | 0.003 | 0.017 | 0.003 | 0.010 | 0.012 | 0.013 | 0.013 | 0.012 | 0.012 | 0.010 | 0.061 |
| 31 | 0.010 | 0.020 | 0.012 | 0.007 | 0.009 | 0.010 | 0.012 | 0.011 | 0.014 | 0.019 | 0.024 | 0.073 |
| 32 | 0.001 | 0.002 | 0.017 | 0.004 | 0.008 | 0.010 | 0.012 | 0.011 | 0.010 | 0.010 | 0.009 | 0.058 |
| 33 | 0.009 | 0.019 | 0.014 | 0.007 | 0.007 | 0.006 | 0.010 | 0.010 | 0.012 | 0.016 | 0.021 | 0.068 |
| 34 | 0.001 | 0.002 | 0.015 | 0.004 | 0.007 | 0.008 | 0.009 | 0.010 | 0.009 | 0.008 | 0.007 | 0.054 |
| 35 | 0.009 | 0.017 | 0.013 | 0.005 | 0.005 | 0.004 | 0.008 | 0.008 | 0.010 | 0.013 | 0.017 | 0.064 |
| 36 | 0.002 | 0.003 | 0.015 | 0.004 | 0.005 | 0.007 | 0.008 | 0.009 | 0.008 | 0.008 | 0.008 | 0.051 |
| 37 | 0.010 | 0.016 | 0.013 | 0.002 | 0.003 | 0.003 | 0.006 | 0.007 | 0.008 | 0.011 | 0.014 | 0.061 |
| 38 | 0.001 | 0.002 | 0.014 | 0.004 | 0.004 | 0.005 | 0.007 | 0.007 | 0.007 | 0.006 | 0.005 | 0.048 |
| 39 | 0.010 | 0.015 | 0.015 | 0.002 | 0.003 | 0.002 | 0.004 | 0.005 | 0.006 | 0.008 | 0.011 | 0.058 |
| 40 | 0.002 | 0.002 | 0.013 | 0.004 | 0.003 | 0.004 | 0.005 | 0.006 | 0.006 | 0.006 | 0.005 | 0.046 |

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| Harmonics-DIN EN 61000-3-12(>16 A and ≤75 A) (iStoragE 5000) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Active power P/Pn[%] | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | Limit value |
| Ordinal number | I [%] | I [%] | I [%] | I [%] | I [%] | I [%] | I [%] | I [%] | I [%] | I [%] | I [%] | [%] |
| 2 | 0.054 | 0.137 | 0.138 | 0.126 | 0.126 | 0.113 | 0.106 | 0.096 | 0.092 | 0.079 | 0.070 | 8% |
| 3 | 0.920 | 1.164 | 0.639 | 0.744 | 0.928 | 1.004 | 1.108 | 1.233 | 1.361 | 1.506 | 1.669 | 21.6% |
| 4 | 0.025 | 0.171 | 0.186 | 0.154 | 0.177 | 0.160 | 0.141 | 0.128 | 0.113 | 0.104 | 0.082 | 4% |
| 5 | 0.933 | 1.289 | 0.415 | 0.374 | 0.527 | 0.587 | 0.632 | 0.678 | 0.745 | 0.815 | 0.905 | 10.7% |
| 6 | 0.036 | 0.137 | 0.175 | 0.169 | 0.181 | 0.175 | 0.167 | 0.164 | 0.154 | 0.144 | 0.128 | 2.67% |
| 7 | 0.524 | 0.764 | 0.507 | 0.368 | 0.379 | 0.377 | 0.389 | 0.411 | 0.444 | 0.489 | 0.531 | 7.2% |
| 8 | 0.021 | 0.165 | 0.138 | 0.131 | 0.142 | 0.130 | 0.128 | 0.112 | 0.103 | 0.088 | 0.067 | 2% |
| 9 | 0.316 | 0.383 | 0.369 | 0.252 | 0.277 | 0.316 | 0.314 | 0.331 | 0.368 | 0.403 | 0.445 | 3.8% |
| 10 | 0.016 | 0.175 | 0.142 | 0.106 | 0.125 | 0.118 | 0.107 | 0.097 | 0.088 | 0.072 | 0.055 | 1.6% |
| 11 | 0.163 | 0.458 | 0.241 | 0.150 | 0.199 | 0.256 | 0.301 | 0.349 | 0.365 | 0.363 | 0.373 | 3.1% |
| 12 | 0.038 | 0.190 | 0.093 | 0.092 | 0.120 | 0.121 | 0.119 | 0.114 | 0.108 | 0.099 | 0.079 | 1.33% |
| 13 | 0.153 | 0.310 | 0.066 | 0.193 | 0.195 | 0.176 | 0.169 | 0.222 | 0.272 | 0.306 | 0.314 | 2% |
| 14 | 0.044 | 0.106 | 0.162 | 0.107 | 0.092 | 0.079 | 0.060 | 0.037 | 0.027 | 0.037 | 0.039 | - |
| 15 | 0.053 | 0.221 | 0.090 | 0.103 | 0.114 | 0.246 | 0.318 | 0.351 | 0.366 | 0.371 | 0.408 | - |
| 16 | 0.056 | 0.157 | 0.071 | 0.061 | 0.098 | 0.116 | 0.124 | 0.129 | 0.128 | 0.118 | 0.107 | - |
| 17 | 0.094 | 0.170 | 0.075 | 0.088 | 0.099 | 0.150 | 0.156 | 0.111 | 0.084 | 0.066 | 0.068 | - |
| 18 | 0.045 | 0.128 | 0.088 | 0.094 | 0.078 | 0.061 | 0.043 | 0.031 | 0.031 | 0.042 | 0.050 | - |
| 19 | 0.062 | 0.080 | 0.139 | 0.087 | 0.041 | 0.087 | 0.126 | 0.145 | 0.153 | 0.190 | 0.242 | - |
| 20 | 0.025 | 0.088 | 0.074 | 0.027 | 0.061 | 0.066 | 0.069 | 0.073 | 0.065 | 0.055 | 0.046 | - |
| 21 | 0.042 | 0.034 | 0.066 | 0.067 | 0.066 | 0.127 | 0.152 | 0.182 | 0.203 | 0.215 | 0.254 | - |
| 22 | 0.019 | 0.077 | 0.085 | 0.057 | 0.051 | 0.050 | 0.050 | 0.053 | 0.060 | 0.065 | 0.062 | - |
| 23 | 0.037 | 0.065 | 0.035 | 0.045 | 0.042 | 0.106 | 0.156 | 0.197 | 0.220 | 0.219 | 0.235 | - |
| 24 | 0.017 | 0.053 | 0.066 | 0.037 | 0.063 | 0.071 | 0.071 | 0.068 | 0.063 | 0.054 | 0.044 | - |
| 25 | 0.062 | 0.087 | 0.043 | 0.037 | 0.070 | 0.078 | 0.100 | 0.128 | 0.153 | 0.165 | 0.195 | - |
| 26 | 0.013 | 0.056 | 0.070 | 0.037 | 0.045 | 0.047 | 0.053 | 0.061 | 0.061 | 0.061 | 0.052 | - |
| 27 | 0.054 | 0.081 | 0.026 | 0.033 | 0.060 | 0.052 | 0.075 | 0.092 | 0.128 | 0.155 | 0.172 | - |
| 28 | 0.019 | 0.039 | 0.053 | 0.033 | 0.045 | 0.050 | 0.054 | 0.049 | 0.054 | 0.048 | 0.044 | - |
| 29 | 0.051 | 0.103 | 0.039 | 0.033 | 0.055 | 0.033 | 0.053 | 0.074 | 0.110 | 0.127 | 0.151 | - |
| 30 | 0.017 | 0.041 | 0.050 | 0.023 | 0.034 | 0.038 | 0.037 | 0.040 | 0.045 | 0.041 | 0.037 | - |
| 31 | 0.043 | 0.110 | 0.030 | 0.036 | 0.041 | 0.039 | 0.060 | 0.072 | 0.103 | 0.123 | 0.149 | - |
| 32 | 0.019 | 0.044 | 0.051 | 0.020 | 0.030 | 0.035 | 0.038 | 0.040 | 0.035 | 0.039 | 0.037 | - |
| 33 | 0.045 | 0.106 | 0.030 | 0.034 | 0.046 | 0.039 | 0.046 | 0.057 | 0.077 | 0.094 | 0.113 | - |
| 34 | 0.019 | 0.034 | 0.044 | 0.027 | 0.034 | 0.034 | 0.029 | 0.028 | 0.035 | 0.036 | 0.042 | - |
| 35 | 0.049 | 0.099 | 0.021 | 0.031 | 0.034 | 0.037 | 0.034 | 0.043 | 0.057 | 0.086 | 0.101 | - |
| 36 | 0.020 | 0.029 | 0.051 | 0.019 | 0.028 | 0.034 | 0.034 | 0.034 | 0.029 | 0.031 | 0.029 | - |
| 37 | 0.045 | 0.090 | 0.021 | 0.021 | 0.025 | 0.034 | 0.030 | 0.043 | 0.057 | 0.074 | 0.091 | - |
| 38 | 0.022 | 0.026 | 0.045 | 0.016 | 0.025 | 0.027 | 0.027 | 0.025 | 0.028 | 0.031 | 0.029 | - |
| 39 | 0.045 | 0.069 | 0.024 | 0.018 | 0.022 | 0.025 | 0.027 | 0.040 | 0.051 | 0.064 | 0.078 | - |
| 40 | 0.014 | 0.022 | 0.050 | 0.018 | 0.023 | 0.027 | 0.027 | 0.027 | 0.024 | 0.023 | 0.026 | - |
| THC/$I_{ref}$ | 4.599 | 6.147 | 4.852 | 4.510 | 4.898 | 5.158 | 5.353 | 5.552 | 5.771 | 5.957 | 6.172 | 23% |
| PWHC/$I_{ref}$ | 0.314 | 0.693 | 0.498 | 0.386 | 0.429 | 0.601 | 0.722 | 0.796 | 0.866 | 0.917 | 1.034 | 23% |
| Remark: Iref=20.0 A | | | | | | | | | | | | |



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### E.6 Certificate of the network and system protection

| Certificate of NS protection | | |
|---|---|---|
| **Manufacturer** | Xiamen Kehua Digital Energy Tech Co., Ltd. | |
| **Type of NS protection** | Integrated NS protection | |
| **Central NS protection** | No | |
| **Integrated NS protection** | Yes | Assigned to power generation unit of type:<br>iStoragE 3600, iStoragE 5000, iStoragE 3600E, iStoragE 5000E, iStoragE1 3600, iStoragE1 5000. |
| **Network connection rule** | **VDE-AR-N 4105 "Generators connected to the low-voltage distribution network"**<br>Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network | |
| **Test requirement** | **DIN VDE V 0124-100 (VDE V 0124-100) "Network integration of power generation systems – Low voltage"**<br>Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network | |
| **Test report** | 64.290.22.31217.01 from 2022.11.14 | |
| The network and system protection designated above meets the requirements of VDE-AR-N 4105. | | |

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### E.7 Requirements for the test report for the NS protection

| Extract from test report for NS protection<br>"Determination of electrical properties" | | | |
|---|---|---|---|
| **NS protection test report** | | | |
| **Type of NS system:** | Integrated NS protection | | **Other Manufacturer indications** |
| **Software version:** | Software version: V1 | | |
| **Manufacturer:** | Xiamen Kehua Digital Energy Tech Co., Ltd.<br>Room 208-38, Hengye Building<br>No. 100 Xiangxing Road Torch High-tech Zone (Xiangan) Industrial Zone<br>361115 Xiamen<br>PEOPLE'S REPUBLIC OF CHINA | | |
| **Measuring period:** | From 2021-09-09 to 2022-01-21, 2022-10-09 to 2022-10-31 | | |

| | **Inverter** | | |
|---|---|---|---|
| **Protection function** | **Setting value** | **Tripping value** | **Tripping time NS protection*** |
| Rise-in-voltage protection *U* >> | 1.25 * $U_n$ | L1-N: 289.0 V | L1-N: 122.2 ms |
| Rise-in-voltage protection *U* > | 1.10 * $U_n$ | 1.10 * $U_n$ | ms** |
| Voltage drop protection *U* < | 0.8 * $U_n$ | L1-N: 182.7 V | L1-N: 3049 ms |
| Voltage drop protection *U* << | 0.45 * $U_n$ | L1-N: 103.9 V | L1-N: 333.8 ms |
| Frequency decrease protection *f* < | 47.5 Hz | 47.49 Hz | 137.6 ms |
| Frequency increase protection *f* > | 51.5 Hz | 51.51 Hz | 135.6 ms |

*: The tripping time includes the period from the limit value violation *U*/*f* until the tripping signal to the interface switch.
When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above.
The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms.

**: Verification disconnection time of moving 10-min-average value.
Disconnecting time as below:

1. 473.8 s (L1-N from 600s@$U_n$ to 112%$U_n$)
2. Continuous operation (L1-N from 600s@$U_n$ to 108%$U_n$)
3. 309.0 s (L1-N from 600s@106%$U_n$ to 114%$U_n$)

☑ **as integrated NS protection**

| | |
|---|---|
| Assigned to power generation unit type | iStoragE 3600, iStoragE 5000, iStoragE 3600E, iStoragE 5000E, iStoragE1 3600, iStoragE1 5000 |
| Integrated interface switch type | Series-connected relays for both the neutral conductor and the line conductor<br>Relay type: HongFa,<br>Model: HF161F-W/12-HT(477) |
| Response time of interface switch for integrated NS protection | HongFa, Model: HF161F-W/12-HT(477):<br>Release time: Max. 10 ms |

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Product Service

# Certificate of Conformity

## No. ESY 115067 0045 Rev. 00

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|---|---|
| Verification of the entire functional chain “integrated NS protection – interface switch” has resulted in successful disconnection. | ☑ |