

**APPENDIX 2 Type Test Certification Test Result Sheet****Micro-generator details**

| | | |
|---|-----------------------|--|
| MICRO-GENERATOR Type reference: <i>Fronius Symo 7.0-3-M</i> | | |
| Maximum continuous rating: | | 7000W |
| Manufacturer: <i>Fronius International GmbH</i> | Tel: +43-7242-241-0 | Address: <i>Guenter Fronius Str 1 4600 Wels-Thalheim, Austria</i> |
| | Fax: +43-7242-241-224 | |
| Technical file reference No.: | | |

Test house details

| | |
|--------------------------------|---|
| Name and address of test house | <i>Fronius R&D Laboratories, Fronius International GmbH, Guenter Fronius Str 1, A-4600 Wels-Thalheim, Austria</i> |
| Telephone number | <i>+43-7242-241-0</i> |
| Facsimile number | <i>+43-7242-241-224</i> |
| E-mail address | <i>pv@fronius.com</i> |

POWER QUALITY

| Harmonic current emissions (A) Maximum permissible harmonic current as per BS EN 61000-3-2 | | | | | | | | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|-------------------------------------|
| Harmonic | 2 nd | 3 rd | 5 th | 7 th | 9 th | 11 th | 13 th | 15 th – 39 th |
| Limit | 1,08 | 2,3 | 1,14 | 0,77 | 0,4 | 0,33 | 0,21 | 0,15x(15/n) |
| Test value (max value of Phase1,2,3) | <i>0.027</i> | <i>0.060</i> | <i>0.088</i> | <i>0.043</i> | <i>0.049</i> | <i>0.035</i> | <i>0.040</i> | <i>PASS</i> |

| Voltage Fluctuations and Flicker | | | | |
|----------------------------------|----------|----------|----------------|-----------------|
| | Starting | Stopping | Running | |
| Limit* | 4% | 4% | $P_{st} = 1.0$ | $P_{lt} = 0.65$ |
| Test value | -0.06** | - ** | 0.1260 ** | 0.0957 ** |

*Maximum permissible voltage fluctuation (expressed as a percentage of nominal voltage at 100% power) and flicker. As per BS EN 61000-3-11.

** The EUT itself does not produce flicker relevant variations of the line current, startup is made using a ramp function and does therefore not create relevant d_{MAX} values.
Solar power variations naturally lead to variations of the electric power fed into the grid, however these variations are not significant for P_{ST} and P_{LT} .

| | Power factor | | |
|------------------|--|--------|--------|
| Protection Limit | +0.95 lag-0,95 at three voltage levels | | |
| | 210 V | 230 V | 250 V |
| Test value | 0.9924 | 0.9878 | 0.9959 |

Under / Over frequency tests

| | Under Frequency | | Over Frequency | |
|------------------|-----------------|-----------|----------------|-----------|
| Parameter | Frequency (Hz) | Time (s) | Frequency (Hz) | Time (s) |
| Protection limit | 48 Hz | 0,5 sec | 50,5 Hz | 0,5 sec |
| Actual setting | 48,02 Hz | 0,48 sec | 50,48 Hz | 0,48 sec |
| Trip value | 48,015 Hz | 0,492 sec | 50,493 Hz | 0,498 sec |

Under / Over voltage tests (single stage protection)

| | Under Voltage | | Over Voltage | |
|------------------|---------------|-----------|--------------|-----------|
| Parameter | Voltage (V) | Time (s) | Voltage (V) | Time (s) |
| Protection limit | 207 V | 0,5 sec | 253 V | 0,5 sec |
| Actual setting | 209,00 V | 0,48 sec | 250,40 V | 0,48 sec |
| Trip value | 207,98 V | 0,498 sec | 252,62 V | 0,498 sec |

LoM test

| Method used | Frequency shift | | |
|-----------------------------|-----------------|-----------|-----------|
| Output power level* | 10% | 55% | 100% |
| Trip setting clearance time | 0,5 sec | 0,5 sec | 0,5 sec |
| Trip value clearance time | 0,435 sec | 0,498 sec | 0,398 sec |

*indicative values are shown for minimum, medium and maximum power levels.

Fault level contribution

| Micro-generator short-circuit parameters | | | | | |
|--|----------|-------|---------------------|---------|-----------------|
| For a directly coupled SSEG | | | For a Inverter SSEG | | |
| Parameter | Symbol | Value | Time after fault | Volts | Amps |
| Peak Short Circuit current | i_p | -- | 20ms | 65,5V | 13,7A |
| Initial Value of aperiodic current | A | -- | 100ms | 30,0V | 11,3A |
| Initial symmetrical short-circuit current* | I_k | -- | 250ms | 19,7V | 12,4A |
| Decaying (aperiodic) component of short circuit current* | i_{DC} | -- | 500ms | 14,8V | 12,4A |
| Reactance/Resistance Ratio of source* | X/R | -- | Time to trip | 537,8ms | In milliseconds |

COMMENTS

These tests have been carried out with specifications and parameters set to meet the requirements of CER/06/190. It is hereby declared by the manufacturer that all units shipped to Ireland will have identical parameter settings and that these parameters cannot be changed by a user, installer or by any person other than the manufacturer after the setup has been selected.