Certificate

Certificate
No. 20-182-03

kiwa

Applicant: **Victron Energy B.V.**
De Paal 35
1351 JG Almere
Netherlands

Product: **Battery Inverter with integrated automatic disconnection device between a generator and the public low-voltage grid**

Model:	MultiPlus-II 48/3000/35-32 230V, MultiPlus-II 48/3000/35-32 230V GX	MultiPlus-II 48/5000/70-50 230V, MultiPlus-II 48/5000/70-50 230V GX	MultiPlus-II 24/3000/70-32 230V, MultiPlus-II 24/3000/70-32 230V GX
Rating: Output power (feed in on-grid):	2,5kVA / 2,47kW	4,5kVA / 4,4kW	2,5kVA / 2,47kW

Model:	MultiPlus-II 48/4k5/55-32 230V, MultiPlus-II 48/4k5/55-32 230V GX	MultiPlus-II 48/6k5/100-50 230V, MultiPlus-II 48/6k5/100-50 230V GX
Rating: Output power (feed in on-grid):	4,0kVA / 4,0kW	6,0kVA / 6,0kW

Intended use:

Battery Inverter with an automatic disconnection device with single phase mains surveillance in accordance with Engineering Recommendation G99/NI for photovoltaic systems with a single phase parallel coupling via an inverter to the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied standards and guidelines:

SOP-9-1_15 GCC Certification Program, 09/21
Based on:
Engineering Recommendation G99/NI Issue 1 – April 2019
Requirements for the connection of generation equipment in parallel with public distribution networks in Northern Ireland on or after 27 April 2019

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

The units are only compliant with type A Power Generating Module requirements.

Report No: 17PP264-26_2

Date of issue: 2026-01-22

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DAkkS
Deutsche Akkreditierungsstelle
D-ZE-12089-01-00

TC_G99/NI_eng_A

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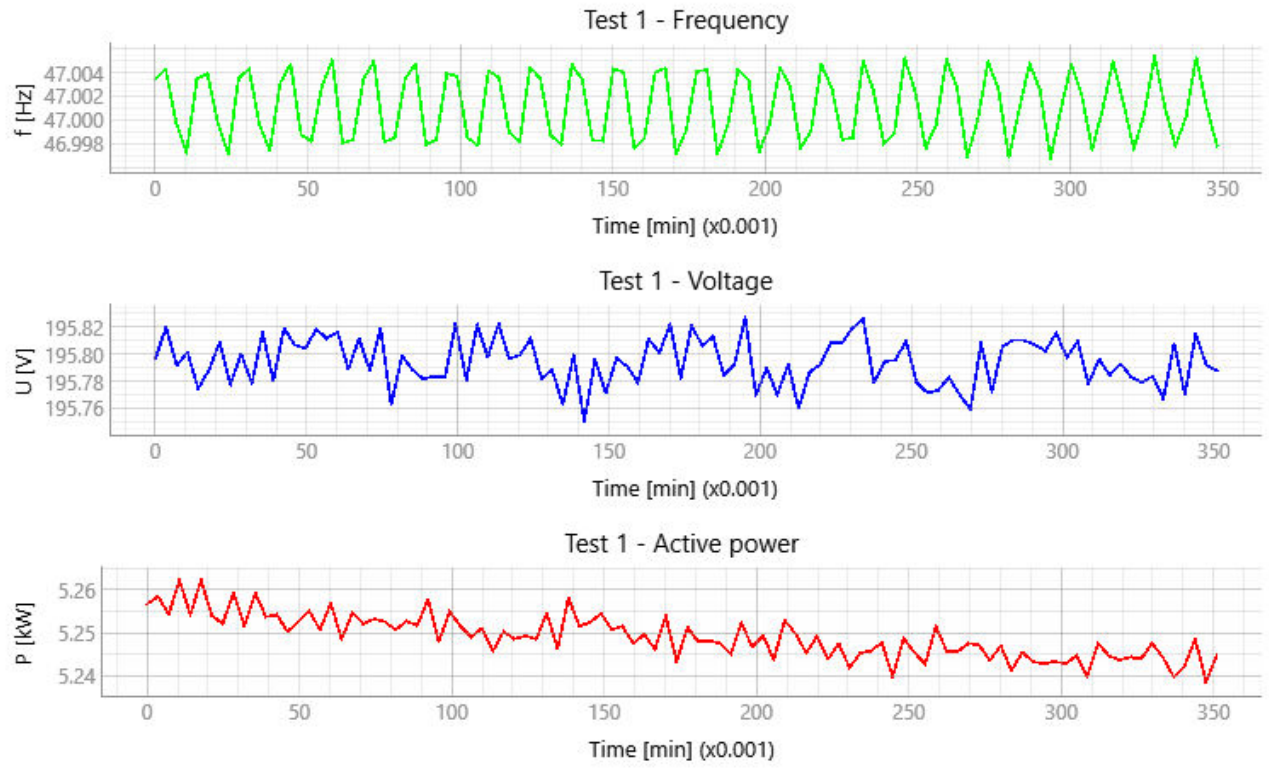
Operating Range:					
MultiPlus-II 48/6k5/100-50 230V GX					
	U [V]	f [Hz]	Cos φ	P [kW]	Limit [%Sn]:
Test 1	85%Un 195,5V	47,00Hz	1,00	Registered Capacity	-
Measured 20s avg	195,5V	47,00Hz	1,00	6,0	Y
Test 2	85%Un 195,5V	47,50Hz	1,00	Registered Capacity	-
Measured 90min avg	195,5V	47,50Hz	1,00	6,0	Y
Test 3	110%Un 253V	51,50Hz	1,00	Registered Capacity	-
Measured 90min avg	253V	51,50Hz	1,00	6,0	Y
Test 4	110%Un 253V	52,00Hz	1,00	Registered Capacity	-
Measured 15min avg	253V	52,00Hz	1,00	6,0	Y
Test 5	100%Un 230V	50,00Hz	1,00	Registered Capacity	-
Measured 90min avg	230V	50,00Hz	1,00	6,0	Y

Test 6	Start frequency	Change	End frequency	Confirm no trip
Positive frequency drift	49,5Hz	+1,0Hz/sec	50,0Hz	No trip
Negative frequency drift	50,5Hz	-1,0Hz/sec	50,0Hz	No trip

Test 1 - Frequency, Voltage, active power over time diagram



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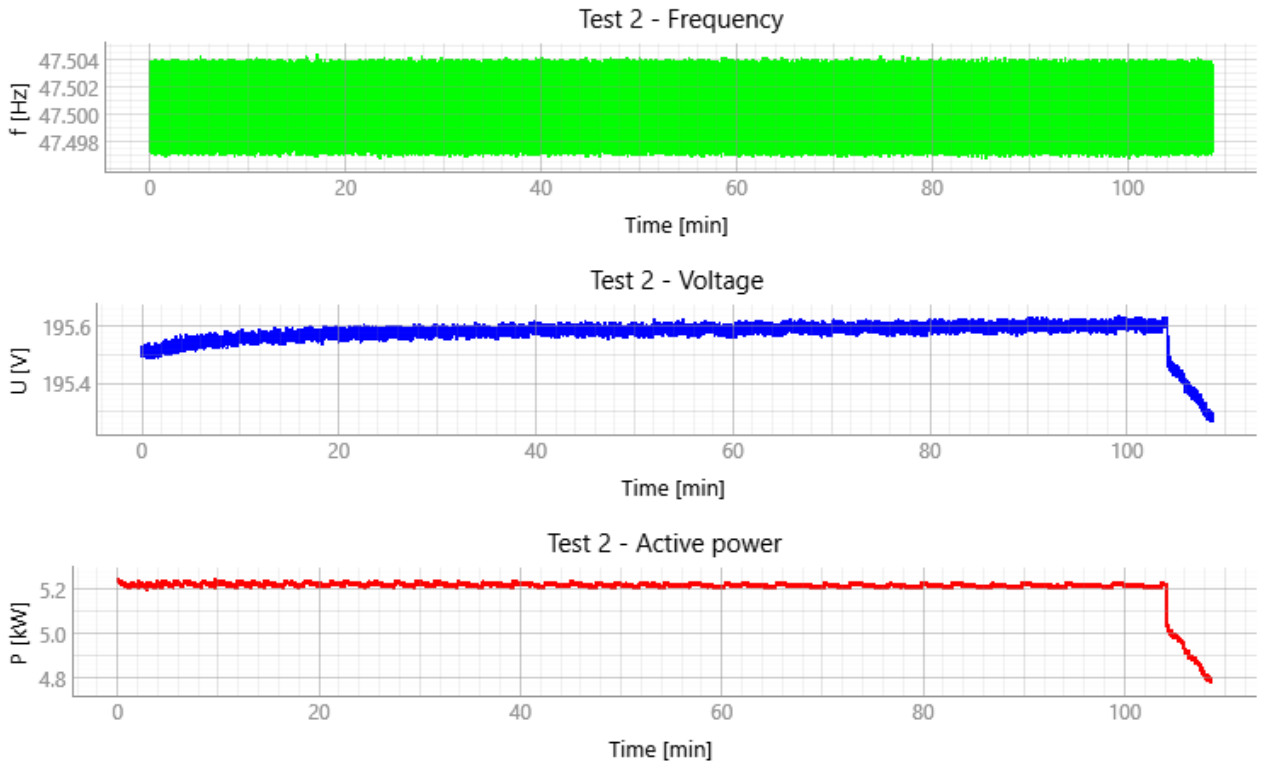
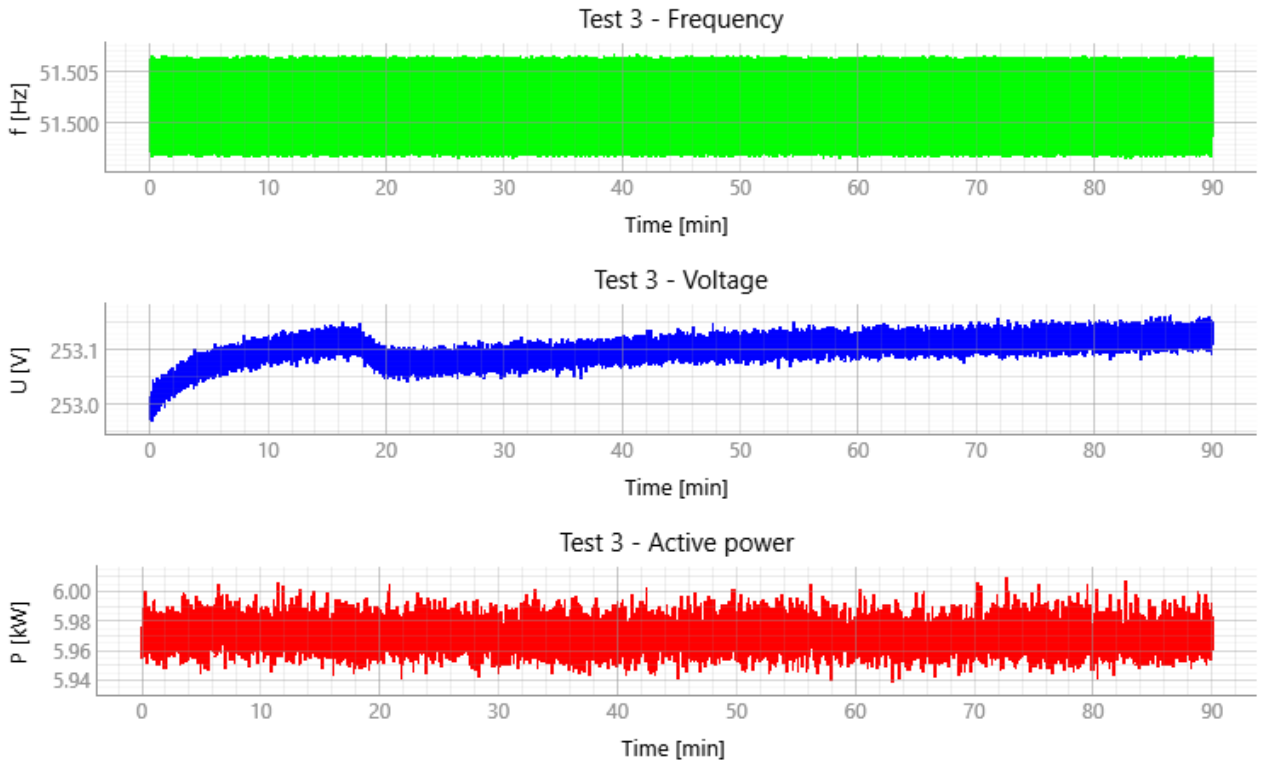
Test 2 - Frequency, Voltage, active power over time diagram



Test 3 - Frequency, Voltage, active power over time diagram



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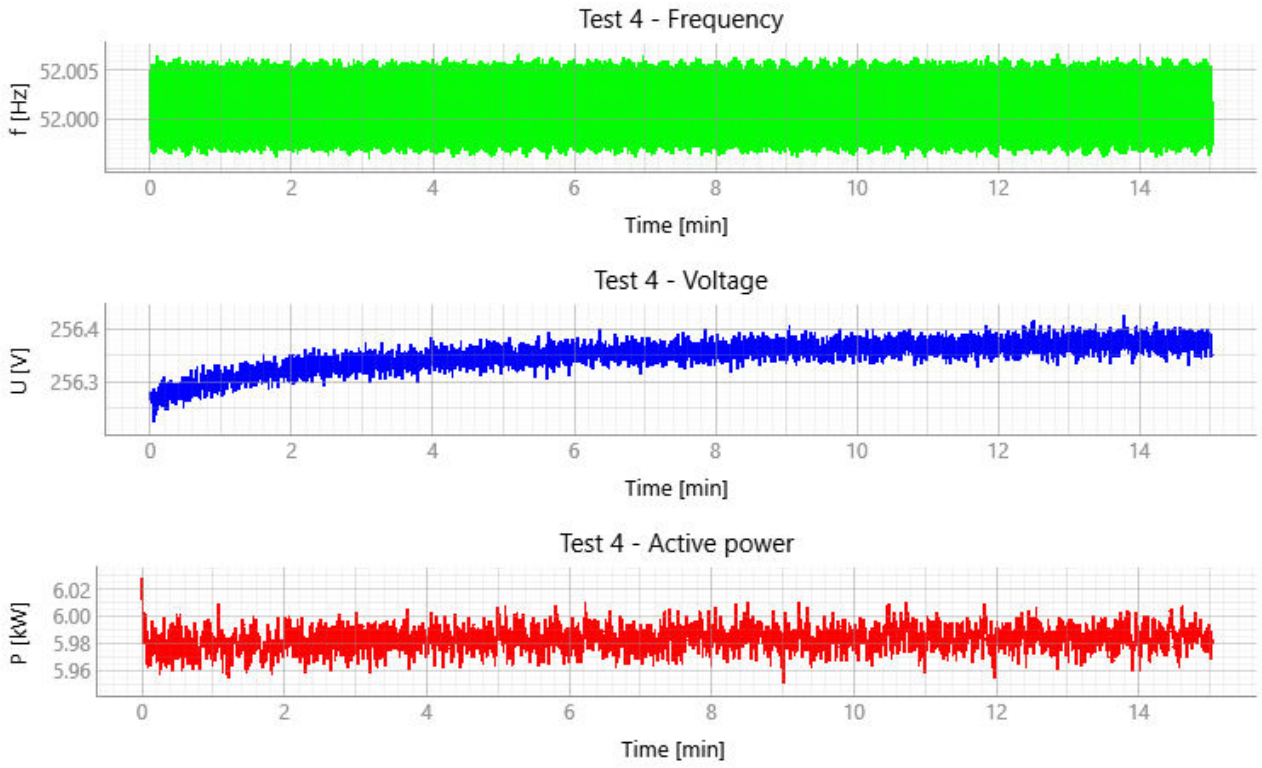
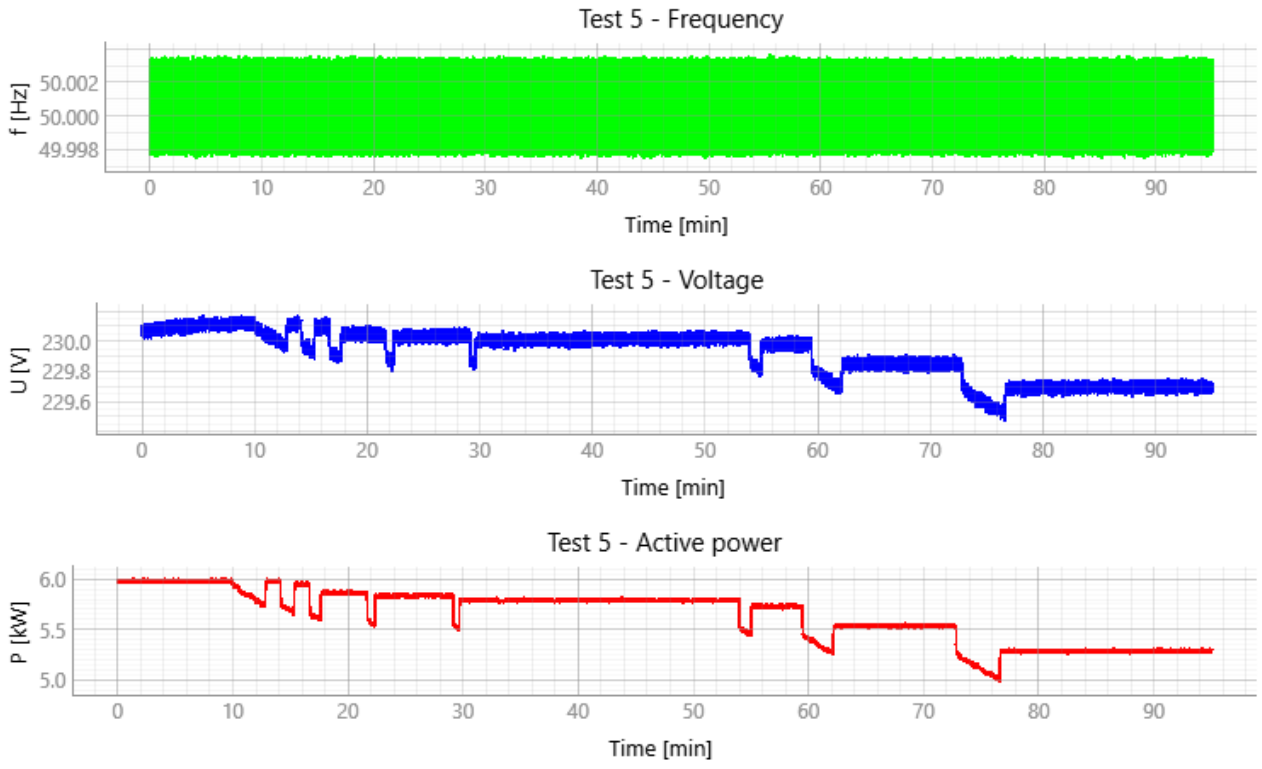
Test 4 - Frequency, Voltage, active power over time diagram



Test 5 - Frequency, Voltage, active power over time diagram



Note:
The overfrequency derating function and the interface protection has been deactivated for this test

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Power Quality – Harmonics								
MultiPlus-II 48/3000/35-32 230V								
Generating Unit tested to BS EN 61000-3-12								
Generating Unit rating per phase (rpp)				2,47		kVA	Harmonics % =Measured Value (Amps) x 23/rating per phase (kVA)	
Harmonic	At 45-55% of rated output						Limit in BS EN 61000-3-12	
	Measured Value (A)			Measured Value (%)			1 phase	3 phase
	L1	L2	L3	L1	L2	L3		
2	0,067	-	-	0,628	-	-	8%	8%
3	0,076	-	-	0,707	-	-	21,6%	Not stated
4	0,058	-	-	0,538	-	-	4%	4%
5	0,154	-	-	1,435	-	-	10,7%	10,7%
6	0,039	-	-	0,359	-	-	2,67%	2,67%
7	0,112	-	-	1,046	-	-	7,2%	7,2%
8	0,024	-	-	0,219	-	-	2%	2%
9	0,063	-	-	0,588	-	-	3,8%	Not stated
10	0,014	-	-	0,130	-	-	1,6%	1,6%
11	0,054	-	-	0,498	-	-	3,1%	3,1%
12	0,009	-	-	0,080	-	-	1,33%	1,33%
13	0,036	-	-	0,339	-	-	2%	2%
THD	-	-	-	2,408	-	-	23%	13%
PWHD	-	-	-	3,735	-	-	23%	22%
Harmonic	At 100% of Registered Capacity						Limit in BS EN 61000-3-12	
	Measured Value (A)			Measured Value (%)			1 phase	3 phase
	L1	L2	L3	L1	L2	L3		
2	0,044	-	-	0,409	-	-	8%	8%
3	0,077	-	-	0,717	-	-	21,6%	Not stated
4	0,040	-	-	0,369	-	-	4%	4%
5	0,083	-	-	0,777	-	-	10,7%	10,7%
6	0,027	-	-	0,249	-	-	2,67%	2,67%
7	0,054	-	-	0,498	-	-	7,2%	7,2%
8	0,016	-	-	0,149	-	-	2%	2%
9	0,043	-	-	0,399	-	-	3,8%	Not stated
10	0,010	-	-	0,090	-	-	1,6%	1,6%
11	0,026	-	-	0,239	-	-	3,1%	3,1%
12	0,005	-	-	0,050	-	-	1,33%	1,33%
13	0,014	-	-	0,130	-	-	2%	2%
THD	-	-	-	1,459	-	-	23%	13%
PWHD	-	-	-	1,744	-	-	23%	22%

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Power Quality – Harmonics								
MultiPlus-II 48/5000/70-50 230V								
Generating Unit tested to BS EN 61000-3-12								
Generating Unit rating per phase (rpp)				4,4		kVA	Harmonics % =Measured Value (Amps) x 23/rating per phase (kVA)	
Harmonic	At 45-55% of rated output						Limit in BS EN 61000-3-12	
	Measured Value (A)			Measured Value (%)			1 phase	3 phase
	L1	L2	L3	L1	L2	L3		
2	0,053	-	-	0,277	-	-	8%	8%
3	0,600	-	-	3,136	-	-	21,6%	Not stated
4	0,055	-	-	0,288	-	-	4%	4%
5	0,256	-	-	1,338	-	-	10,7%	10,7%
6	0,038	-	-	0,199	-	-	2,67%	2,67%
7	0,193	-	-	1,009	-	-	7,2%	7,2%
8	0,029	-	-	0,152	-	-	2%	2%
9	0,143	-	-	0,748	-	-	3,8%	Not stated
10	0,021	-	-	0,110	-	-	1,6%	1,6%
11	0,052	-	-	0,272	-	-	3,1%	3,1%
12	0,015	-	-	0,078	-	-	1,33%	1,33%
13	0,027	-	-	0,141	-	-	2%	2%
THD	-	-	-	3,694	-	-	23%	13%
PWHD	-	-	-	1,636	-	-	23%	22%
Harmonic	At 100% of Registered Capacity						Limit in BS EN 61000-3-12	
	Measured Value (A)			Measured Value (%)			1 phase	3 phase
	L1	L2	L3	L1	L2	L3		
2	0,048	-	-	0,251	-	-	8%	8%
3	0,304	-	-	1,589	-	-	21,6%	Not stated
4	0,040	-	-	0,209	-	-	4%	4%
5	0,285	-	-	1,490	-	-	10,7%	10,7%
6	0,032	-	-	0,167	-	-	2,67%	2,67%
7	0,130	-	-	0,680	-	-	7,2%	7,2%
8	0,023	-	-	0,120	-	-	2%	2%
9	0,090	-	-	0,470	-	-	3,8%	Not stated
10	0,017	-	-	0,089	-	-	1,6%	1,6%
11	0,069	-	-	0,361	-	-	3,1%	3,1%
12	0,011	-	-	0,058	-	-	1,33%	1,33%
13	0,053	-	-	0,277	-	-	2%	2%
THD	-	-	-	2,423	-	-	23%	13%
PWHD	-	-	-	1,275	-	-	23%	22%

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Power Quality – Harmonics								
MultiPlus-II 48/6k5/100-50 230V GX								
Generating Unit tested to BS EN 61000-3-12								
Generating Unit rating per phase (rpp)				6,0		kVA	Harmonics % =Measured Value (Amps) x 23/rating per phase (kVA)	
Harmonic	At 45-55% of rated output						Limit in BS EN 61000-3-12	
	Measured Value (A)			Measured Value (%)			1 phase	3 phase
	L1	L2	L3	L1	L2	L3		
2	0,073	-	-	0,565	-	-	8%	8%
3	0,534	-	-	4,147	-	-	21,6%	Not stated
4	0,045	-	-	0,346	-	-	4%	4%
5	0,247	-	-	1,920	-	-	10,7%	10,7%
6	0,089	-	-	0,688	-	-	2,67%	2,67%
7	0,176	-	-	1,369	-	-	7,2%	7,2%
8	0,110	-	-	0,856	-	-	2%	2%
9	0,163	-	-	1,264	-	-	3,8%	Not stated
10	0,152	-	-	1,182	-	-	1,6%	1,6%
11	0,084	-	-	0,650	-	-	3,1%	3,1%
12	0,076	-	-	0,589	-	-	1,33%	1,33%
13	0,053	-	-	0,410	-	-	2%	2%
THD	-	-	-	2,412	-	-	23%	13%
PWHD	-	-	-	3,726	-	-	23%	22%
Harmonic	At 100% of Registered Capacity						Limit in BS EN 61000-3-12	
	Measured Value (A)			Measured Value (%)			1 phase	3 phase
	L1	L2	L3	L1	L2	L3		
2	0,089	-	-	0,349	-	-	8%	8%
3	0,229	-	-	0,899	-	-	21,6%	Not stated
4	0,062	-	-	0,242	-	-	4%	4%
5	0,412	-	-	1,613	-	-	10,7%	10,7%
6	0,125	-	-	0,488	-	-	2,67%	2,67%
7	0,202	-	-	0,793	-	-	7,2%	7,2%
8	0,153	-	-	0,599	-	-	2%	2%
9	0,161	-	-	0,632	-	-	3,8%	Not stated
10	0,188	-	-	0,735	-	-	1,6%	1,6%
11	0,123	-	-	0,481	-	-	3,1%	3,1%
12	0,094	-	-	0,369	-	-	1,33%	1,33%
13	0,106	-	-	0,414	-	-	2%	2%
THD	-	-	-	1,420	-	-	23%	13%
PWHD	-	-	-	1,738	-	-	23%	22%

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Power Quality – Voltage Fluctuations and Flicker			
Test start date	2019-08-01	Test End date	2019-08-01
Test Location	Kiwa Primara GmbH, Gewerbestraße 28-32, 87600 Kaufbeuren, Germany		

MultiPlus-II 48/3000/35-32 230V

	Starting			Stopping			Running	
	dmax	dc	d(t)	dmax	dc	d(t)	Pst	Plt 2 hours
Measured Values	0,313	0,313	0ms	0,388	0,274	0ms	0,021	0,021
Normalised to standard impedance	0,313	0,313	0ms	0,388	0,274	0ms	0,021	0,021
Normalised to required maximum impedance	-	-	-	-	-	-	-	-
Limit set under BS EN 61000-3-11	4%	3,3%	500ms (>3,3%)*	4%	3,3%	500ms (>3,3%)*	1,0	0,65

*500ms is the maximum allowed time above 3,3%.

Test Impedance	R	0,4	Ω	X	0,25	Ω
Standard Impedance	R	0,4	Ω	X	0,25	Ω
Maximum Impedance	R	-	Ω	X	-	Ω

Power Quality – Voltage Fluctuations and Flicker			
Test start date	2019-08-01	Test End date	2019-08-01
Test Location	Kiwa Primara GmbH, Gewerbestraße 28-32, 87600 Kaufbeuren, Germany		

MultiPlus-II 48/5000/70-50 230V

	Starting			Stopping			Running	
	dmax	dc	d(t)	dmax	dc	d(t)	Pst	Plt 2 hours
Measured Values	3,344	3,344	150,0ms	-3,469	-3,377	0,0ms	0,027	0,027
Normalised to standard impedance	3,344	3,344	150,0ms	-3,469	-3,377	0,0ms	0,027	0,027
Normalised to required maximum impedance	3,268	3,268	0,0ms	-3,390	-3,300	0,0ms	0,026	0,026
Limit set under BS EN 61000-3-11	4%	3,3%	500ms (>3,3%)*	4%	3,3%	500ms (>3,3%)*	1,0	0,65

*500ms is the maximum allowed time above 3,3%.

Test Impedance	R	0,4	Ω	X	0,25	Ω
Standard Impedance	R	0,4	Ω	X	0,25	Ω
Maximum Impedance	R	0,39	Ω	X	0,24	Ω

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Power Quality – Voltage Fluctuations and Flicker			
Test start date	2025-10-07	Test End date	2025-10-07
Test Location	Kiwa Primara GmbH, Gewerbestraße 28-32, 87600 Kaufbeuren, Germany		

MultiPlus-II 48/6k5/100-50 230V GX

	Starting			Stopping			Running	
	dmax	dc	d(t)	dmax	dc	d(t)	Pst	Plt 2 hours
Measured Values	0,50	0,50	0,50	0,50	0,50	0,50	0,025	0,025
Normalised to standard impedance	0,52	0,52	0,52	0,52	0,52	0,52	0,03	0,03
Normalised to required maximum impedance	-	-	-	-	-	-	-	-
Limit set under BS EN 61000-3-11	4%	3,3%	3ms	4%	3,3%	3ms	1,0	0,65

Test Impedance	R	0,4	Ω	X	0,25	Ω
Standard Impedance	R	0,4	Ω	X	0,25	Ω
Maximum Impedance	R	-	Ω	X	-	Ω

Power Quality – DC injection			
MultiPlus-II 48/3000/35-32 230V			
Test power level	10%	55%	100%
Recorded DC value in Amps	-0,021	-0,001	-0,015
As % of rated AC current	-0,20%	-0,01%	-0,14%
Limit	0,25%	0,25%	0,25%
Power Quality – DC injection			
MultiPlus-II 48/5000/70-50 230V			
Test power level	10%	55%	100%
Recorded DC value in Amps	-0,001	0,001	0,005
As % of rated AC current	-0,01%	0,00%	0,03%
Limit	0,25%	0,25%	0,25%
Power Quality – DC injection			
MultiPlus-II 48/6k5/100-50 230V GX			
Test power level	10%	55%	100%
Recorded DC value in Amps	-0,001	-0,012	-0,014
As % of rated AC current	-0,01%	-0,05%	-0,06%
Limit	0,25%	0,25%	0,25%

Power Factor			
MultiPlus-II 48/3000/35-32 230V			
Voltage	0,94 pu (216.2 V)	1,0 pu (230 V)	1,1 pu (253 V)
Measured Value	1,000	1,000	1,000
Power Factor Limit	>0,95		
Power Factor			
MultiPlus-II 48/6k5/100-50 230V GX			
Voltage	0,94 pu (216.2 V)	1,0 pu (230 V)	1,1 pu (253 V)
Measured Value	1,000	1,000	1,000
Power Factor Limit	>0,95		

Protection – Frequency Tests						
MultiPlus-II 48/3000/35-32 230V						
Function	Setting		Trip test		No trip test	
	Frequency	Time delay	Frequency	Time delay	Frequency time	Confirm no trip
U/F	48,0 Hz	0,5 s	47,99Hz	0,59s	48,2 Hz 25,0s	No trip
					47,8 Hz 0,45 s	No trip
O/F	52,0 Hz	1,0 s	52,00Hz	1,03s	51,8 Hz 120 s	No trip
					52,2Hz 0,98s	No trip

Protection – Frequency Tests						
MultiPlus-II 48/6k5/100-50 230V GX						
Function	Setting		Trip test		No trip test	
	Frequency	Time delay	Frequency	Time delay	Frequency time	Confirm no trip
U/F	48,0 Hz	0,5 s	48,00Hz	0,57s	48,2 Hz 25,0s	No trip
					47,8 Hz 0,45 s	No trip
O/F	52,0 Hz	1,0 s	52,00Hz	1,06s	51,8 Hz 120 s	No trip
					52,2Hz 0,45s	No trip

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Protection – Voltage Tests						
MultiPlus-II 48/3000/35-32 230V						
Function	Setting		Trip test		No trip test	
	Voltage	Time delay	Voltage	Time delay	Voltage time	Confirm no trip
U/V stage 1	195,5V	3,0s	194,1V	3,04s	199,5 V 5 s	No trip
U/V stage 2*	138,0V	2,0s	-	-	142 V 2,5 s	-
					134V 1,98 s	-
O/V	253,0V	0,5s	252,2V	0,58s	249,0 V 5,0 s	No trip
					257,0 V 0,45 s	No trip
Note: *With voltage <80%Un and >115%Un the inverter goes into the VRT/UPS mode and disconnects immediatly.						

Protection – Voltage Tests						
MultiPlus-II 48/6k5/100-50 230V GX						
Function	Setting		Trip test		No trip test	
	Voltage	Time delay	Voltage	Time delay	Voltage time	Confirm no trip
U/V stage 1	195,5V	3,0s	194,0V	3,02s	199,5 V 5 s	No trip
U/V stage 2	138,0V	2,0s	-	-	142,0 V 2,5 s	-
					134V 1,98 s	-
O/V	253,0V)	0,5s	253,4V	0,58s	249,0 V 5,0 s	No trip
					257,0 V 0,45 s	No trip

Protection – Loss of Mains Test according BS EN 62116 for Inverters.						
Test Power and imbalance	33% -5% Q	66% -5% Q	100% -5% P	33% +5% Q	66% +5% Q	100% -5% P
Trip time (s)	0.199	0.209	0.263	0.151	0.166	0.150

Protection – Frequency change, Vector Shift Stability test.			
	Start frequnecy	Change	Confirm no trip
Positive vector shift	49,5Hz	+50 dregrees	No Trip
Negative vector shift	50,5Hz	- 50 dregrees	No Trip

Protection – Frequency Change, RoCoF Stability Test			
Ramp range	Test frequency ramp	Test duration	Confirm no Trip
49,0 Hz to 51,0 Hz	+0,95 Hzs^{-1}	2,1 s	No trip
51,0 Hz to 49,0 Hz	-0,95 Hzs^{-1}	2,1 s	No trip

Protection – Limited Frequency Sensitive Mode – Over frequency Test				
MultiPlus-II 48/3000/35-32 230V				
Active Power response to rising frequency/time plots are attached				N
Test sequence at **registered capacity** >80%	Measured **Active Power** output [kW]	Frequency [Hz]	Primary power source (if applicable	**Active Power** Gradient
Step a) 50,00Hz ± 0,01Hz	2,42	50,00	—	—
Step b) 50,25Hz ± 0,05Hz	2,35	50,25		—
Step c) 50,70Hz ± 0,10Hz	1,81	50,70		—
Step d) 51,15Hz ± 0,05Hz	1,27	51,15		—
Step e) 51,70Hz ± 0,10Hz	1,81	50,70		—
Step f) 50,25Hz ± 0,05Hz	2,35	50,25		—
Step g) 50,00Hz ± 0,01Hz	2,42	50,00		≤10,0%P_n/min
Test sequence at **registered capacity** 40% - 60%	Measured **Active Power** output [kW]	Frequency [Hz]	Primary power source (if applicable	**Active Power** Gradient
Step a) 50,00Hz ± 0,01Hz	1,22	50,00	—	—
Step b) 50,25Hz ± 0,05Hz	1,19	50,25		—
Step c) 50,70Hz ± 0,10Hz	0,91	50,70		—
Step d) 51,15Hz ± 0,05Hz	0,65	51,15		—
Step e) 50,70Hz ± 0,01Hz	0,91	50,70		—
Step f) 50,25 Hz ± 0,05Hz	1,19	50,25		—
Step g) 50,00 Hz ± 0,01Hz	1,22	50,00		≤10,0%P_n/min

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Protection – Limited Frequency Sensitive Mode – Over frequency Test				
MultiPlus-II 48/6k5/100-50 230V GX				
Active Power response to rising frequency/time plots are attached				N
Test sequence at **registered capacity** >80%	Measured **Active Power** output [kW]	Frequency [Hz]	Primary power source (if applicable	**Active Power** Gradient
Step a) 50,00Hz ± 0,01Hz	5,16	50,00	—	—
Step b) 50,25Hz ± 0,05Hz	5,02	50,25		—
Step c) 50,70Hz ± 0,10Hz	3,87	50,70		—
Step d) 51,15Hz ± 0,05Hz	2,71	51,15		—
Step e) 51,70Hz ± 0,10Hz	3,87	50,70		—
Step f) 50,25Hz ± 0,05Hz	5,02	50,25		—
Step g) 50,00Hz ± 0,01Hz	5,17	50,00		≤10,0%P_n/min
Test sequence at **registered capacity** 40% - 60%	Measured **Active Power** output [kW]	Frequency [Hz]	Primary power source (if applicable	**Active Power** Gradient
Step a) 50,00Hz ± 0,01Hz	2,98	50,00	—	—
Step b) 50,25Hz ± 0,05Hz	2,88	50,25		—
Step c) 50,70Hz ± 0,10Hz	2,22	50,70		—
Step d) 51,15Hz ± 0,05Hz	1,55	51,15		—
Step e) 50,70Hz ± 0,01Hz	2,22	50,70		—
Step f) 50,25 Hz ± 0,05Hz	2,88	50,25		—
Step g) 50,00 Hz ± 0,01Hz	2,98	50,00		≤10,0%P_n/min

Protection – Reconnection Timer					
MultiPlus-II 48/3000/35-32 230V					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
60s	62s	At 257,0 V	At 191,5 V	At 47,9 Hz	At 52,1 Hz
Confirmation that the **Power Generating Module** does not re-connect.		No reconnection	No reconnection	No reconnection	No reconnection

Protection – Reconnection Timer					
MultiPlus-II 48/6k5/100-50 230V GX					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
60s	Max. 63s Min. 61s	At 257,0 V	At 191,5 V	At 47,9 Hz	At 52,1 Hz
Confirmation that the **Power Generating Module** does not re-connect.		No reconnection	No reconnection	No reconnection	No reconnection

Fault Level Contribution		
MultiPlus-II 48/3000/35-32 230V		
For Inverter Output		
Time after fault	Volts	Amps
20ms	85,1	19,27
100ms	0,0	0,0
250ms	0,0	0,0
500ms	0,0	0,0
Time to trip	0,03	In seconds
As SSEGs (small-scale embedded generators) for PV are inverter-connected the max. short circuit current is the max. AC current.		

Fault Level Contribution		
MultiPlus-II 48/6k5/100-50 230V GX		
For Inverter Output		
Time after fault	Volts	Amps
20ms	198,3	0,8
100ms	96,2	0,5
250ms	96,5	0,5
500ms	96,5	0,5
Time to trip	0,0002	In seconds
As SSEGs (small-scale embedded generators) for PV are inverter-connected the max. short circuit current is the max. AC current.		

Certificate
20-182-03

Annex to certificate

Self-Monitoring Sold state switching	
It has been verified that in the event of the solid state switching device failing to disconnect the Power Park Module, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.	NA*
*there are no solid state switching devices in the unit, mechanical relays are provided	

Wiring functional Tests	
Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning)	NA

Logic interface (input port)	
Confirm that an input port is provided and can be used to shut down the module.	YES
Provide high level description of logic interface, e.g. details in 11.1.3.1 such as AC or DC signal (the additional comments box below can be used)	YES
**When the switch is closed the Micro-generator can operate normally. When the switch is opened the Micro-generator will reduce its Active Power to zero within 5 s. The signal from the Micro-generator that is being switched is DC (maximum value 5V).*	

Additional Comments
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