



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

**Product:** **Battery Inverter**

|                                   |                                                                                                                                                                  |                                                                                |                                                                               |                                                                                 |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Model:</b>                     | MultiPlus-II<br>48/3000/35-32 230V<br>MultiPlus-II<br>48/3000/35-32 230V<br>GX<br>MultiPlus-II<br>24/3000/70-32 230V<br>MultiPlus-II<br>24/3000/70-32 230V<br>GX | MultiPlus-II<br>48/5000/70-50 230V<br>MultiPlus-II<br>48/5000/70-50 230V<br>GX | MultiPlus-II<br>48/4k5/55-32 230V,<br>MultiPlus-II<br>48/4k5/55-32 230V<br>GX | MultiPlus-II<br>48/6k5/100-50 230V,<br>MultiPlus-II<br>48/6k5/100-50 230V<br>GX |
| <b>Rating:</b>                    |                                                                                                                                                                  |                                                                                |                                                                               |                                                                                 |
| Output power<br>(Feed in On-Grid) | 2,5kVA / 2,47kW                                                                                                                                                  | 4,5kVA / 4,4kW                                                                 | 4,0 kVA / 4,0kW                                                               | 6,0 kVA / 6,0kW                                                                 |
| Output power<br>(Off-Grid)        | 3,0kVA / 2,4kW                                                                                                                                                   | 5,0kVA / 4,0kW                                                                 | 4,0kVA / 4,0kW                                                                | 6,0kVA / 6,0kW                                                                  |
| <b>Firmware<br/>Version:</b>      | see page 2                                                                                                                                                       |                                                                                |                                                                               |                                                                                 |

**Intended use:**

Photovoltaic inverter in accordance with EN 50549-1:2019 with single-phase parallel coupling to the distribution network. 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:

**EN 50549-1:2019**

**Requirements for generating plants to be connected in parallel with distribution networks Part 1:**  
Connection to a LV distribution network - Generating plants up to and including Type B

Tested according to:

**EN 50549-10:2022**

**Requirements for generating plants to be connected in parallel with distribution networks Part 10:**  
Tests for conformity assessment of generating units

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.

**Limitation:**

The tested models have a limitation concerning VRT cases. This special condition is that if the inverter detects voltages of  $<80\%U_n$  and above  $>115\%U_n$  the inverter immediately switches to a "VRT/UPS" mode. This mode consists in the inverter stops injecting current into the grid (at the AC-IN port) but continues to inject current to the loads connected to the AC-OUT ports 1 and/or 2.

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**Certificate No:** 24-105-01

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| Model type(s)                                                       | Software version |
|---------------------------------------------------------------------|------------------|
| MultiPlus-II 48/3000/35-32 230V                                     | 2629497          |
| MultiPlus-II 48/3000/35-32 230V GX                                  | 2699508          |
| MultiPlus-II 48/5000/70-50 230V                                     | 2623556          |
| MultiPlus-II 48/5000/70-50 230V GX                                  | 2623508          |
| MultiPlus-II 24/3000/70-32 230V, MultiPlus-II 24/3000/70-32 230V GX | 2611508          |
| MultiPlus-II 48/4k5/55-32 230V, MultiPlus-II 48/4k5/55-32 230V GX   | 2601558          |
| MultiPlus-II 48/6k5/100-50 230V, MultiPlus-II 48/6k5/100-50 230V GX | 2602558          |

| Parameter table                                                       |                                                                                                                                                            |                                       |                    |               |                   |                                                                                                                                                      |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------|---------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clause(s) / subclause(s) of EN 50549-1:2019                           | Parameter                                                                                                                                                  | Parameter name in the generating unit | Configurable range | Default value | Minimum step size | Considered value range / Remarks                                                                                                                     |
| 4.3.2 Interface switch                                                | Single fault tolerance for interface switch required                                                                                                       | N/A                                   | -                  | -             | -                 | Automatic disconnection with single fault tolerance is provided.                                                                                     |
| 4.4.2 Operating frequency range                                       | 47,0 – 47,5 Hz Duration                                                                                                                                    | N/A                                   | -                  | -             | -                 | Device can operate in under- and over-frequency for an unlimited time. This is ambient temperature dependent                                         |
|                                                                       | 47,5 – 48,5 Hz Duration                                                                                                                                    | N/A                                   | -                  | -             | -                 |                                                                                                                                                      |
|                                                                       | 48,5 – 49,0 Hz Duration                                                                                                                                    | N/A                                   | -                  | -             | -                 |                                                                                                                                                      |
|                                                                       | 49,0 – 51,0 Hz Duration                                                                                                                                    | N/A                                   | -                  | -             | -                 |                                                                                                                                                      |
|                                                                       | 51,0 – 51,5 Hz Duration                                                                                                                                    | N/A                                   | -                  | -             | -                 |                                                                                                                                                      |
|                                                                       | 51, 5 – 52 Hz Duration                                                                                                                                     | N/A                                   | -                  | -             | -                 |                                                                                                                                                      |
| 4.4.3 Minimal requirement for active power delivery at underfrequency | Reduction threshold                                                                                                                                        | N/A                                   | -                  | -             | -                 | Power reduction due to low frequency is lower than the most stringent allowable reduction. The long-term reduction is ambient temperature dependent. |
|                                                                       | Maximum reduction rate                                                                                                                                     | N/A                                   | -                  | -             | -                 |                                                                                                                                                      |
| 4.4.4 Continuous operating voltage range                              | Upper limit                                                                                                                                                | N/A                                   | not configurable   | 110% Un       | -                 | -                                                                                                                                                    |
|                                                                       | Lower limit                                                                                                                                                | N/A                                   | not configurable   | 85% Un        | -                 | -                                                                                                                                                    |
| 4.5.2 Rate of change of frequency (ROCOF) immunity                    | ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology: synchronous generating technology: | N/A                                   | not defined        | -             | -                 | Expected to be better than 2Hz/s                                                                                                                     |



| Parameter table                                                     |                               |                                       |                    |               |          |                   |
|---------------------------------------------------------------------|-------------------------------|---------------------------------------|--------------------|---------------|----------|-------------------|
| Clause(s) / subclause(s) of EN 50549-1:2019                         | Parameter                     | Parameter name in the generating unit | Configurable range | Default value |          | Minimum step size |
| 4.5.3.2 Generating plant with non-synchronous generating technology | Maximum power resumption time | N/A                                   | -                  | -             | -        | -                 |
|                                                                     | Voltage-Time-Diagram          | N/A                                   | -                  | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
| 4.5.3.3 Generating plant with synchronous generating technology     | Maximum power resumption time | N/A                                   | -                  | -             | -        | -                 |
|                                                                     | Voltage-Time-Diagram          | N/A                                   | -                  | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
|                                                                     |                               | N/A                                   |                    | -             | -        | -                 |
| 4.5.4 Over-voltage ride through (OVRT)                              | Voltage-Time-Diagram          | N/A                                   | Not configurable   | Time [s]      | U [p.u.] | -                 |
|                                                                     |                               | N/A                                   |                    | 0,0           | 1,25     | -                 |
|                                                                     |                               | N/A                                   |                    | 0,1           | 1,25     | -                 |
|                                                                     |                               | N/A                                   |                    | 0,1           | 1,20     | -                 |
|                                                                     |                               | N/A                                   |                    | 5,0           | 1,20     | -                 |
|                                                                     |                               | N/A                                   |                    | 5,0           | 1,15     | -                 |
|                                                                     |                               | N/A                                   |                    | 60            | 1,15     | -                 |
|                                                                     |                               | N/A                                   |                    | 60            | 1,10     | -                 |



| Parameter table                             |                                    |                                       |                                             |                                                                                                                      |                    |                                                  |
|---------------------------------------------|------------------------------------|---------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------------------|
| Clause(s) / subclause(s) of EN 50549-1:2019 | Parameter                          | Parameter name in the generating unit | Configurable range                          | Default value                                                                                                        | Minimum step size  | Considered value range / Remarks                 |
| 4.6.1 Power response to overfrequency       | Threshold frequency f1             | Start freq f>                         | 50...55Hz                                   | 50,2Hz                                                                                                               | 0,025Hz            |                                                  |
|                                             | Droop                              | Droop f>                              | 1...12,5%                                   | 5 %                                                                                                                  | 0,05%              |                                                  |
|                                             | Power reference                    | N/A                                   | P <sub>max</sub>                            | P <sub>max</sub> , for synchronous Generating technology and EESS PM for other non-synchronous Generating technology | -                  |                                                  |
|                                             | Intentional delay                  | Start delay f>                        | 0...3,1s                                    | 0s                                                                                                                   | 0,1s               |                                                  |
|                                             | Deactivation threshold fstop       | Stop freq f>                          | 50,0 Hz – f1                                | Equal to start freq                                                                                                  | 0,025Hz            |                                                  |
|                                             | Deactivation time tstop            | Stop delay f>                         | 0 – 600 s                                   | 30s                                                                                                                  | 0,5s               |                                                  |
|                                             | Acceptance of staged disconnection | -                                     | yes   no                                    | yes                                                                                                                  |                    |                                                  |
| 4.6.2 Power response to underfrequency      | Threshold frequency f1             | Start freq f<                         | 50...46Hz                                   | 49,8Hz                                                                                                               | 0,025Hz            |                                                  |
|                                             | Droop                              | Droop f<                              | 1...12,5%                                   | 5%                                                                                                                   | 0,05%              |                                                  |
|                                             | Power reference                    | N/A                                   | P <sub>max</sub>                            | P <sub>max</sub>                                                                                                     | -                  |                                                  |
|                                             | Intentional delay                  | Start delay f<                        | 0...3,1s                                    | 0s                                                                                                                   | 0,1s               |                                                  |
| 4.7.2.2 Capabilities                        | Active factor range overexcited    | N/A                                   | -                                           | -                                                                                                                    | -                  | Capabilities are equal or „better“ than required |
|                                             | Active factor range underexcited   | N/A                                   | -                                           | -                                                                                                                    | -                  | Capabilities are equal or „better“ than required |
| 4.7.2.3 Control modes                       | Enabled control mode               | Reactive power regulation             | Q setp.<br>Q(U)<br>cos φ setp.<br>cos φ (P) | Cos Phi =1<br>fixed Q = 0                                                                                            | -                  |                                                  |
| 4.7.2.3.2 Setpoint control modes            | Q setpoint and excitation          | Use a fixed Q                         | 0...60%S <sub>r</sub>                       | 0                                                                                                                    | 0,1%S <sub>r</sub> |                                                  |
|                                             | cos φ setpoint and excitation      | Use a fixed CosPhi                    | 1...0,8                                     | 1                                                                                                                    | 0,01               |                                                  |



| Parameter table                                                           |                                   |                                       |                    |                  |                   |                                  |
|---------------------------------------------------------------------------|-----------------------------------|---------------------------------------|--------------------|------------------|-------------------|----------------------------------|
| Clause(s) / subclause(s) of EN 50549-1:2019                               | Parameter                         | Parameter name in the generating unit | Configurable range | Default value    | Minimum step size | Considered value range / Remarks |
| 4.7.2.3.3 Voltage related control modes                                   | Characteristic curve              | Q as function of input voltage        | -                  | -                | -                 |                                  |
|                                                                           | Time constant                     | Filter time reactive power            | 1...60s            | 3.3s             | 0,1s              |                                  |
|                                                                           | Min cos $\phi$                    | Min. Cos phi                          | 0,0 – 1            | 0                | 0,01              |                                  |
|                                                                           | Lock in power                     | P Lock-in                             | 0...100%           | Deactivated (0%) | 0,5%              |                                  |
|                                                                           | Lock out power                    | P Lock-out                            | 0...100%           | Deactivated (0%) | 0,5%              |                                  |
| 4.7.2.3.4 Power related control mode                                      | Characteristic curve              |                                       | -                  | -                |                   |                                  |
| 4.7.4.2.2 Zero current mode for converter connected generating technology | Enabling                          | N/A                                   | -                  | -                | -                 | UVRT not available               |
|                                                                           | Static voltage range overvoltage  | N/A                                   | -                  | -                | -                 |                                  |
|                                                                           | Static voltage range undervoltage | N/A                                   | -                  | -                | -                 |                                  |



| Parameter table                                        |                                                                 |                                        |                             |                    |                     |                                  |
|--------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------|-----------------------------|--------------------|---------------------|----------------------------------|
| Clause(s) / subclause(s) of EN 50549-1:2019            | Parameter                                                       | Parameter name in the generating unit  | Configurable range          | Default value      | Minimum step size   | Considered value range / Remarks |
| 4.9.2 Requirements on voltage and frequency protection | Threshold for protection as dedicated device [ in A or kW, kVA] | N/A                                    | -                           | -                  | -                   | -                                |
|                                                        | Undervoltage threshold stage 1                                  | U<                                     | 78...100%U <sub>n</sub>     | 85%U <sub>n</sub>  | 0,25%U <sub>n</sub> |                                  |
|                                                        | Undervoltage operate time stage 1                               | Trip delay U<                          | 0...200s                    | 0,5s               | 0,05s               |                                  |
|                                                        | Undervoltage threshold stage 2                                  | U<                                     | 77,75...100 %U <sub>n</sub> | 80%U <sub>n</sub>  | 0,25%U <sub>n</sub> |                                  |
|                                                        | Undervoltage operate time stage 2                               | Trip delay U<                          | 0...6,5s                    | 0,2s               | 0,05s               |                                  |
|                                                        | Overvoltage threshold stage 1                                   | U>                                     | 100...125%U <sub>n</sub>    | 115%U <sub>n</sub> | 0,25%U <sub>n</sub> |                                  |
|                                                        | Overvoltage operate time stage 1                                | Trip delay U>                          | 0...200s                    | 0,5s               | 0,05s               |                                  |
|                                                        | Overvoltage threshold stage 2                                   | U>                                     | 100...130%U <sub>n</sub>    | 120%U <sub>n</sub> | 0,25%U <sub>n</sub> |                                  |
|                                                        | Overvoltage operate time stage 2                                | Trip delay U>                          | 0...6,5s                    | 0,2s               | 0,05s               |                                  |
|                                                        | Overvoltage threshold 10 min mean protection                    | Over voltage U> (10 min. running mean) | 100...125%U <sub>n</sub>    | 110%U <sub>n</sub> | 0,25%U <sub>n</sub> |                                  |
|                                                        | Underfrequency threshold stage 1                                | f<                                     | 45,10...50,0 0Hz            | 47,50 Hz           | 0,025Hz             |                                  |
|                                                        | Underfrequency operate time stage 1                             | Trip delay f<                          | 0...200s                    | 30s                | 0,05s               |                                  |
|                                                        | Underfrequency threshold stage 2                                | f<                                     | 45,10...50,0 0Hz            | 47,00Hz            | 0,025Hz             |                                  |
|                                                        | Underfrequency operate time stage 2                             | Trip delay f<                          | 0...6,5s                    | 0,2s               | 0,05s               |                                  |
|                                                        | Overfrequency threshold stage 1                                 | f>                                     | 50,00...54,9 0Hz            | 52,70Hz            | 0,025Hz             |                                  |
|                                                        | Overfrequency operate time stage 1                              | Trip delay f>                          | 0...200s                    | 30s                | 0,05s               |                                  |
|                                                        | Overfrequency threshold stage 2                                 | f>                                     | 50,00...55,0 0Hz            | 53,00Hz            | 0,025Hz             |                                  |
|                                                        | Overfrequency operate time stage 2                              | Trip delay f>                          | 0...6,5s                    | 0,2s               | 0,05s               |                                  |



| Parameter table                               |                                         |                                       |                          |                        |                     |                                  |
|-----------------------------------------------|-----------------------------------------|---------------------------------------|--------------------------|------------------------|---------------------|----------------------------------|
| Clause(s) / subclause(s) of EN 50549-1:2019   | Parameter                               | Parameter name in the generating unit | Configurable range       | Default value          | Minimum step size   | Considered value range / Remarks |
| 4.10.2 Automatic reconnection after tripping  | Lower frequency                         | Low frequency                         | 45,00...50,00Hz          | 49,5 Hz                | 0,025Hz             |                                  |
|                                               | Upper frequency                         | High frequency                        | 50,00...55,00Hz          | 50,2 Hz                | 0,025Hz             |                                  |
|                                               | Lower voltage                           | Low voltage                           | 78...100%U <sub>n</sub>  | 85%U <sub>n</sub>      | 0,25%U <sub>n</sub> |                                  |
|                                               | Upper voltage                           | High voltage                          | 100...130%U <sub>n</sub> | 110%U <sub>n</sub>     | 0,25%U <sub>n</sub> |                                  |
|                                               | Observation time                        | Waiting time                          | 15...1200s               | 60s                    | 1s                  |                                  |
|                                               | Active power increase gradient          | Power rate. 100%per xx s              | 0...1200s                | 100% / 600s (=10%/min) | 0,5s                |                                  |
| 4.10.3 Starting to generate electrical power  | Lower frequency                         | Low frequency                         | 45,00...50,00Hz          | 49,5 Hz                | 0,025Hz             |                                  |
|                                               | Upper frequency                         | High frequency                        | 50,00...55,00Hz          | 50,1 Hz                | 0,025Hz             |                                  |
|                                               | Lower voltage                           | Low voltage                           | 78...100%U <sub>n</sub>  | 85%U <sub>n</sub>      | 0,25%U <sub>n</sub> |                                  |
|                                               | Upper voltage                           | High voltage                          | 100...130%U <sub>n</sub> | 110%U <sub>n</sub>     | 0,25%U <sub>n</sub> |                                  |
|                                               | Observation time                        | Waiting time                          | 15...1200s               | 60s                    | 1s                  |                                  |
|                                               | Active power increase gradient          | Power rate. 100%per xx s              | 0...1200s                | 100% / 0 (disabled)    | 0,5s                |                                  |
| 4.11.1 Ceasing active power                   | Remote operation of the logic interface | Use Aux 1 as disable FeedIn signal    | yes   no                 | Yes                    | -                   |                                  |
| 4.11.2 Reduction of active power on set point | Remote operation                        | N/A                                   | -                        | -                      | -                   | -                                |
| 4.12 Remote information exchange              | Remote information exchange required    | N/A                                   | -                        | -                      | -                   | -                                |