



# Certificate of Compliance

**Certificate:** 2708530

**Master Contract:** 203213

**Project:** 70107362

**Date Issued:** 2016-12-20

**Issued to:** Fronius International GmbH  
 Guenter Fronius Strasse 1  
 Wels-Thalheim, 4600  
 AUSTRIA

*The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.*



**Issued by:** *Thian (Peter) Lim*  
 Thian (Peter) Lim

**PRODUCTS**

CLASS – 5311 09 - POWER SUPPLIES-Distributed Generation Power Systems Equipment  
 CLASS – 5311 89 - POWER SUPPLIES - Distributed Generation-Power Systems Equipment - Certified to U.S. Standards

Utility Interactive Inverter, Models Fronius Galvo 1.5-1 208-240, Fronius Galvo 2.0-1 208-240, Fronius Galvo 2.5-1 208-240 and Fronius Galvo 3.1-1 208-240, permanently connected, system ratings as follows:

PART A: Models Fronius Galvo 1.5-1 208-240 & Fronius Galvo 2.0-1 208-240

| Model                                   | Fronius Galvo 1.5-1 208-240 |         |         | Fronius Galvo 2.0-1 208-240 |         |         |
|---|-----------------------------|---------|---------|-----------------------------|---------|---------|
| <b><u>INPUT RATINGS:</u></b>            |                             |         |         |                             |         |         |
| Maximum input voltage                   | 420                         |         |         | 420                         |         |         |
| Range of input operating voltage (V dc) | 120-335                     | 120-335 | 120-335 | 120-335                     | 120-335 | 120-335 |
| Maximum input current (A dc)            | 13.4                        | 13.4    | 13.4    | 17.0                        | 17.9    | 17.9    |



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| Model  | Fronius Galvo 1.5-1 208-240 |                 |                 | Fronius Galvo 2.0-1 208-240 |                 |                 |
|--|-----------------------------|-----------------|-----------------|-----------------------------|-----------------|-----------------|
| Maximum input short circuit current (A)  | 20.1                        |                 |                 | 26.8                        |                 |                 |
| Maximum input source backfeed current to input source (A)                          | 8.9                         |                 |                 | 11.9                        |                 |                 |
| <b>OUTPUT RATINGS:</b>   |                             |                 |                 |                             |                 |                 |
|  | 208                         | 220             | 240             | 208                         | 220             | 240             |
| Output power factor rating   | 1                           | 1               |                 | 1                           | 1               | 1               |
| Adjustable PF  | +/- 0.85                    | +/- 0.85        | +/- 0.85        | +/- 0.85                    | +/- 0.85        | +/- 0.85        |
| Operating voltage range (V ac)   | 183-229 L-L                 | 194-242 L-L     | 211-264 L-L     | 183-229 L-L                 | 194-242 L-L     | 211-264 L-L     |
| Operating frequency range or single frequency (Hz)                                 | 59.3 - 60.5                 | 59.3 - 60.5     | 59.3 - 60.5     | 59.3 - 60.5                 | 59.3 - 60.5     | 59.3 - 60.5     |
| Number of phases   | 1                           | 1               | 1               | 1                           | 1               | 1               |
| Nominal output voltage (V ac)  | 208 L-L                     | 220 L-L         | 240 L-L         | 208 L-L                     | 220 L-L         | 240 L-L         |
| Normal output frequency  | 60                          | 60              | 60              | 60                          | 60              | 60              |
| Maximum continuous output current (A ac)   | 8.2                         | 7.7             | 7.1             | 9.1                         | 9.1             | 9.1             |
| <b>Output power temperature derating and maximum full power operating ambient:</b> |                             |                 |                 |                             |                 |                 |
| Maximum continuous output power (W ac) (@40°C at nom V dc)                         | 1500 W/ 1500 VA             | 1500 W/ 1500 VA | 1500 W/ 1500 VA | 1900 W/ 1900 VA             | 2000 W/ 2000 VA | 2000 W/ 2000 VA |
| Maximum continuous output power (W ac) (@45°C at nom V dc)                         | 1500 W/ 1500 VA             | 1500 W/ 1500 VA | 1500 W/ 1500 VA | 1900 W/ 1900 VA             | 2000 W/ 2000 VA | 2000 W/ 2000 VA |
| Maximum continuous output power (W ac) (@50°C at nom V dc)                         | 1500 W/ 1500 VA             | 1500 W/ 1500 VA | 1500 W/ 1500 VA | 1900 W/ 1900 VA             | 2000 W/ 2000 VA | 2000 W/ 2000 VA |
| Maximum output fault current (A ac) pk   | 248A                        | 320A            | 232A            | 248A                        | 320A            | 232A            |
| Maximum output fault current (A ac) rms @ 50mS                                     | 14.4A                       | 17.6A           | 12.7A           | 14.4A                       | 17.6A           | 12.7A           |
| Duration (Sec)   | 1.2mS                       | 1.1mS           | 3.6mS           | 1.2mS                       | 1.1mS           | 3.6mS           |
| Maximum output overcurrent protection  | 20A                         | 20A             | 20A             | 20A                         | 20A             | 20A             |

| Utility interconnection voltage and frequency trip limits and trip times |                     |                   |
|--|---------------------|-------------------|
| Trip limit and trip time accuracy  | Voltage:            | +/- 1.0 % Nominal |
|  | Frequency:          | +/- 0.05 Hz       |
|  | Trip Time Accuracy: | +/- 0.016 Sec     |
| Normal operation temperature range                                       |                     | -40°C - +50°C     |
| Storage Temperature Range  |                     | -40°C - +70°C     |
| Enclosure Rating Type  |                     | 4X                |



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**PART B:** Fronius Galvo 2.5-1 208-240 & Fronius Galvo 3.1-1 208-240

| Model  | Fronius Galvo 2.5-1 208-240 |                    |                    | Fronius Galvo 3.1-1 208-240 |                    |                    |
|--|-----------------------------|--------------------|--------------------|-----------------------------|--------------------|--------------------|
| <b>INPUT RATINGS:</b>  |                             |                    |                    |                             |                    |                    |
| Maximum input voltage  | 550                         |                    |                    | 550                         |                    |                    |
| Range of input operating voltage (V dc)  | 165-440                     | 165-440            | 165-440            | 165-440                     | 165-440            | 165-440            |
| Maximum input current (A dc)   | 16.1A                       | 16.1A              | 16.1A              | 18.7A                       | 20A                | 20A                |
| Maximum input short circuit current (A)  | 24.1                        |                    |                    | 30.1                        |                    |                    |
| Maximum input source backfeed current to input source (A)                          | 10.7                        |                    |                    | 13.4                        |                    |                    |
| <b>OUTPUT RATINGS:</b>   |                             |                    |                    |                             |                    |                    |
|  | 208                         | 220                | 240                | 208                         | 220                | 240                |
| Output power factor rating   | 1                           | 1                  |                    | 1                           | 1                  | 1                  |
| Adjustable PF  | +/- 0.85                    | +/- 0.85           | +/- 0.85           | +/- 0.85                    | +/- 0.85           | +/- 0.85           |
| Operating voltage range (V ac)   | 183-229<br>L-L              | 194-242<br>L-L     | 211-264<br>L-L     | 183-229<br>L-L              | 194-242<br>L-L     | 211-264<br>L-L     |
| Operating frequency range or single frequency (Hz)                                 | 59.3 - 60.5                 | 59.3 - 60.5        | 59.3 - 60.5        | 59.3 - 60.5                 | 59.3 - 60.5        | 59.3 - 60.5        |
| Number of phases   | 1                           | 1                  | 1                  | 1                           | 1                  | 1                  |
| Nominal output voltage (V ac)  | 208 L-L                     | 220 L-L            | 240 L-L            | 208 L-L                     | 220 L-L            | 240 L-L            |
| Normal output frequency  | 60                          | 60                 | 60                 | 60                          | 60                 | 60                 |
| Maximum continuous output current (A ac)   | 13.7                        | 12.9               | 11.8               | 14.1                        | 14.1               | 14.1               |
| <b>Output power temperature derating and maximum full power operating ambient:</b> |                             |                    |                    |                             |                    |                    |
| Maximum continuous output power (W ac) (@40°C at nom V dc)                         | 2500 W/<br>2500 VA          | 2500 W/<br>2500 VA | 2500 W/<br>2500 VA | 2930 W/<br>2930 VA          | 3100 W/<br>3100 VA | 3100 W/<br>3100 VA |
| Maximum continuous output power (W ac) (@45°C at nom V dc)                         | 2500 W/<br>2500 VA          | 2500 W/<br>2500 VA | 2500 W/<br>2500 VA | 2930 W/<br>2930 VA          | 3100 W/<br>3100 VA | 3100 W/<br>3100 VA |
| Maximum continuous output power (W ac) (@50°C at nom V dc)                         | 2500 W/<br>2500 VA          | 2500 W/<br>2500 VA | 2500 W/<br>2500 VA | 2600 W/<br>2600 VA          | 2650 W/<br>2650 VA | 2750 W/<br>2750 VA |
| Maximum output fault current (A ac) pk   | 456A                        | 440A               | 488A               | 456A                        | 440A               | 488A               |
| Maximum output fault current (A ac) rms  | 26.8A                       | 20.9A              | 28.0A              | 26.8A                       | 20.9A              | 28.0A              |
| Duration (Sec)   | 1.9mS                       | 1.5mS              | 1.4mS              | 1.9mS                       | 1.5mS              | 1.4mS              |
| Maximum output overcurrent protection  | 20A                         | 20A                | 20A                | 20A                         | 20A                | 20A                |
| Utility interconnection voltage and frequency trip limits and trip times           |                             |                    |                    |                             |                    |                    |



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|                                    |                             |                             |
|------------------------------------|-----------------------------|-----------------------------|
| Model                              | Fronius Galvo 2.5-1 208-240 | Fronius Galvo 3.1-1 208-240 |
| Trip limit and trip time accuracy  | Voltage:                    | +/- 1.0 % Nominal           |
|                                    | Frequency:                  | +/- 0.05 Hz                 |
|                                    | Trip Time Accuracy:         | +/- 0.016 Sec               |
| Normal operation temperature range | -40°C - +50°C               |                             |
| Storage Temperature Range          | -40°C - +70°C               |                             |
| Enclosure Rating Type              | 4X                          |                             |

Notes:

- Utility Interconnection Default Voltage and Frequency Trip Limits and Trip Times:

Voltage and frequency limits for utility Interaction

| Condition | Simulated utility source   |  | Maximum time (sec) at 60 Hz before cessation of current to the simulated utility |
|-----------|--|--|--|
|           | Voltage (V)  | Frequency (Hz)   |  |
| A         | < 0.50 V <sub>nor</sub><br>Adjustable<br>(104V to 0.95% V <sub>nor</sub> )                           | Rated  | 0.16 (Default)<br>@ HI1: 0.5 (Default)<br>Adjustable (0.016s to 4.25s)           |
| B         | 0.50 V <sub>nor</sub> ≤ V < 0.88 V <sub>nor</sub><br>Adjustable<br>(104V to 0.95% V <sub>nor</sub> ) | Rated  | 2 (Default)<br>@ HI1: 21.0 (Default)<br>Adjustable (0.016s to 21s)               |
| C         | 1.10 V <sub>nor</sub> < V < 1.20 V <sub>nor</sub><br>Adjustable<br>(105% V <sub>nor</sub> to 288V)   | Rated  | 1 (Default)<br>Adjustable (0.016s to 21s)  |
| D         | 1.20 V <sub>nor</sub> ≤ V<br>Adjustable<br>(105% V <sub>nor</sub> to 288V)                           | Rated  | 0.16 (Default)<br>Adjustable (0.016s to 4.25s)                                   |
| E         | Rated  | f > 60.5 (Default)<br>@ HI1: > 63.0 (Default)<br>Adjustable (45.0 to 65.0) | 0.16 (Default)<br>@ HI1: 21.0 (Default)<br>Adjustable (0.016s to 600s)           |
| F         | Rated  | f < 59.3<br>@ HI1: < 57.0 (Default)<br>Adjustable (45.0 to 65.0)           | 0.16 (Default)<br>@ HI1: 21.0 (Default)<br>Adjustable (0.016s to 600s)           |
| G         | Rated  | f < 57.0<br>@ HI1: < 56.0 (Default)<br>Adjustable (45.0 to 65.0)           | 0.16 (Default)<br>Adjustable (0.016s to 600s)                                    |
| H         | Rated  | f > 62.0<br>@ HI1: > 64.0 (Default)<br>Adjustable (45.0 to 65.0)           | 0.16 (Default)<br>Adjustable (0.016s to 600s)                                    |
| I         | Reconnect Time 300s (Default)<br>Adjustable (5s to 900s)   |  |  |



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2. Utility interactive evaluations were conducted with the following firmware:

| Device     | Device Manufacturer/Type                  | Software Version (release date)  | Device Checksum   |
|------------|---|--|---|
| RECERBO    | ST Microelectronics / STM32F437IIIH6 (U2) | 0.2.3.0 (26/02/2014)<br>0.2.14.0 (06/08/2014)<br>0.2.20.0 (04/12/2014)<br>0.3.11.10 (26/08/2016) | 4774F5AFD29B5BFF92F601A<br>61CD1C2BFC27526E3<br>(26/02/2014)<br>D88F56E6CC – 3477D51716 –<br>E87415E0E8 – 4683CA8626<br>(06/08/2014)<br>FFB688D1F3–A9E70320F9–<br>9ED48AA03C–347DDE8F5C<br>(04/12/2014)<br>2D01EA09E3–2D84EC84B6–<br>30DFD04F56–<br>7079E83D63 (26/08/2016) |
| GALVOPSUS  | ST Microelectronics / STM32F103VCT6 (U12) | 0.1.2.15 (07/03/2014)<br>0.1.3.4 (06/08/2014)<br>0.1.3.7 (18/12/2014)<br>0.1.3.12 (16/11/2016)   | 0xE8D96C4B (07/03/2014)<br>0x2E6C7333 (27/08/2014)<br>0x18B0C370 (18/12/2014)<br>0xa63750b9 (16/11/2016)  |
| GALVOFILUS | ST Microelectronics / STM32F415VGT6 (U24) | 0.0.1.2 (07/03/2014)   | 0x42414E80 (07/03/2014)   |

3. All models meet the surge requirements of IEEE C62.41.2-2002, Location Category B (6kV). Tests were performed using ring wave and combination waveforms, both polarities, for common mode and differential mode coupling, 20 pulses each test. After surge testing the units were operational with control functionally verified by frequency and voltage disconnect tests.
4. The above models are permanently connected utility-interactive inverters intended for operation with Photovoltaic supplies only.
5. The above inverter models are provided with integral PV DC ARC-Fault Circuit Protection for series arcing faults (type 1).



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**APPLICABLE REQUIREMENTS**

|                                 |   |   |
|---------------------------------|---|---|
| CSA-C22.2 No.107.1-16           | - | General Use Power Supplies  |
| *UL Std No. 1741-Second Edition | - | Inverters, Converters, Controllers and Interconnection System Equipment For Use With Distributed Energy Sources (Rev. March 23, 2016) |
| UL 1699B                        |   | Outline of Investigation for Photovoltaic (PV) DC Arc-Fault Circuit Protection (Issue Number 2, January 14, 2013)                     |
| CSA TIL M-07                    |   | Interim Certification Requirements for Photovoltaic (PV) DC Arc-Fault Protection (Issue Number 1, March 11, 2013)                     |

\*Note: Conformity to UL 1741-Second Edition (Rev. March 23, 2016) includes compliance with applicable requirements of IEEE 1547 and IEEE 1547.1



## *Supplement to Certificate of Compliance*

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*The products listed, including the latest revision described below,  
are eligible to be marked in accordance with the referenced Certificate.*

### **Product Certification History**

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| <b>Project</b> | <b>Date</b> | <b>Description</b>  |
|----------------|-------------|---|
| 70107362       | 2016-12-20  | Update report 2708530 (Ed 3 – Project 70023253) – Fronius Galvo Series to include firmware revision, alternative components and acceptance of test data under the CSA SMTC program. |
| 70023253       | 2015-02-17  | Update report 2708530 (Fronius Galvo Series) to include firmware revisions  |
| 2759899        | 2014-10-16  | Update to report 2708530 to include alternate components and firmware versions.   |
| 2708530        | 2014-04-02  | Utility Interactive Inverter, Models Fronius Galvo 1.5-1 208-240, Fronius Galvo 2.0-1 208-240, Fronius Galvo 2.5-1 208-240 and Fronius Galvo 3.1-1 208-240. (C/US)                  |