



## Reslab Summary Test Report for Compliance to AS4777

### Report of Tests Performed For:

Fronius International GmbH  
A 4600 Wels – Thalheim  
Gunter Fronius Strasse 1

### TEST ITEM DESCRIPTION

Type: Fronius IG40  
Serial no: 152 111 59/40  
Art no: 4,200,004  
Indoor Large with display  
SETUP AUS  
Screw Terminal

Software Version: Not Provided  
Nominal Operating Voltage: 230 V<sub>AC</sub>  
Nominal Operating Frequency: 50 Hz  
Nominal Output Power Rating: 3500 W  
Single Phase

### Abstract

This summary test report provides the compliance results for the Fronius IG40 as tested at Reslab between 29/9/2004 to 14/10/2004 for Fronius International GmbH for compliance to AS4777. The full test results are reported in the ResLab REP-RL18-T-0001 rev 0.doc. The testing described in this report was done according to the Reslab Test Procedures based on AS4777 (Grid connection of energy systems via inverters).

### -Confidential Not for Publication or Distribution-

**Test Date:** 29/9/2004 to 14/10/2004

**Authorised by:** Hari Sharma, ResLab

Authorise Signature:

*H. Sharma*  
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**Checked By:** Oscar Arteaga, ResLab

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| 0               | 28/10/2004 | Draft Document   |

## 1 INTRODUCTION

This summary test report provides the compliance results for the 3500 W single phase Fronius IG40 as tested at Reslab between 29/9/2004 to 14/10/2004 for Fronius International GmbH to AS4777. The full test results are reported in the ResLab REP-RL18-T-0001 rev 0.doc. The testing described in this report was done according to the Reslab Test Procedures based on AS4777 (Grid connection of energy systems via inverters).

The details of the Equipment Under Test (EUT) are as follows:

|                             |   |
|-----------------------------|---|
| Serial. Number              | 152 111 59/40   |
| Model Number                | FRONIUS IG 40   |
| Year of Production          | 2004  |
| Nominal Operating Voltage   | 230 V <sub>rms</sub>  |
| Nominal Operating Frequency | 50 Hz   |
| Nominal AC Output Power     | 3500 W  |
| Hardware – Version          | Type: Fronius IG40<br>Serial no: 152 111 59/40<br>Art no: 4,200,005<br>Indoor Large with display<br>SETUP AUS<br>Screw Terminal |
| Software – Version          | Not Supplied  |

**Table 1: Details of Test Inverter**



**Figure 1: Test Inverter Pictures**

## 2 SUMMARY

- The EUT complies with the requirements of AS4777.2 and AS4777.3 as per section 3.1 and 3.2 of this report.
- The EUT was not tested to clause 4.1, 4.6 and 4.11 of AS4777.2 by ResLab. The EUT should be tested for these requirements by an appropriate laboratory/authority.

### 3 COMPLIANCE TEST REPORT

#### 3.1 Compliance to AS4777.2 clause 4

The 3500 W single phase Fronius IG40 grid connected inverter was tested for compliance to AS4777.2 (2002): "Grid connection of energy systems via inverters" Part2: inverter requirements.

**Clause 4.1. General: (Not tested)**

All the tests as required by AS3100 were not performed by Reslab. The insulation resistance and earthing tests were performed by ResLab. The EUT complies with the requirements of AS3100: 2002 for insulation resistance (clause 8.3.1) and testing of earthing connection (clause 8.5) requirements. The other relevant AS3100 tests were not performed and should be performed by an appropriate laboratory.

**Clause 4.2. Compatibility with electrical installations: (Complies)**

The EUT output a.c. voltage and frequency comply with AS60038.

**Clause 4.3. Power flow direction: (Noted)**

The power flow during the test was from EUT to the grid.

**Clause 4.4. Power factor: (Complies)**

The EUT maintained a power factor in the range of 0.987 (leading) to 0.996 (lagging) over the operating range from 20% to 100% of output. It does comply with the requirements of AS4777.2.

**Clause 4.5. Harmonic currents: (Complies)**

The EUT current THD of 4.12% is less than the required limit of 5%. The individual harmonic current components up to the 33<sup>rd</sup> were within the limits and complied with the Australian Standard 4777.2, clause 4.5.

**Clause 4.6. EMC: (Not tested)**

The EUT was not tested for EMC by Reslab. The EUT must conform to the requirements of Radio-communications Act and it should be examined for the relevant requirements.

**Clause 4.7. Voltage fluctuations and flicker: (Complies)**

The flicker level is within the required limits under normal operation.

**Clause 4.8. Impulse protection: (Complies)**

The equipment operated normally after the lightning impulse test.

**Clause 4.9. Transient voltage limits: (Complies)**

During the trip tests with light electronic load, the worst-case over-voltage observed was with 50% EUT output and this was 453.2 V peak with a base duration of 0.3 msec, which is within the required envelope specified in the AS4777.2.

#### **Clause 4.10. DC current injection: (Complies)**

The EUT does not have a mains frequency transformer. As per clause 4.10 of AS4777.2, a type test for DC current injection is required. The EUT uses a high frequency transformer to isolate the DC from AC. The EUT was type tested at 100% rated output power. The average DC current value measured at 100% rated power output was 31.7mA, which is below the limit of 0.5% (i.e. 76.1mA) of rated output current.

#### **Clause 4.11. Data logging and communication devices: (Not tested)**

The data logging and communication equipment of the EUT were not tested. The data communications device must conform to the appropriate requirements of AS/NZS 60950.

### **3.2 Compliance to AS4777.3 clause 6**

The 3500 W single phase Fronius IG40 grid connected inverter was tested for compliance to AS4777.3 (2002): "Grid connection of energy systems via inverters" Part 3: Grid protection requirements.

#### **Clause 6.3. (Passive Islanding Protection)**

##### **Under/over voltage limits: (Complies)**

The EUT tripped at  $V_{\min}$  205.5 Volts and  $V_{\max}$  271.9 Volts with under and over voltage trip set points of 202 V and 268 V respectively. The ac voltages at which disconnection occurred were equal to the under/over voltage set points  $\pm 5$  V as per the requirements of AS 4777.3. The disconnection times were less than 2 seconds.

##### **Under/over frequency limits: (Complies)**

The EUT tripped at  $f_{\min}$  49.03 Hz and  $f_{\max}$  50.98 Hz with under and over frequency trip set points of 49.01 Hz and 50.99 Hz respectively. The frequencies at which disconnection occurred were equal to the under/over frequency set points  $\pm 0.1$  Hz as per the requirements of AS 4777.3. The disconnection times were less than 2 seconds.

#### **Clause 6.5. (Active Islanding Protection)**

##### **Grid trip test: (Complies)**

The EUT was tested under a range of local load conditions as required i.e. light electronic load, load match and load match plus 10%. The EUT tripped within the required time (less than 2 seconds) under all local load conditions.

#### **Clause 6.6. Reconnection procedure: (Complies)**

After the EUT was tripped on under/over voltage and under/over frequency, it reconnected after 60 seconds when voltage and frequency were returned to the nominal value.

#### **Clause 6.7. Security of protection settings: (Complies)**

The EUT protection settings are password protected.