Application Note – Inverter SPI Self-Test

Version History

- Version 1.1, October 2019 – added instructions for use with SetApp
- Version 1.0, July 2016 – first version

Introduction

Italian regulation requires that all inverters connected to the grid first perform an SPI self-test. During this self-test, the inverter checks the trip times for over voltage, under voltage, over frequency and under frequency – to ensure that the inverter disconnects when required. The inverter does this by changing the trip values; for over voltage/frequency, the value is decreased and for under voltage/frequency, the value is increased. The inverter disconnects from the grid as soon as the trip value is equal to the measured value. The trip time is recorded to verify that the inverter disconnected within the required time. After the self-test has been completed, the inverter automatically begins grid monitoring for the required GMT (grid monitoring time) and then connects to the grid.

This document describes how to run the self-test using SetApp and using the inverter display.

- To run the self-test using SetApp, see *Running the Self-Test using SetApp* on page 2.
- To run the self-test using the inverter display, see *Running the Self-Test using the Inverter Display* on page 3.

Running the Self-Test using SetApp

This section details how to perform the self-test using SetApp. Screenshots of the app screen, showing the inverter serial number and the test results, can be taken and submitted to the grid operator.

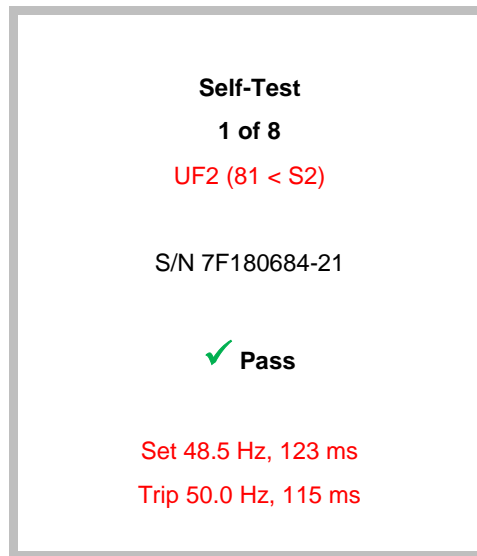To use this feature, the inverter communication board firmware (CPU) must be version 4.2.xx or higher.

→ **To perform the self-test using SetApp:**

> **NOTE**
>
> SPI self tests are normally run together. If a single test fails, you may rerun it (see "To run a single test using SetApp").

1. Ensure that the inverter country is set to one of the Italy country settings. From the Commissioning page, select **Country and Language** to view the country name. Select **Set Country & Grid** if you wish to modify the settings.

2. From the Diagnostics menu, select **Self-Test → Run All Tests**. The inverter runs a series of 8 tests, displaying the message "Self-Test X of 8" during each test in which X refers to the test number. An example appears below, in which the first test is run.

<div align="center">

Self-Test

1 of 8

UF2 (81 < S2)

S/N 7F180684-21

✔ **Pass**

Set 48.5 Hz, 123 ms

Trip 50.0 Hz, 115 ms

</div>

A result is displayed following each test, indicating one of the following outcomes:

Result	Symbol
Pass	✔
Fail	✘
Not Tested	▬

3. Tap the **OK** button that appears after the last test is completed.

4. Select **Show Test Results** to display a summary of the results of all eight tests. If a specific test has failed, you may rerun the test (see "To run a single test using SetApp").

→ **To run a single test using SetApp:**

1. From the Diagnostics menu, select **Self-Test → Run Single Test**. Select the test to be run.

2. Tap the **OK** button that appears after the last test is complete.

Running the Self-Test using the Inverter Display

This section details how to perform the self-test using the inverter display. Photos of the display, showing the inverter serial number and the test results can be taken and submitted to the grid operator.

To use this feature, the inverter communication board firmware (CPU) must be version 3.19xx or higher.

→ **To perform the self-test using the inverter display:**

> **NOTE**
> SPI self tests are normally run together. If a single test fails, you may rerun it (see "To run a single test using the inverter display").

1. Ensure that the inverter country is set to one of the Italy country settings; the country setting can be viewed in the inverter main menu:

   ```
   Country  < Italy >
   Language  < Eng >
   Communication
   Power Control
   Display
   Maintenance
   Information
   ```

2. To change the country setting, select **Country** ➔ **Italy+** ➔ select one of the options.

3. From the inverter main menu, select **Maintenance** ➔ **Diagnostics** ➔ **Self-Test** ➔ **Run All Tests**.

   ```
   Run All Tests
   Run Single Test
   Show Results
   ```

   The test results are shown sequentially for 3 seconds each.

   ```
   S/N: 7F180684-21
   OF2(81>.S2)    Pass
   SET 51.5Hz      123ms
   TRP 50.0Hz      115ms
   ```

   If all tests have passed, the following screen appears for 5 seconds.

   ```
   Self-Test Passed
   ```

4. Tests results can also be viewed by selecting **Show Results** in the Self-Test sub-menu:
   '-' = test not run; 'P'=Pass; 'F'=Fail.

   ```
   OV1(59.S1)     < - / P / F >
   OV2(59.S2)     < - / P / F >
   UV1(27.S1)     < - / P / F >
   UV2(27.S2)     < - / P / F >
   OF1(81>.S1)    < - / P / F >
   OF2(81>.S2)    < - / P / F >
   UF1(81<.S1)    < - / P / F >
   UF2(81<.S2)    < - / P / F >
   ```

If all tests have <P>, the inverter will begin grid monitoring for the required time and connect to the grid.
If one of the tests failed, the following message appears for 5 seconds.

```
S e l f - T e s t   F a i l e d

< T e s t   D e s c r i p t i o n >
```

5. If a test failed or is aborted, it can be repeated (See "To run a single test using the inverter display").

→ **To run a single test using the inverter display:**

1. In the Self-Test sub-menu, select **Run Single Test**.

```
R u n   A l l   T e s t s

R u n   S i n g l e   T e s t

S h o w   R e s u l t s
```

2. Select 1 of 8 tests to run.

```
O V 1 ( 5 9 . S 1 )      < - >

O V 2 ( 5 9 . S 2 )      < - >

U V 1 ( 2 7 . S 1 )      < - >

U V 2 ( 2 7 . S 2 )      < - >

O F 1 ( 8 1 > . S 1 )    < - >

O F 2 ( 8 1 > . S 2 )    < - >

U F 1 ( 8 1 < . S 1 )    < - >

U F 2 ( 8 1 < . S 2 )    < - >
```

3. After repeating any failed tests confirm that all tests passed by selecting **Show Results** in the Self-Test sub-menu. All tests should indicate <P> (pass).

```
O V 1 ( 5 9 . S 1 )      < P >

O V 2 ( 5 9 . S 2 )      < P >

U V 1 ( 2 7 . S 1 )      < P >

U V 2 ( 2 7 . S 2 )      < P >

O F 1 ( 8 1 > . S 1 )    < P >

O F 2 ( 8 1 > . S 2 )    < P >

U F 1 ( 8 1 < . S 1 )    < P >

U F 2 ( 8 1 < . S 2 )    < P >
```