1116

# TEST REPORT FOR THE PATTERN AND CONSTRUCTION OF ELECTRICITY METERS

| | | |
|---|---|---|
| MANUFACTURER | : | *Schneider Electric India Pvt. Ltd* |
| TYPE | : | *PM5**1* |
| CLASS | : | *0.5s (kWh) & 2(kvarh)* |
| DESCRIPTION | : | *Polyphase, Active Import/ Export (kWh), Transformer Operated, Electricity Meter* |

Tested in accordance with IEC 62052-11: 2003, Electricity metering equipment (AC) – General requirements, tests and test conditions.
Part 11: Metering equipment.

And IEC 62053-22: 2003, Electricity metering equipment (AC) – Particular requirements
Part 22: Static meters for active energy (classes 0.2s and 0.5s).

And IEC 62053-23: 2003, Electricity metering equipment (AC) – Particular requirements
Part 23: Static meters for reactive energy (classes 2 & 3).

The meters tested satisfied the required specification.

| ISSUED BY: | CHECKED BY: | VERIFIED BY: |
|---|---|---|
| K. Hunter | P. Fairless | R. Jackson |
| Test Engineer | Test Engineer | Metering Manager |

REPORT ISSUE DATE: 13th March 2014 Issue 3





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**CONTENTS**

## INTRODUCTION

The type tests described were carried out in the SGS (Durham) measurement laboratory on behalf of:

| | |
|---|---|
| CLIENT DETAILS: | Schneider Electric India Pvt. Ltd.<br>44P Electronic City<br>Phase II East<br>Hosur Road<br>Bangalore<br>Kamataka 560100<br>India |
| ORDER No's: | 1400043774, 1400050278 |

DATE OF RECEIPT OF SAMPLES: 15th August 2013, 1st November 2013, 8th January 2014

DATE OF TESTS: 14th April 2013 to 13th March 2014

In the cases where no or only limited tests have been conducted on the submitted samples, tests carried out during previous OFGEM approval (or by other accredited bodies) on meters of similar construction and designs have been taken to confirm that the meter satisfies the requirements of the relevant standard. See supporting documentation for reference.

Conditions under which the type tests took place:

Unless otherwise stated, the meters were examined at an ambient temperature of 23°C ± 2°C, and after the voltage circuits had been connected to reference voltage for at least 1 hour.

Unless otherwise stated, Polyphase tests were tested with a standard phase sequence of L1-L2-L3 (corresponding to the Red, Yellow & Blue phases ).

The tests were conducted using equipment, traceable to National and International Standards.

## INFORMATION ON THE ELECTRICITY METERS TESTED

| | | |
|---|---|---|
| Manufacturer | : | *Schneider Electric* |
| Type | : | *PM5**1* |
| Class | : | *0.5s (kWh) & 2(kvarh)* |
| Type of circuit | : | *3 phase 4 wire, 3 phase 3 wire* |
| In | : | *5A* |
| Imax | : | *6A* |
| Reference Supply Voltage | : | *3x63.5/110V-277/480V* |
| Rated Frequency | : | *50Hz* |
| Pulse output constant | : | *10000 imp/kWh/kvarh, 20000 imp/kWh/kvarh* |
| Manufacturers Serial No's. | : | *JB1310214000072, JB1310214000122, JB1310426000105, 340000002002, 340090000114, 340000002003, 340060001062, 340090000120, 340000002001, 340090000112, 34000000114 340000008115, New case sample No.1* |

The meter types submitted for testing PM5111, PM5331 and PM5341 are superset models and the test report covers below listed models.

| Meter series | Description (2nd digit meaning) | Model reference number | VAF, PQS-power & Energy, PF, DM, THD | Accuracy Class | Ind Harmonics | Alarms | Whetting Voltage | RS485 | Ethernet | Multitariff | Digital Inputs (DI) | Digital Outputs (S=Solid State Relay & R= Form A relay) | Data Logging | Remote display | MID* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM5100 | Basic power and energy meter with Class 0.5S accuracy | METSEPM5100 | ✓ | 0.5S | 15th | 33 | x | x | x | x | x | 1DO (kWh only) | x | x | x |
| | | METSEPM5110 | ✓ | 0.5S | 15th | 33 | x | ✓ | x | x | x | 1DO (kWh only) | x | x | x |
| | | METSEPM5111 | ✓ | 0.5S | 15th | 33 | x | ✓ | x | x | x | 1DO (kWh only) | x | x | ✓ |
| PM5300 | Basic power and energy meter with Class 0.5S, DI/DO, Multi Tariff, Data logging & Relays | METSEPM5310 | ✓ | 0.5S | 31st | 35 | ✓ | ✓ | x | 4 | 2 DI | 2 DO | ✓ | x | x |
| | | METSEPM5330 | ✓ | 0.5S | 31st | 35 | ✓ | ✓ | x | 4 | 2 DI | 2 DO+2R | ✓ | x | x |
| | | METSEPM5331 | ✓ | 0.5S | 31st | 35 | ✓ | ✓ | x | 4 | 2 DI | 2 DO+2R | ✓ | x | ✓ |
| | | METSEPM5320 | ✓ | 0.5S | 31st | 35 | ✓ | x | ✓ | 4 | 2 DI | 2 DO | ✓ | x | x |
| | | METSEPM5340 | ✓ | 0.5S | 31st | 35 | ✓ | x | ✓ | 4 | 2 DI | 2 DO+2R | ✓ | x | x |
| | | METSEPM5341 | ✓ | 0.5S | 31st | 35 | ✓ | x | ✓ | 4 | 2 DI | 2 DO+2R | ✓ | x | ✓ |

| | |
|---|---|
| | Tested for EN 50470-1 and EN 50470-3 |

2nd digit :

PM51xx = Basic w/ 0.5S accuracy

PM53xx = Basic w/ 0.5S accuracy + up to 31st harmonics +DI/DO + whetting + Multitariff + Datalog

3rd digit: 0 = Non com

1 = RS-485

2 = Ethernet

3 = RS485 + Relay

4 = Ethernet + Relay

4th digit: 0 = Non MID

1 = MID

## GENERAL REQUIREMENTS

**Sealing Arrangements** IEC 62052-11 X-Ref. 5.2.1

| | |
|---|---|
| The meter shall have a case which can be sealed in such a way that the internal parts of the meter are accessible only after breaking the seal(s)<br>The cover shall not be removable without the use of a tool.<br>Non permanent deformation may not influence the meter. | Complied |

**Display of Measured Values** IEC 62052-11 X-Ref. 5.10

| | |
|---|---|
| The principal unit is (kWh)<br>The active tariff shall be indicated.<br>The identification of each tariff applied shall be possible.<br>The register shall be able to record and display, starting from zero, for a minimum of 1500 h, the energy corresponding to maximum current at reference voltage and unity power factor. | Complied |
| Non-volatile memory shall have a minimum retention time of four months.<br>In the case of multiple values presented by a single display, it shall be possible to display the content of all relevant memories.<br>Automatic sequencing displays shall display each value for at least 5 s.<br>Every numerical element of an electronic display shall be able to show all numbers from "zero" to "nine": | Complied |

**Inspection of Markings** IEC 62052-11 X-Ref. 5.12

| | |
|---|---|
| The requirements are met for the marking of the meter samples with respect to both name-plates and connection diagrams. | Complied |

**SUPPORTING DOCUMENTATION**

Accredited Laboratory tests reports:

| | |
|---|---|
| Dust Ingress IP5X Test | X-Ref. 5.9 |
| MS Testing (UK) Ltd | Report No.: TL13083 Issued: 17th September 2013 |

# SUMMARY OF TEST RESULTS

## IEC 62052-11: 2003 General Requirements:

| EN 62052-11 Clause | Test | Performed | Result |
|---|---|---|---|
| 5.2.2.1 | Spring hammer | Yes | Complied |
| 5.2.2.2 | Shock | Yes | Complied |
| 5.2.2.3 | Vibration | Yes | Complied |
| 5.8 | Resistance to heat and fire | Yes | Complied |
| 5.9 | Penetration of water | Yes | Complied |
| 5.9 | Penetration of dust | Yes* | Complied |
| 6.3.1 | Dry heat | Yes | Complied |
| 6.3.2 | Cold | Yes | Complied |
| 6.3.3 | Damp heat cyclic | Yes | Complied |
| 6.3.4 | Solar radiation | No | - |
| 7.1.2 | Voltage dips and short interruptions | Yes | Complied |
| 7.2 | Influence of heating | Yes | Complied |
| 7.3.2 | Impulse voltage | Yes | Complied |
| 7.5.2 | Electrostatic discharge immunity | Yes | Complied |
| 7.5.3 | Radiated immunity | Yes | Complied |
| 7.5.4 | Fast transient bursts immunity | Yes | Complied |
| 7.5.5 | Conducted immunity | Yes | Complied |
| 7.5.6 | Surge immunity | Yes | Complied |
| 7.5.7 | Damped oscillatory waves immunity | Yes | Complied |
| 7.5.8 | Radio interference suppression | Yes | Complied |

## IEC 62053-22: 2003 Particular Requirements:

| EN 62053-22 Clause | Test | Performed | Result |
|---|---|---|---|
| 7.1 | Power consumption | Yes | Complied |
| 7.2 | Influence of short–time over-currents | Yes | Complied |
| 7.3 | Influence of self-heating | Yes | Complied |
| 7.3.3 | AC voltage | Yes | Complied |
| 8.1 | Current variation | Yes | Complied |
| 8.2 | Variation of error due to voltage variation | Yes | Complied |
| 8.2 | Variation of error due to frequency variation | Yes | Complied |
| 8.2 | Reverse Phase Sequence | Yes | Complied |
| 8.2 | Voltage Unbalance | Yes | Complied |
| 8.2 | Operation of accessories | No | - |
| 8.2 | Auxiliary voltage variation | Yes | Complied |
| 8.2 | Variation of error due to temperature variation | Yes | Complied |
| 8.2 | Variation of error due to harmonics | Yes | Complied |
| 8.2 | Sub-harmonics in the AC circuit | Yes | Complied |
| 8.2 | Continuous magnetic induction of external origin | Yes | Complied |
| 8.2 | Magnetic induction of external origin (0.5mT) | Yes | Complied |
| 8.3 | Starting and no-load condition | Yes | Complied |
| 8.4 | Meter constant | Yes | Complied |

## SUMMARY OF TEST RESULTS (cont.)

### IEC 62053-23: 2003 Particular Requirements:

| EN 62053-23 Clause | Test | Performed | Result |
|---|---|---|---|
| 7.1 | Power consumption | No | - |
| 7.2 | Influence of short–time overcurrents | No | - |
| 7.3 | Influence of self-heating | No | - |
| 7.4 | AC voltage | No | - |
| 8.1 | Current variation | Yes | Complied |
| 8.2 | Variation of error due to voltage variation | Yes | Complied |
| 8.2 | Variation of error due to frequency variation | Yes | Complied |
| 8.2 | Operation of accessories | No | - |
| 8.2 | Variation of error due to temperature variation | No | - |
| 8.2 | DC Component in the current circuit | No | - |
| 8.2 | Continuous magnetic induction of external origin | No | - |
| 8.2 | Magnetic induction of external origin (0.5mT) | No | - |
| 8.3 | Starting and no-load condition | Yes | Complied |
| 8.4 | Meter constant | Yes | Complied |

Yes Tests performed at SGS (UK) Ltd

Yes* Tests performed at MS Testing (UK) Ltd Report No.: TL13083 2013

## 1 INSULATION IEC 62052-11 X-Ref. 7

### 1.1 Impulse Voltage Test X-Ref. 7.3.2

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Impulse Voltage |
|---|---|
| Impulse /340000002002 | 19EMA TP12 |

**Environmental Conditions**

| | |
|---|---|
| Temperature | 23°C |
| Relative Humidity | 42% |
| Barometric Pressure | 998mB |

Impulse specification: Test level 6kV @ 0.5J open circuit
Time between impulse's 3s

The meter samples were placed on a flat conducting earth surface with the case wrapped in a conductive foil.
The test voltage was applied 10 times in each polarity between the points listed below:-

1) With one terminal of the voltage circuit connect to earth, the impulse voltage was applied between the common voltage/current meter terminal and earth.

2) With all meter terminals connected together, impulse voltage was applied between the meter terminals and earth.

During the tests auxiliary circuits with reference rated voltage ≤ 40V were connected to earth.

On completion of the above tests, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions, with no signs of damage or degradation in the meter's insulation properties.

## 1.2 AC Voltage Test

IEC 62053-22 X-Ref. 7.4

| Test Results ID / Sample No. | Test Procedure: IEC62052-22 AC Voltage |
|---|---|
| AC / 340000002002 | 19EMA TP13 |

**Environmental Conditions**

| | |
|---|---|
| Temperature | 23°C |
| Relative Humidity | 42% |
| Barometric Pressure | 998mB |

Test level 2kV & 4kV Test duration 1 minute.

The a.c. voltage tests were conducted as follows:

1) Between all meter voltage and current circuits connected together, and earth.

2) Between all circuits not intended to be connected together in service, and earth.

The earth consisting of a conductive foil wrapped around the meter and connected to a flat conducting earth surface, upon which the meter was placed.
During the tests auxiliary circuits with reference rated voltage ≤ 40V were connected to earth.

On completion of the above test, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions, with no signs of damage or degradation in the meter's insulation properties.

## 2 ACCURACY REQUIREMENTS IEC 62053-22 X-Ref. 8

### 2.1 Meter Constant X-Ref. 8.4

The relation between the test output and the meter energy registers were checked to ensure the constant marking on the meter nameplate.

*Measurement mode - Active Import Energy kWh*

| | |
|---|---|
| Test Results ID / Sample No.<br>Meter Constant / 340090000120 | Test Procedure: Meter Constant (1h @ Im)<br>19EMA TP37 |

Test conditions: *Un: 3x230/400V* *Imax: 6A* *Cos. $\phi$ = 1.0, 50Hz*

Test Circuit: *3 phase 4 wire*

Measurement mode: *Active Import Energy kWh*

| Number of Pulses Recorded | Pulse Constant (p/ kWh) | LED Test Output (kWh) | Energy Registered By Meter (kWh) | Percentage difference between Energy Registered and LED Test Output (%) |
|---|---|---|---|---|
| 83061 | 20000 | 4.15 | 4.15 | 0.00 |

Limit of % Error Variation: ±0. 5% for Class 0.5s (kWh)

*Measurement mode - Active Export Energy kWh*

| | |
|---|---|
| Test Results ID / Sample No.<br>Meter Constant / 340090000120 | Test Procedure: Meter Constant (1h @ Im)<br>19EMA TP37 |

Test conditions: *Un: 3x230/400V* *Imax: 6A* *Cos. $\phi$ = 1.0, 50Hz*

Test Circuit: *3 phase 4 wire*

Measurement mode: *Active Export Energy kWh*

| Number of Pulses Recorded | Pulse Constant (p/ kWh) | LED Test Output (kWh) | Energy Registered By Meter (kWh) | Percentage difference between Energy Registered and LED Test Output (%) |
|---|---|---|---|---|
| 83079 | 20000 | 4.159 | 4.154 | 0.00 |

Limit of % Error Variation: ±0. 5% for Class 0.5s (kWh)

During the registration tests, rate registers not active were found not to have been corrupted.

**Meter Constant (cont.)** IEC 62053-23 X-Ref. 8.4

*Measurement mode - Reactive Import Energy kvarh*

| Test Results ID / Sample No. | Test Procedure: Meter Constant (1h @ Im) |
|---|---|
| Meter Constant / 34009000120 | 19EMA TP37 |

Test conditions: *Un: 3x230/400V* *Imax: 6A* *Cos. $\phi$ = 1.0, 50Hz*

Test Circuit: *3 phase 4 wire*

Measurement mode: *Reactive Import Energy kvarh*

| Number of Pulses Recorded | Pulse Constant (p/ kvarh) | LED Test Output (kvarh) | Energy Registered By Meter (kvarh) | Percentage difference between Energy Registered and LED Test Output (%) |
|---|---|---|---|---|
| 83037 | 20000 | 4.15185 | 4.152 | 0.00 |

Limit of % Error Variation: ± 2% for Class 2 (kvarh)

*Measurement mode - Reactive Export Energy kvarh*

| Test Results ID / Sample No. | Test Procedure: Meter Constant (1h @ Im) |
|---|---|
| Meter Constant / 34009000120 | 19EMA TP37 |

Test conditions: *Un: 3x230/400V* *Imax: 6A* *Cos. $\phi$ = 1.0, 50Hz*

Test Circuit: *3 phase 4 wire*

Measurement mode: *Reactive Export Energy kvarh*

| Number of Pulses Recorded | Pulse Constant (p/ kvarh) | LED Test Output (kvarh) | Energy Registered By Meter (kvarh) | Percentage difference between Energy Registered and LED Test Output (%) |
|---|---|---|---|---|
| 83058 | 20000 | 4.1529 | 4.153 | 0.00 |

Limit of % Error Variation: ± 2% for Class 2 (kvarh)

During the registration tests, rate registers not active were found not to have been corrupted.

## 2.2 Starting and No-Load condition IEC 62053-22 X-Ref. 8.3

### Initial Start-up of the meter X-Ref. 8.3.1

| Test Results ID / Sample No. | Test Procedure: Start-up |
|---|---|
| Start Up / 340090000120 | |

The meter sample was fully functional within 5s after rated voltage Un was applied to the meter terminals.

### Starting X-Ref. 8.3.3

| Test Results ID / Sample No. | Test Procedure: Starting Current 0.1(% Ib) |
|---|---|
| Starting Current / 340090000120 | 19EMA TP36 |

The meter commenced and continued to measure the active power in both the import and export directions.

Test conditions for Transformer Operated meters
Class 0.2s Active meters : Umin, 0.1%In, Cos. ϕ = 1.0, 50Hz
Class 0.5s Active meters : Umin, 0.1%In, Cos. ϕ = 1.0, 50Hz

### Running with No-Load X-Ref. 8.3.2

| Test Results ID / Sample No. | Test Procedure: Non Registration Test 115(%U) |
|---|---|
| No Load / 340090000120 | 19EMA TP36 |

Tests were conducted as follows;

Test conditions: *115% Un, current circuits open*

The minimum test duration in minutes being given by

$$\Delta t \geq \frac{900 \times 10^6}{k \cdot m \cdot Un \cdot Imax} \quad \text{[min] for meters of class 0.2s}$$

$$\Delta t \geq \frac{600 \times 10^6}{k \cdot m \cdot Un \cdot Imax} \quad \text{[min] for meters of class 0.5s}$$

where

k is the meter output constant (pulses per kWh )
m is the number of measuring elements

The meter sample was tested for a period of at least Δt minutes, on completion of which, no changes in the energy registers were recorded, and the test output did not produce more than one pulse.

**Starting and No-Load condition (cont)** IEC 62053-23 X-Ref. 8.3

**Initial Start-up of the meter** X-Ref. 8.3.1

| Test Results ID / Sample No. | Test Procedure: Start-up |
|---|---|
| Start Up / 340090000120 | |

The meter sample was fully functional within 5s after rated voltage Un was applied to the meter terminals.

**Starting** X-Ref. 8.3.3

| Test Results ID / Sample No. | Test Procedure: Starting Current 0.3(% Ib) |
|---|---|
| Starting Current / 340090000120 | 19EMA TP36 |

The meter commenced and continued to measure the reactive power in both the import and export directions.

Test conditions for Transformer Operated meters
Class 2 Reactive meters : Umin, 0.3%In, Sin $\phi$ = 1.0, 50Hz
Class 3 Reactive meters : Umin, 0.5%In, Sin $\phi$ = 1.0, 50Hz

**Running with No-Load** X-Ref. 8.3.2

Tests were conducted as follows;

Test conditions: *115% Un, current circuits open*

The minimum test duration in minutes being given by

$$\Delta t \geq \frac{480 \times 10^6}{k \cdot m \cdot Un \cdot Imax} \quad \text{[min] for meters of class 2}$$

$$\Delta t \geq \frac{300 \times 10^6}{k \cdot m \cdot Un \cdot Imax} \quad \text{[min] for meters of class 3}$$

where

k is the meter output constant (pulses per kvarh )
m is the number of measuring elements

The meter sample was tested for a period of at least $\Delta t$ minutes, on completion of which, no changes in the energy registers were recorded, and the test output did not produce more than one pulse.

## 2.4 Influence of Ambient Temperature

IEC 62053-22 X-Ref. 8
X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Temperature Variation |
|---|---|
| Temperature Var. / 340090000112 | 19EMA TP31 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| Temperature /°C | Current | PF Cos. ϕ | *% Error* | *Mean Temperature coefficient %/K* |
|---|---|---|---|---|
| 33 | 0.05In | 1.0 | *0.28* | *0.01* |
| 13 | 0.05In | 1.0 | *0.08* | |
| 33 | 0.1In | 0.5ind | *0.31* | *0.0115* |
| 13 | 0.1In | 0.5ind | *0.08* | |
| 33 | In | 1.0 | *0.27* | *0.0065* |
| 13 | In | 1.0 | *0.14* | |
| 33 | In | 0.5ind | *0.48* | *0.0135* |
| 13 | In | 0.5ind | *0.21* | |
| 33 | Im | 1.0 | *0.28* | *0.0065* |
| 13 | Im | 1.0 | *0.15* | |
| 33 | Im | 0.5ind | *0.48* | *0.0135* |
| 13 | Im | 0.5ind | *0.21* | |

Limit of Mean Temperature coefficient for: Class 0.2s ±0.01%/K @ Cos. ϕ = 1.0
±0.02%/K @ Cos. ϕ = 0.5ind
Class 0.5s ±0.03%/K @ Cos. ϕ = 1.0
±0.05%/K @ Cos. ϕ = 0.5ind

**Influence of Ambient Temperature (cont.)**

**Operation of meter at the limit of the specified operating temperature range (Indoor meters)** IEC 62053-22 X-Ref. 6.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

| | | | |
|---|---|---|---|
| Temperature /°C | Current | PF Cos. ϕ | *% Error* |
| -10°C | 0.1In | 1.0 | *-0.14* |
| 45°C | 0.1In | 1.0 | *0.40* |
| -10°C | 0.2In | 0.5ind | *-0.17* |
| 45°C | 0.2In | 0.5ind | *0.48* |
| -10°C | In | 1.0 | *-0.01* |
| 45°C | In | 1.0 | *0.35* |
| -10°C | In | 0.5ind | *-0.06* |
| 45°C | In | 0.5ind | *0.66* |
| -10°C | Im | 1.0 | *0.00* |
| 45°C | Im | 1.0 | *0.36* |
| -10°C | Im | 0.5ind | *-0.06* |
| 45°C | Im | 0.5ind | *0.65* |

Limits of % Error: Class accuracy.

**Operation of meter at the Limit of temperature range (Indoor meters)** X-Ref. 6.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

| | | |
|---|---|---|
| Temperature /°C | Current | *% Error* |
| 70°C | In | *0.39* |
| -25°C | In | *-0.18* |

On completion of the above test, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions.

## 2.5 Influence Quantities IEC 62053-22 X-Ref. 8

### 2.5.1 Variation in Current X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Acc3P4W kWh +P |
|---|---|
| Current Variation / 340090000112 | 19EMA TP25 |

Test conditions: *Un: 3x230/400V* *In: 5A* *Im: 6A* *Fn: 50Hz*
*Ux: 230V*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| 0.01 In | 1.0 | *0.12* | ±0.4 | ±1.0 |
| 0.02 In | - | *-0.06* | ±0.4 | ±1.0 |
| 0.05 In | - | *0.08* | ±0.2 | ±0.5 |
| 0.1 In | - | *0.11* | ±0.2 | ±0.5 |
| 0.2 In | - | *0.13* | ±0.2 | ±0.5 |
| 0.5 In | - | *0.17* | ±0.2 | ±0.5 |
| In | - | *0.15* | ±0.2 | ±0.5 |
| 0.4 Im | - | *0.17* | ±0.2 | ±0.5 |
| 0.6 Im | - | *0.15* | ±0.2 | ±0.5 |
| 0.8 Im | - | *0.16* | ±0.2 | ±0.5 |
| Im | - | *0.16* | ±0.2 | ±0.5 |
| 0.02 In | 0.5ind | *0.08* | ±0.5 | ±1.0 |
| 0.05 In | - | *0.23* | ±0.5 | ±1.0 |
| 0.1 In | - | *0.19* | ±0.3 | ±0.6 |
| 0.2 In | - | *0.12* | ±0.3 | ±0.6 |
| 0.5 In | - | *0.24* | ±0.3 | ±0.6 |
| In | - | *0.28* | ±0.3 | ±0.6 |
| Im | - | *0.28* | ±0.3 | ±0.6 |
| 0.1 In | 0.25ind | *0.28* | ±0.5 | ±1.0 |
| 0.2 In | - | *0.11* | ±0.5 | ±1.0 |
| 0.5 In | - | *0.30* | ±0.5 | ±1.0 |
| In | - | *0.43* | ±0.5 | ±1.0 |
| 0.1 In | 0.8cap | *0.10* | ±0.3 | ±0.6 |
| 0.2 In | - | *0.14* | ±0.3 | ±0.6 |
| 0.5 In | - | *0.15* | ±0.3 | ±0.6 |
| In | - | *0.11* | ±0.3 | ±0.6 |
| 0.1 In | 0.5cap | *0.05* | ±0.5 | ±1.0 |
| 0.2 In | - | *0.13* | ±0.5 | ±1.0 |
| 0.5 In | - | *0.12* | ±0.5 | ±1.0 |
| In | - | *0.03* | ±0.5 | ±1.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *0.19* | *0.02* | *0.17* | ±0.3 | ±0.6 |
| 0.1 In | - | *0.21* | *0.04* | *0.17* | ±0.3 | ±0.6 |
| 0.2 In | - | *0.33* | *-0.03* | *0.11* | ±0.3 | ±0.6 |
| 0.5 In | - | *0.27* | *0.07* | *0.19* | ±0.3 | ±0.6 |
| In | - | *0.23* | *0.08* | *0.17* | ±0.3 | ±0.6 |
| Im | - | *0.23* | *0.10* | *0.18* | ±0.3 | ±0.6 |
| 0.1 In | 0.5ind | *0.21* | *0.13* | *0.31* | ±0.4 | ±1.0 |
| 0.2 In | - | *0.44* | *-0.11* | *0.13* | ±0.4 | ±1.0 |
| 0.5 In | - | *0.37* | *0.11* | *0.31* | ±0.4 | ±1.0 |
| In | - | *0.30* | *0.24* | *0.40* | ±0.4 | ±1.0 |
| Im | - | *0.32* | *0.18* | *0.27* | ±0.4 | ±1.0 |
| 0.2 In | 0.5cap | *0.51* | *-0.20* | *0.00* | - | - |
| In | - | *0.18* | *-0.06* | *-0.04* | - | - |
| Im | - | *0.18* | *-0.09* | *-0.04* | - | - |

**Variation in Current(cont.)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Acc 3P4W kWh -P |
|---|---|
| Current Variation / 340090000112 | 19EMA TP25 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Export Energy kWh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| 0.01 In | 1.0 | *0.16* | ±0.4 | ±1.0 |
| 0.02 In | - | *-0.03* | ±0.4 | ±1.0 |
| 0.05 In | - | *0.12* | ±0.2 | ±0.5 |
| 0.1 In | - | *0.14* | ±0.2 | ±0.5 |
| 0.2 In | - | *0.18* | ±0.2 | ±0.5 |
| 0.5 In | - | *0.20* | ±0.2 | ±0.5 |
| In | - | *0.18* | ±0.2 | ±0.5 |
| Im | - | *0.18* | ±0.2 | ±0.5 |
| 0.02 In | 0.5ind | *0.10* | ±0.5 | ±1.0 |
| 0.05 In | - | *0.26* | ±0.5 | ±1.0 |
| 0.1 In | - | *0.23* | ±0.3 | ±0.6 |
| 0.2 In | - | *0.20* | ±0.3 | ±0.6 |
| 0.5 In | - | *0.28* | ±0.3 | ±0.6 |
| In | - | *0.33* | ±0.3 | ±0.6 |
| Im | - | *0.37* | ±0.3 | ±0.6 |
| 0.1 In | 0.25ind | *0.33* | ±0.5 | ±1.0 |
| 0.2 In | - | *0.23* | ±0.5 | ±1.0 |
| 0.5 In | - | *0.38* | ±0.5 | ±1.0 |
| In | - | *0.51* | ±0.5 | ±1.0 |
| 0.1 In | 0.8cap | *0.11* | ±0.3 | ±0.6 |
| 0.2 In | - | *0.17* | ±0.3 | ±0.6 |
| 0.5 In | - | *0.17* | ±0.3 | ±0.6 |
| In | - | *0.12* | ±0.3 | ±0.6 |
| 0.1 In | 0.5cap | *0.07* | ±0.5 | ±1.0 |
| 0.2 In | - | *0.18* | ±0.5 | ±1.0 |
| 0.5 In | - | *0.14* | ±0.5 | ±1.0 |
| In | - | *0.04* | ±0.5 | ±1.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Export Energy kWh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.1 In | 1.0 | *0.19* | *0.06* | *0.17* | ±0.3 | ±0.6 |
| In | - | *0.19* | *0.17* | *0.20* | ±0.3 | ±0.6 |
| Im | - | *0.20* | *0.14* | *0.21* | ±0.3 | ±0.6 |
| 0.2 In | 0.5ind | *-0.07* | *0.30* | *0.35* | ±0.4 | ±1.0 |
| In | - | *0.27* | *0.33* | *0.48* | ±0.4 | ±1.0 |
| Im | - | *0.25* | *0.31* | *0.38* | ±0.4 | ±1.0 |
| 0.2 In | 0.5cap | *-0.01* | *0.26* | *0.23* | - | - |
| In | - | *0.09* | *-0.01* | *0.02* | - | - |
| Im | - | *0.09* | *0.01* | *0.07* | - | - |

**Variation in Current(cont)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Acc3P4W kWh +P |
|---|---|
| Current Variation / 340000008115 | 19EMA TP25 |

Test conditions: *Un: 3x230/400V* *In: 5A* *Im: 6A* *Fn: 50Hz*
*Ux: 230V*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| 0.01 In | 1.0 | *-0.23* | ±0.4 | ±1.0 |
| 0.02 In | - | *-0.20* | ±0.4 | ±1.0 |
| 0.05 In | - | *-0.06* | ±0.2 | ±0.5 |
| 0.1 In | - | *-0.09* | ±0.2 | ±0.5 |
| 0.2 In | - | *-0.10* | ±0.2 | ±0.5 |
| 0.5 In | - | *-0.09* | ±0.2 | ±0.5 |
| In | - | *-0.09* | ±0.2 | ±0.5 |
| 0.4 Im | - | *-0.10* | ±0.2 | ±0.5 |
| 0.6 Im | - | *-0.09* | ±0.2 | ±0.5 |
| 0.8 Im | - | *-0.08* | ±0.2 | ±0.5 |
| Im | - | *-0.07* | ±0.2 | ±0.5 |
| 0.02 In | 0.5ind | *-0.07* | ±0.5 | ±1.0 |
| 0.05 In | - | *0.07* | ±0.5 | ±1.0 |
| 0.1 In | - | *0.05* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.16* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.03* | ±0.3 | ±0.6 |
| In | - | *0.05* | ±0.3 | ±0.6 |
| Im | - | *0.13* | ±0.3 | ±0.6 |
| 0.1 In | 0.25ind | *0.21* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.21* | ±0.5 | ±1.0 |
| 0.5 In | - | *0.04* | ±0.5 | ±1.0 |
| In | - | *0.22* | ±0.5 | ±1.0 |
| 0.1 In | 0.8cap | *-0.13* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.07* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.11* | ±0.3 | ±0.6 |
| In | - | *-0.13* | ±0.3 | ±0.6 |
| 0.1 In | 0.5cap | *-0.21* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.04* | ±0.5 | ±1.0 |
| 0.5 In | - | *-0.14* | ±0.5 | ±1.0 |
| In | - | *-0.21* | ±0.5 | ±1.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *0.01* | *-0.14* | *-0.02* | ±0.3 | ±0.6 |
| 0.1 In | - | *0.00* | *-0.16* | *-0.07* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.08* | *-0.07* | *-0.18* | ±0.3 | ±0.6 |
| 0.5 In | - | *0.01* | *-0.14* | *-0.08* | ±0.3 | ±0.6 |
| In | - | *0.00* | *-0.13* | *-0.08* | ±0.3 | ±0.6 |
| Im | - | *0.00* | *-0.14* | *-0.06* | ±0.3 | ±0.6 |
| 0.1 In | 0.5ind | *0.11* | *0.01* | *0.15* | ±0.4 | ±1.0 |
| 0.2 In | - | *-0.14* | *0.02* | *-0.26* | ±0.4 | ±1.0 |
| 0.5 In | - | *-0.13* | *0.00* | *-0.02* | ±0.4 | ±1.0 |
| In | - | *0.06* | *0.03* | *0.10* | ±0.4 | ±1.0 |
| Im | - | *0.21* | *0.12* | *0.15* | ±0.4 | ±1.0 |
| 0.2 In | 0.5cap | *0.08* | *0.10* | *-0.30* | - | - |
| In | - | *-0.08* | *-0.28* | *-0.32* | - | - |
| Im | - | *-0.09* | *-0.39* | *-0.41* | - | - |

**Variation in Current(cont.)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Acc 3P4W kWh -P |
|---|---|
| Current Variation / 340000008115 | 19EMA TP25 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Export Energy kWh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| 0.01 In | 1.0 | *-0.21* | ±0.4 | ±1.0 |
| 0.02 In | - | *-0.18* | ±0.4 | ±1.0 |
| 0.05 In | - | *-0.04* | ±0.2 | ±0.5 |
| 0.1 In | - | *-0.07* | ±0.2 | ±0.5 |
| 0.2 In | - | *-0.11* | ±0.2 | ±0.5 |
| 0.5 In | - | *-0.08* | ±0.2 | ±0.5 |
| In | - | *-0.07* | ±0.2 | ±0.5 |
| Im | - | *-0.06* | ±0.2 | ±0.5 |
| 0.02 In | 0.5ind | *-0.04* | ±0.5 | ±1.0 |
| 0.05 In | - | *0.10* | ±0.5 | ±1.0 |
| 0.1 In | - | *0.07* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.17* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.03* | ±0.3 | ±0.6 |
| In | - | *0.07* | ±0.3 | ±0.6 |
| Im | - | *0.15* | ±0.3 | ±0.6 |
| 0.1 In | 0.25ind | *0.26* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.25* | ±0.5 | ±1.0 |
| 0.5 In | - | *0.06* | ±0.5 | ±1.0 |
| In | - | *0.25* | ±0.5 | ±1.0 |
| 0.1 In | 0.8cap | *-0.12* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.08* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.10* | ±0.3 | ±0.6 |
| In | - | *-0.13* | ±0.3 | ±0.6 |
| 0.1 In | 0.5cap | *-0.20* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.06* | ±0.5 | ±1.0 |
| 0.5 In | - | *-0.14* | ±0.5 | ±1.0 |
| In | - | *-0.21* | ±0.5 | ±1.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Export Energy kWh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.1 In | 1.0 | *0.03* | *-0.17* | *-0.05* | ±0.3 | ±0.6 |
| In | - | *0.04* | *-0.22* | *-0.04* | ±0.3 | ±0.6 |
| Im | - | *0.05* | *-0.19* | *-0.03* | ±0.3 | ±0.6 |
| 0.2 In | 0.5ind | *-0.06* | *-0.55* | *0.11* | ±0.4 | ±1.0 |
| In | - | *0.06* | *-0.05* | *0.21* | ±0.4 | ±1.0 |
| Im | - | *0.15* | *0.06* | *0.29* | ±0.4 | ±1.0 |
| 0.2 In | 0.5cap | *0.07* | *-0.44* | *0.05* | - | - |
| In | - | *0.00* | *-0.39* | *-0.26* | - | - |
| Im | - | *-0.07* | *-0.45* | *-0.24* | - | - |

**Variation in Current(cont.)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Acc 3P3W kWh +P |
|---|---|
| Current Variation / 34000000114 | 19EMA TP25 |

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Active Import Energy kWh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| 0.01 In | 1.0 | *-0.27* | ±0.4 | ±1.0 |
| 0.02 In | - | *-0.36* | ±0.4 | ±1.0 |
| 0.05 In | - | *-0.26* | ±0.2 | ±0.5 |
| 0.1 In | - | *-0.22* | ±0.2 | ±0.5 |
| 0.2 In | - | *-0.23* | ±0.2 | ±0.5 |
| 0.5 In | - | *-0.22* | ±0.2 | ±0.5 |
| In | - | *-0.21* | ±0.2 | ±0.5 |
| Im | - | *-0.20* | ±0.2 | ±0.5 |
| 0.02 In | 0.5ind | *-0.21* | ±0.5 | ±1.0 |
| 0.05 In | - | *-0.17* | ±0.5 | ±1.0 |
| 0.1 In | - | *-0.15* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.22* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.14* | ±0.3 | ±0.6 |
| In | - | *-0.13* | ±0.3 | ±0.6 |
| Im | - | *-0.08* | ±0.3 | ±0.6 |
| 0.1 In | 0.25ind | *-0.08* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.22* | ±0.5 | ±1.0 |
| 0.5 In | - | *-0.07* | ±0.5 | ±1.0 |
| In | - | *-0.04* | ±0.5 | ±1.0 |
| 0.1 In | 0.8cap | *-0.18* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.19* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.20* | ±0.3 | ±0.6 |
| In | - | *-0.21* | ±0.3 | ±0.6 |
| 0.1 In | 0.5cap | *-0.23* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.19* | ±0.5 | ±1.0 |
| 0.5 In | - | *-0.23* | ±0.5 | ±1.0 |
| In | - | *-0.25* | ±0.5 | ±1.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Active Import Energy kWh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *-0.18* | - | *-0.26* | ±0.3 | ±0.6 |
| 0.1 In | - | *-0.14* | - | *-0.22* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.14* | - | *-0.21* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.12* | - | *-0.24* | ±0.3 | ±0.6 |
| In | - | *-0.10* | - | *-0.30* | ±0.3 | ±0.6 |
| Im | - | *-0.07* | - | *-0.10* | ±0.3 | ±0.6 |
| 0.1 In | 0.5ind | *0.02* | - | *-0.17* | ±0.4 | ±1.0 |
| 0.2 In | - | *-0.11* | - | *-0.23* | ±0.4 | ±1.0 |
| 0.5 In | - | *0.05* | - | *-0.03* | ±0.4 | ±1.0 |
| In | - | *0.09* | - | *-0.20* | ±0.4 | ±1.0 |
| Im | - | *0.09* | - | *-0.01* | ±0.4 | ±1.0 |
| 0.2 In | 0.5cap | *-0.13* | - | *-0.15* | - | - |
| In | - | *-0.27* | - | *-0.42* | - | - |
| Im | - | *-0.33* | - | *-0.33* | - | - |

**Variation in Current(cont.)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Acc 3P3W kWh -P |
|---|---|
| Current Variation / 34000000114 | 19EMA TP25 |

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Active Export Energy kWh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| 0.01 In | 1.0 | *-0.27* | ±0.4 | ±1.0 |
| 0.02 In | - | *-0.29* | ±0.4 | ±1.0 |
| 0.05 In | - | *-0.18* | ±0.2 | ±0.5 |
| 0.1 In | - | *-0.16* | ±0.2 | ±0.5 |
| 0.2 In | - | *-0.18* | ±0.2 | ±0.5 |
| 0.5 In | - | *-0.16* | ±0.2 | ±0.5 |
| In | - | *-0.17* | ±0.2 | ±0.5 |
| Im | - | *-0.17* | ±0.2 | ±0.5 |
| 0.02 In | 0.5ind | *-0.11* | ±0.5 | ±1.0 |
| 0.05 In | - | *-0.09* | ±0.5 | ±1.0 |
| 0.1 In | - | *-0.17* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.10* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.09* | ±0.3 | ±0.6 |
| In | - | *-0.08* | ±0.3 | ±0.6 |
| Im | - | *-0.03* | ±0.3 | ±0.6 |
| 0.1 In | 0.25ind | *-0.01* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.17* | ±0.5 | ±1.0 |
| 0.5 In | - | *-0.02* | ±0.5 | ±1.0 |
| In | - | *-0.02* | ±0.5 | ±1.0 |
| 0.1 In | 0.8cap | *-0.19* | ±0.3 | ±0.6 |
| 0.2 In | - | *-0.19* | ±0.3 | ±0.6 |
| 0.5 In | - | *-0.19* | ±0.3 | ±0.6 |
| In | - | *-0.21* | ±0.3 | ±0.6 |
| 0.1 In | 0.5cap | *-0.23* | ±0.5 | ±1.0 |
| 0.2 In | - | *-0.17* | ±0.5 | ±1.0 |
| 0.5 In | - | *-0.23* | ±0.5 | ±1.0 |
| In | - | *-0.25* | ±0.5 | ±1.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Active Export Energy kWh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.1 In | 1.0 | *-0.13* | - | *-0.20* | ±0.3 | ±0.6 |
| In | - | *-0.12* | - | *-0.33* | ±0.3 | ±0.6 |
| Im | - | *-0.20* | - | *-0.21* | ±0.3 | ±0.6 |
| 0.2 In | 0.5ind | *0.02* | - | *-0.24* | ±0.4 | ±1.0 |
| In | - | *0.06* | - | *-0.09* | ±0.4 | ±1.0 |
| Im | - | *0.09* | - | *-0.08* | ±0.4 | ±1.0 |
| 0.2 In | 0.5cap | *-0.29* | - | *-0.31* | - | - |
| In | - | *-0.37* | - | *-0.12* | - | - |
| Im | - | *-0.29* | - | *-0.42* | - | - |

**Variation in Current (cont.)** IEC 62053-23 X-Ref. 8
X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-23 Acc 3P4W kvarh +Q |
|---|---|
| Current Variation / 340090000112 | 19EMA TP25 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Reactive Import Energy kvarh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Sin ϕ | *% Error* | Accuracy | |
| | | | Class 2 | Class 3 |
| 0.05 In | 1.0 | *0.15* | ±2.5 | ±4.0 |
| 0.1 In | - | *0.15* | ±2.0 | ±3.0 |
| 0.2 In | - | *0.17* | ±2.0 | ±3.0 |
| 0.5 In | - | *0.20* | ±2.0 | ±3.0 |
| In | - | *0.18* | ±2.0 | ±3.0 |
| 0.4 Im | - | *0.19* | ±2.0 | ±3.0 |
| 0.6 Im | - | *0.18* | ±2.0 | ±3.0 |
| 0.8 Im | - | *0.18* | ±2.0 | ±3.0 |
| Im | - | *0.19* | ±2.0 | ±3.0 |
| 0.1 In | 0.5ind | *0.07* | ±2.5 | ±4.0 |
| 0.2 In | - | *0.16* | ±2.0 | ±3.0 |
| 0.5 In | - | *0.13* | ±2.0 | ±3.0 |
| In | - | *0.03* | ±2.0 | ±3.0 |
| Im | - | *0.05* | ±2.0 | ±3.0 |
| 0.2 In | 0.25ind | *0.21* | ±2.5 | ±4.0 |
| 0.5 In | - | *0.04* | ±2.5 | ±4.0 |
| In | - | *-0.14* | ±2.5 | ±4.0 |
| 0.2 In | 0.5cap | *0.20* | ±2.0 | ±3.0 |
| 0.5 In | - | *0.29* | ±2.0 | ±3.0 |
| In | - | *0.33* | ±2.0 | ±3.0 |
| Im | - | *0.33* | ±2.0 | ±3.0 |
| 0.2 In | 0.25cap | *0.30* | ±2.5 | ±4.0 |
| 0.5 In | - | *0.41* | ±2.5 | ±4.0 |
| In | - | *0.53* | ±2.5 | ±4.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Reactive Import Energy kvarh

| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
|---|---|---|---|---|---|---|
| CURRENT | PF Sin ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 2 | Class 3 |
| 0.1 In | 1.0 | *0.21* | *0.07* | *0.18* | ±3.0 | ±4.0 |
| In | - | *0.24* | *0.13* | *0.21* | ±3.0 | ±4.0 |
| Im | - | *0.22* | *0.13* | *0.19* | ±3.0 | ±4.0 |
| 0.2 In | 0.5ind | *0.22* | *0.32* | *-0.07* | ±3.0 | ±4.0 |
| In | - | *0.08* | *0.02* | *-0.05* | ±3.0 | ±4.0 |
| Im | - | *0.17* | *0.01* | *0.01* | ±3.0 | ±4.0 |
| 0.2 In | 0.5cap | *0.20* | *0.37* | *0.07* | ±3.0 | ±4.0 |
| In | - | *0.30* | *0.41* | *0.33* | ±3.0 | ±4.0 |
| Im | - | *0.31* | *0.35* | *0.33* | ±3.0 | ±4.0 |

**Variation in Current(cont.)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-23 Acc 3P4W kvarh -Q |
|---|---|
| Current Variation / 340090000112 | 19EMA TP25 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Reactive Export Energy kvarh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Sin ϕ | *% Error* | Accuracy | |
| | | | Class 2 | Class 3 |
| 0.05 In | 1.0 | *0.14* | ±2.5 | ±4.0 |
| 0.1 In | - | *0.15* | ±2.0 | ±3.0 |
| 0.2 In | - | *0.17* | ±2.0 | ±3.0 |
| 0.5 In | - | *0.20* | ±2.0 | ±3.0 |
| In | - | *0.18* | ±2.0 | ±3.0 |
| Im | - | *0.19* | ±2.0 | ±3.0 |
| 0.1 In | 0.5ind | *0.08* | ±2.5 | ±4.0 |
| In | - | *0.03* | ±2.0 | ±3.0 |
| Im | - | *0.05* | ±2.0 | ±3.0 |
| 0.1 In | 0.5cap | *0.25* | ±2.0 | ±4.0 |
| In | - | *0.34* | ±2.0 | ±3.0 |
| Im | - | *0.33* | ±2.0 | ±3.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Reactive Export Energy kvarh

| | | | | | | |
|---|---|---|---|---|---|---|
| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
| CURRENT | PF Sin ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 2 | Class 3 |
| In | 1.0 | *0.23* | *0.09* | *0.21* | ±3.0 | ±4.0 |
| In | 0.5ind | *0.14* | *-0.10* | *0.02* | ±3.0 | ±4.0 |
| In | 0.5cap | *0.34* | *0.23* | *0.44* | ±3.0 | ±4.0 |

**Variation in Current (cont.)** IEC 62053-23 X-Ref. 8
X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-23 Acc 3P3W kvarh +Q |
|---|---|
| Current Variation / 340000008114 | 19EMA TP25 |

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Reactive Import Energy kvarh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Sin ϕ | *% Error* | Accuracy | |
| | | | Class 2 | Class 3 |
| 0.05 In | 1.0 | *-0.19* | ±2.5 | ±4.0 |
| 0.1 In | - | *-0.18* | ±2.0 | ±3.0 |
| 0.2 In | - | *-0.18* | ±2.0 | ±3.0 |
| 0.5 In | - | *-0.19* | ±2.0 | ±3.0 |
| In | - | *-0.19* | ±2.0 | ±3.0 |
| 0.4 Im | - | *-0.20* | ±2.0 | ±3.0 |
| 0.6 Im | - | *-0.18* | ±2.0 | ±3.0 |
| 0.8 Im | - | *-0.18* | ±2.0 | ±3.0 |
| Im | - | *-0.18* | ±2.0 | ±3.0 |
| 0.1 In | 0.5ind | *-0.22* | ±2.5 | ±4.0 |
| 0.2 In | - | *-0.08* | ±2.0 | ±3.0 |
| 0.5 In | - | *-0.20* | ±2.0 | ±3.0 |
| In | - | *-0.23* | ±2.0 | ±3.0 |
| Im | - | *0.29* | ±2.0 | ±3.0 |
| 0.2 In | 0.25ind | *0.22* | ±2.5 | ±4.0 |
| 0.5 In | - | *-0.12* | ±2.5 | ±4.0 |
| In | - | *-0.22* | ±2.5 | ±4.0 |
| 0.2 In | 0.5cap | *-0.02* | ±2.0 | ±3.0 |
| 0.5 In | - | *-0.06* | ±2.0 | ±3.0 |
| In | - | *-0.07* | ±2.0 | ±3.0 |
| Im | - | *0.03* | ±2.0 | ±3.0 |
| 0.2 In | 0.25cap | *0.33* | ±2.5 | ±4.0 |
| 0.5 In | - | *0.28* | ±2.5 | ±4.0 |
| In | - | *0.22* | ±2.5 | ±4.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Reactive Import Energy kvarh

| | | | | | | |
|---|---|---|---|---|---|---|
| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
| CURRENT | PF Sin ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 2 | Class 3 |
| 0.1 In | 1.0 | *-0.15* | - | *-0.19* | ±3.0 | ±4.0 |
| In | - | *-0.15* | - | *-0.16* | ±3.0 | ±4.0 |
| Im | - | *-0.14* | - | *-0.13* | ±3.0 | ±4.0 |
| 0.2 In | 0.5ind | *-0.40* | - | *-0.01* | ±3.0 | ±4.0 |
| In | - | *-0.22* | - | *-0.27* | ±3.0 | ±4.0 |
| Im | - | *-0.32* | - | *-0.27* | ±3.0 | ±4.0 |
| 0.2 In | 0.5cap | *-0.16* | - | *-0.16* | ±3.0 | ±4.0 |
| In | - | *-0.05* | - | *-0.11* | ±3.0 | ±4.0 |
| Im | - | *0.00* | - | *-0.13* | ±3.0 | ±4.0 |

**Variation in Current(cont.)** X-Ref. 8.1

| Test Results ID / Sample No. | Test Procedure: IEC62053-23 Acc 3P3Wkvarh -Q |
|---|---|
| Current Variation / 340000008114 | 19EMA TP25 |

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Reactive Export Energy kvarh

| | | | Limit of % Error | |
|---|---|---|---|---|
| CURRENT | PF Sin ϕ | *% Error* | Accuracy | |
| | | | Class 2 | Class 3 |
| 0.05 In | 1.0 | *-0.15* | ±2.5 | ±4.0 |
| 0.1 In | - | *-0.14* | ±2.0 | ±3.0 |
| 0.2 In | - | *-0.14* | ±2.0 | ±3.0 |
| 0.5 In | - | *-0.15* | ±2.0 | ±3.0 |
| In | - | *-0.16* | ±2.0 | ±3.0 |
| Im | - | *-0.15* | ±2.0 | ±3.0 |
| 0.1 In | 0.5ind | *-0.17* | ±2.5 | ±4.0 |
| In | - | *-0.23* | ±2.0 | ±3.0 |
| Im | - | *-0.28* | ±2.0 | ±3.0 |
| 0.1 In | 0.5cap | *-0.05* | ±2.0 | ±4.0 |
| In | - | *-0.04* | ±2.0 | ±3.0 |
| Im | - | *0.00* | ±2.0 | ±3.0 |

**Polyphase meter carrying a single-phase load, with balanced voltage applied to the voltage's circuits.** X-Ref. 8.1

Test conditions: *Un: 3x230V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 3 wire*

Measurement mode - Reactive Export Energy kvarh

| | | | | | | |
|---|---|---|---|---|---|---|
| Elements/Lines | | I1 Element L1 | I2 Element L2 | I3 Element L3 | Limit of % Error | |
| CURRENT | PF Sin ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 2 | Class 3 |
| In | 1.0 | *-0.11* | - | *-0.21* | ±3.0 | ±4.0 |
| In | 0.5ind | *-0.25* | - | *-0.35* | ±3.0 | ±4.0 |
| In | 0.5cap | *0.01* | - | *-0.18* | ±3.0 | ±4.0 |

## 2.5.2 Voltage Variation

IEC 62053-22 X-Ref. 8.2

Specified Operating Range

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Voltage Variation P |
|---|---|
| Voltage Variation / 340090000120 | 19EMA TP26 |

Test conditions: *Un: 3x63.5/110V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | 110% Un | 100% Un | 90% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *0.09* | *0.04* | *0.05* | ±0.1 | ±0.2 |
| In | - | *0.14* | *0.09* | *0.10* | ±0.1 | ±0.2 |
| Im | - | *0.15* | *0.10* | *0.10* | ±0.1 | ±0.2 |
| 0.1 In | 0.5ind | *0.20* | *0.16* | *0.17* | ±0.2 | ±0.4 |
| In | - | *0.30* | *0.26* | *0.27* | ±0.2 | ±0.4 |
| Im | - | *0.31* | *0.27* | *0.28* | ±0.2 | ±0.4 |

Limit Range of Operation

| | | 115% Un | 80% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | Accuracy | |
| | | | | Class 0.2s | Class 0.5s |
| In | 1.0 | *0.14* | *0.09* | ±0.3 | ±0.6 |
| In | 0.5ind | *0.31* | *0.28* | ±0.6 | ±1.2 |

**Voltage Variation (cont.)** IEC 62053-22 X-Ref. 8.2

Specified Operating Range

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Voltage Variation P |
|---|---|
| Voltage Variation / 340090000120 | 19EMA TP26 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | 110% Un | 100% Un | 90% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *0.11* | *0.13* | *0.15* | ±0.1 | ±0.2 |
| In | - | *0.15* | *0.17* | *0.19* | ±0.1 | ±0.2 |
| Im | - | *0.16* | *0.17* | *0.20* | ±0.1 | ±0.2 |
| 0.1 In | 0.5ind | *0.21* | *0.23* | *0.26* | ±0.2 | ±0.4 |
| In | - | *0.29* | *0.31* | *0.33* | ±0.2 | ±0.4 |
| Im | - | *0.29* | *0.30* | *0.33* | ±0.2 | ±0.4 |

Limit Range of Operation

| | | 115% Un | 80% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | Accuracy | |
| | | | | Class 0.2s | Class 0.5s |
| In | 1.0 | *0.16* | *0.20* | ±0.3 | ±0.6 |
| In | 0.5ind | *0.31* | *0.35* | ±0.6 | ±1.2 |

**Voltage Variation (cont.)** IEC 62053-22 X-Ref. 8.2

Specified Operating Range

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Voltage Variation P |
|---|---|
| Voltage Variation / 340090000120 | 19EMA TP26 |

Test conditions: *Un: 3x277/480V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | 110% Un | 100% Un | 90% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *0.13* | *0.13* | *0.12* | ±0.1 | ±0.2 |
| In | - | *0.17* | *0.17* | *0.16* | ±0.1 | ±0.2 |
| Im | - | *0.18* | *0.17* | *0.17* | ±0.1 | ±0.2 |
| 0.1 In | 0.5ind | *0.23* | *0.24* | *0.24* | ±0.2 | ±0.4 |
| In | - | *0.32* | *0.31* | *0.31* | ±0.2 | ±0.4 |
| Im | - | *0.32* | *0.31* | *0.30* | ±0.2 | ±0.4 |

Limit Range of Operation

| | | 115% Un | 80% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | Accuracy | |
| | | | | Class 0.2s | Class 0.5s |
| In | 1.0 | *0.17* | *0.18* | ±0.3 | ±0.6 |
| In | 0.5ind | *0.32* | *0.33* | ±0.6 | ±1.2 |

**Voltage Variation (cont.)** IEC 62053-23 X-Ref. 8.2

Specified Operating Range

| Test Results ID / Sample No. | Test Procedure: IEC62053-23 Voltage Variation Q |
|---|---|
| Voltage Variation / 340090000120 | 19EMA TP26 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Reactive Energy kvarh

| | | 110% Un | 100% Un | 90% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|---|
| Current | PF Sin ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 2 | Class 3 |
| 0.05 In | 1.0 | *0.13* | *0.14* | *0.16* | ±1.0 | ±2.0 |
| In | - | *0.17* | *0.19* | *0.21* | ±1.0 | ±2.0 |
| Im | - | *0.18* | *0.19* | *0.21* | ±1.0 | ±2.0 |
| 0.1 In | 0.5ind | *0.06* | *0.07* | *0.09* | ±1.5 | ±3.0 |
| In | - | *0.03* | *0.04* | *0.06* | ±1.5 | ±3.0 |
| Im | - | *0.05* | *0.06* | *0.08* | ±1.5 | ±3.0 |

Limit Range of Operation

| | | 115% Un | 80% Un | Limit of % Error Variation | |
|---|---|---|---|---|---|
| Current | PF Sin ϕ | *% Error* | *% Error* | Accuracy | |
| | | | | Class 2 | Class 3 |
| In | 1.0 | *0.18* | *0.21* | ±3.0 | ±6.0 |
| In | 0.5ind | *0.04* | *0.06* | ±4.5 | ±9.0 |

## 2.5.3 Frequency Variation

IEC62053-22 X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Frequency 51Hz to 49Hz P |
|---|---|
| Frequency Variation / 340090000120 | 19EMA TP27 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | 102% Fn | 100% Fn | 98% Fn | Limit of % Error Variation | |
|---|---|---|---|---|---|---|
| Current | PF Cos. ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 0.2s | Class 0.5s |
| 0.05 In | 1.0 | *0.13* | *0.13* | *0.12* | ±0.1 | ±0.2 |
| In | 1.0 | *0.17* | *0.17* | *0.17* | ±0.1 | ±0.2 |
| Im | 1.0 | *0.17* | *0.18* | *0.17* | ±0.1 | ±0.2 |
| 0.10 In | 0.5ind | *0.17* | *0.24* | *0.28* | ±0.1 | ±0.2 |
| In | 0.5ind | *0.26* | *0.31* | *0.37* | ±0.1 | ±0.2 |
| Im | 0.5ind | *0.25* | *0.34* | *0.37* | ±0.1 | ±0.2 |

**Frequency Variation (cont)** IEC62053-23 X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-23 Frequency 51Hz to 49Hz Q |
|---|---|
| Frequency Variation / 340090000120 | 19EMA TP27 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Reactive Import Energy kvarh

| | | 102% Fn | 100% Fn | 98% Fn | Limit of % Error Variation | |
|---|---|---|---|---|---|---|
| Current | PF Sins ϕ | *% Error* | *% Error* | *% Error* | Accuracy | |
| | | | | | Class 2 | Class 3 |
| 0.05 In | 1.0 | *0.14* | *0.14* | *0.14* | ±2.5 | ±2.5 |
| In | 1.0 | *0.19* | *0.19* | *0.18* | ±2.5 | ±2.5 |
| Im | 1.0 | *0.19* | *0.19* | *0.19* | ±2.5 | ±2.5 |
| 0.10 In | 0.5ind | *0.17* | *0.07* | *0.02* | ±2.5 | ±2.5 |
| In | 0.5ind | *0.10* | *0.04* | *-0.02* | ±2.5 | ±2.5 |
| Im | 0.5ind | *0.11* | *0.06* | *0.00* | ±2.5 | ±2.5 |

### 2.5.4 Reversed Phase Sequence

IEC 62053-22 X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Reverse Phase Sequence |
|---|---|
| Reverse Phase / 340090000120 | 19EMA TP28 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Phase Sequence Current | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| Sequence **L1-L2-L3** 0.1 In | *0.04* | - | - |
| Sequence **L1-L3-L2** 0.1 In | *0.06* | ±0.05 | ±0.1 |

### 2.5.5 Voltage Unbalance

IEC 62053-22 X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Phase Interruption |
|---|---|
| Voltage Unbalance / 340090000120 | 19EMA TP29 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Network Phase/Lines connected | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| L1 & L2 & L3 | *0.05* | - | - |
| L2 & L3 | *0.09* | ±0.5 | ±1.0 |
| L1 & L3 | *0.07* | ±0.5 | ±1.0 |
| L1 & L2 | *0.08* | ±0.5 | ±1.0 |
| L3 | *0.06* | ±0.5 | ±1.0 |
| L2 | *0.11* | ±0.5 | ±1.0 |
| L1 | *0.03* | ±0.5 | ±1.0 |

## 2.5.6 Continuous Magnetic Induction of External Origin IEC 62053-22 X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 DC Magnetic Field P |
|---|---|
| DC Mag. Field / JB1310214000122 | 19EMA TP33 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Electromagnetic Position | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| No field applied | *0.06* | - | - |
| Left side of meter | *0.17* | ±2.0 | ±2.0 |
| Front of meter | *0.14* | ±2.0 | ±2.0 |
| Right side of meter | *0.17* | ±2.0 | ±2.0 |
| Top of meter | *0.17* | ±2.0 | ±2.0 |

### 2.5.7 Magnetic Induction of External Origin 0.5mT IEC 62053-22 X-Ref. 8.2

Ac magnetic induction of external origin, produced by a coil of one metre diameter, field strength at its centre 0.5mT (400 Ampere turns)

| Test Results ID / Sample No. | Test Procedure: T/T +P X-X FAIRY RING<br>T/T +P Y-Y FAIRY RING<br>T/T +P Z-Z FAIRY RING |
|---|---|
| AC Mag. Fields / JB1310214000072 | 19EMA TP34 |

Test conditions: *Un: 3x230/400V* *Fn: 50Hz*
*In: 5A* *PF: Cos. $\phi$ = 1.0*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| Phase angle of the field with respect to U3 (Vph) | Direction of field orientation | | |
|---|---|---|---|
| | X - X | Y - Y | Z - Z |
| | *% Error* | *% Error* | % Error |
| No Field Applied | *0.12* | *0.09* | *0.09* |
| 0° | *0.11* | *0.09* | *0.09* |
| 30° | *0.11* | *0.09* | *0.08* |
| 60° | *0.11* | *0.09* | *0.08* |
| 90° | *0.11* | *0.09* | *0.08* |
| 120° | *0.10* | *0.09* | *0.08* |
| 150° | *0.10* | *0.09* | *0.08* |
| 180° | *0.10* | *0.09* | *0.08* |
| 210° | *0.10* | *0.09* | *0.09* |
| 240° | *0.10* | *0.09* | *0.09* |
| 270° | *0.10* | *0.09* | *0.09* |
| 300° | *0.10* | *0.09* | *0.09* |
| 330° | *0.10* | *0.09* | *0.09* |
| 360° | *0.09* | *0.09* | *0.09* |

Limit of % Error Variation for Class 0.2s ± 0.5%
Class 0.5s ± 1.0%

## 2.5.8 Auxiliary Power Supply Voltage Variation IEC 62053-22 X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Aux Voltage Variation (PLE) |
|---|---|
| Aux Voltage Var / 3400000002003 | |

Test conditions: *Un: 3x230/400V* *Ux: 100V* *Fn: 50Hz*
*0.01In: 0.05A* *PF: Cos. ϕ = 1.0*

Measurement mode - Active Energy kWh

| Auxiliary Power Supply Voltage Level | *% Error* | Limit of % Error Variation Accuracy | |
|---|---|---|---|
| | | Class 0.2s | Class 0.5s |
| 100% | *-0.07* | - | - |
| 115% | *-0.07* | ±0.05 | ±0.1 |
| 85% | *-0.06* | ±0.05 | ±0.1 |

Test conditions: *Un: 3x230/400V* *Ux: 400V* *Fn: 50Hz*
*0.01In: 0.05A* *PF: Cos. ϕ = 1.0*

Measurement mode - Active Energy kWh

| Auxiliary Power Supply Voltage Level | *% Error* | Limit of % Error Variation Accuracy | |
|---|---|---|---|
| | | Class 0.2s | Class 0.5s |
| 100% | *-0.06* | - | - |
| 115% | *-0.07* | ±0.05 | ±0.1 |
| 85% | *-0.07* | ±0.05 | ±0.1 |

## 2.6 Accuracy test in the Presence of Harmonics IEC 62053-22 X-Ref. 8.2

### 2.6.1 Harmonic Components in the Current and Voltage Circuits X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Harmonics Tests |
|---|---|
| Harmonics / 340090000120 | 19EMA TP32 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A* *PF: Cos. $\phi$ = 1.0*

Fundamental frequency current: $I_0$ = 0.5 Imax
Fundamental frequency voltage: $U_0$ = Un
content of 5th harmonic current: $I_5$ = 40% of $I_0$
content of 5th harmonic voltage: $U_5$ = 10% of Un

Resulting harmonic power due to the 5th harmonic presence: $P_{resultant} = 1.04\ P_0$

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Waveform | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| Fundamental Only ( $P_0$ ) 0.5 Imax | *0.07* | - | - |
| Fundamental + 5th Harmonic ($P_{resultant} = 1.04\ P_0$ ) | *0.04* | ±0.4 | ±0.5 |

**Harmonic Components in the Current and Voltage Circuits (cont)** X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Harmonics Tests |
|---|---|
| Harmonics / 340000008115 | 19EMA TP32 |

Test conditions: *Un: 3x230/400V* *Ux: 230V* *Fn: 50Hz*
*In: 5A* *Im: 6A* *PF: Cos. $\phi$ = 1.0*

Fundamental frequency current: $I_0$ = 0.5 Imax
Fundamental frequency voltage: $U_0$ = Un
content of 5th harmonic current: $I_5$ = 40% of $I_0$
content of 5th harmonic voltage: $U_5$ = 10% of Un

Resulting harmonic power due to the 5th harmonic presence: $P_{resultant}$ = 1.04 $P_0$

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Waveform | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| Fundamental Only ( $P_0$ ) 0.5 Imax | *-0.07* | - | - |
| Fundamental + 5th Harmonic ($P_{resultant}$ = 1.04 $P_0$ ) | *-0.10* | ±0.4 | ±0.5 |

### 2.6.3 Influence of Odd and Sub Harmonics in the AC Current Circuit X-Ref. 8.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Harmonics Tests |
|---|---|
| Harmonics / 340090000120 | 19EMA TP32 |

Test conditions: *Un: 3x230/400V* *Ux : 230V* *Fn: 50Hz:*
*In:5A* *PF: Cos. $\phi$ = 1.0*

Reference current waveform: $I_{ref}$ = 0.5 In
Reference voltage: U = Un
Test current Phase-fired waveform: $I_{test} = \sqrt{2} \cdot I_{ref}$
Firing points = 5ms and 15ms ± 1ms
Test current Burst fired waveform: $I_{test} = 2 \cdot I_{ref}$
Distortion factor on the voltage waveform: < 0.5 % THD

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Waveform | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| Fundamental Only 0.5 In | *0.07* | - | - |
| Waveform Phase-fired Test current | *0.15* | ±0.6 | ±1.5 |
| Waveform Burst fired Test current | *-0.04* | ±0.6 | ±1.5 |

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Harmonics Tests |
|---|---|
| Harmonics / 340000008115 | 19EMA TP32 |

Test conditions: *Un: 3x230/400V Ux : 230V Fn: 50Hz: In:5A PF: Cos. ϕ = 1.0*

Reference current waveform: $I_{ref}$ = 0.5 In
Reference voltage: U = Un
Test current Phase-fired waveform: $I_{test} = \sqrt{2} \cdot I_{ref}$
Firing points = 5ms and 15ms ± 1ms
Test current Burst fired waveform: $I_{test} = 2 \cdot I_{ref}$
Distortion factor on the voltage waveform: < 0.5 % THD

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Waveform | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| Fundamental Only 0.5 In | *-0.08* | - | - |
| Waveform Phase-fired Test current | *0.05* | ±0.6 | ±1.5 |
| Waveform Burst fired Test current | *-0.21* | ±0.6 | ±1.5 |

## 3 ELECTRICAL REQUIREMENTS IEC 62053-22 X-Ref. 7

### 3.1 Power Consumption X-Ref. 7.1

| Test Results ID / Sample No. | Test Procedure: EN62053-22 Power Consumption |
|---|---|
| Power Consumption / 3400600001062 | 19EMA TP22 |

| | Volts/V | Amps/A | VA | Watts/W |
|---|---|---|---|---|
| **Auxiliary Power Supply**<br><br>Wiring Configuration:<br>Single Phase Two Wire<br><br>Voltage Circuit: **L1** | *276.6* | *0.0153* | *4.28* | *1.94* |

Power consumption limits for auxiliary power supply circuits shall not exceed the following based on IEC 62053-61: 1998-02

| Voltage Circuits | Single Phase | Two Element | Three Element |
|---|---|---|---|
| Basic Meter | 2W 10VA | 2W 10VA | 2W 10VA |
| multi-energy meter | 3W 15VA | 2.5W 12.5VA | 2W 10VA |
| Multi-function meter | 5W 25VA | 3.5W 17.5VA | 3W 15VA |

## 3.2 Influence of Supply Voltage

IEC 62052-11 X-Ref. 7

### Voltage dips and interruptions

X-Ref. 7.1.2

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Voltage Dips |
|---|---|
| Voltage Dips / 340000002002 | 19EMA TP10 |

**Environmental Conditions**

| | |
|---|---|
| Power Supply | 230V, 50Hz |
| Temperature | 21°C |
| Relative Humidity | 42% |
| Barometric Pressure | 998mB |

Test Circuit: *1 phase 2 wire, in the case of Polyphase meters tests were conducted on each voltage circuit in turn.*

The tests were applied under the following conditions;

- voltage and auxiliary circuits energised with reference voltage
- current circuits open.

| | | |
|---|---|---|
| Test a) | Voltage interruption of: | V = 100% |
| | Interruption time: | 1s |
| | Number of interruptions: | 3 |
| | Restoring time between interruption: | 50ms |
| Test b) | Voltage interruption of: | V = 100% |
| | Interruption time: | 20ms |
| | Number of interruptions: | 1 |
| Test c) | Voltage depression of: | V=50% |
| | Depression time: | 60s |
| | Number of depressions: | 1 |

The application of the above test did not produce a change in the meter registers of more than ***x*** kWh/kvarh, and the test output did not produce a signal equivalent of more than ***x*** kWh/kvarh, where ***x*** is given by

$$\boldsymbol{x} = 10^{-6} \cdot m \cdot Un \cdot Imax$$

## 3.3 Test of Influence of Short-Time Over-Currents IEC 62053-22 X-Ref. 7.2

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Short-Time Over-Current |
|---|---|
| STOC / 340060001062 | 19EMA TP23 |

**Environmental Conditions**

| | |
|---|---|
| Temperature | 21°C |
| Relative Humidity | 51% |
| Barometric Pressure | 1008mB |

Test Conditions: *Im: 6A* *Fn: 50Hz*

Test Circuit: *3 phase 4 wire*

The test was applied under the following conditions;

Meter for connection through current transformer:

An impulse currents were applied = 20 x Imax
At rated frequency for 0.5 second duration
Applied to each current phase

On completion of the test, the meters voltage circuits were energised at reference voltage for 1 hour after which the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions.

| | | |
|---|---|---|
| Power Factor | Current | *% Error* |
| Cos. $\phi$ = 1.0 | In | *0.01* |

Limit of % Error: Class 0.2s ± 0.05% for connection through a current transformer
Class 0.5s ± 0.05% for connection through a current transformer

The meter showed no signs of damage and functioned correctly.

## 3.4 Test of Influence of Self Heating

IEC 227122262053-22 X-Ref. 7
X-Ref. 7.3

Test conditions:- The meter voltage circuits were energised at reference voltage for at least 2 hours, without any current in the current circuits, after which the meter's maximum rated current was applied and the meter error determined every 5 minutes. The test was conducted at power factors of both Cos. ϕ = 1.0 and Cos. ϕ = 0.5 ind.

| Test Results ID / Sample No. | Test Procedure: IEC62053-22 Self Heating |
|---|---|
| Self Heating / 340090000120 | 19EMA TP24 |

Test conditions: *Un: 3x230/400V* *Ux: 230V*
*Im: 6A* *Fn: 50Hz*

Test Circuit: *3 phase 4 wire*

Measurement Mode Active Energy kWh

| | | |
|---|---|---|
| Elapsed Test time (minutes) | Un Im Cos.ϕ = 1.0 | Un Im Cos.ϕ = 0.5 |
| | *% Error* | *% Error* |
| 1 | *0.05* | *0.16* |
| 5 | *0.06* | *0.16* |
| 10 | *0.06* | *0.16* |
| 15 | *0.06* | *0.16* |
| 20 | *0.06* | *0.16* |
| 25 | *0.06* | *0.16* |
| 30 | *0.06* | *0.16* |
| 35 | *0.06* | *0.16* |
| 40 | *0.06* | *0.16* |
| 45 | *0.06* | *0.16* |
| 50 | *0.06* | *0.16* |
| 55 | *0.06* | *0.16* |
| 60 | *0.06* | *0.16* |

Limit of % Error Variation: Class 0.2s ±0.1% @ Cos. ϕ = 1.0 & Cos. ϕ = 0.5ind
Class 0.5s ±0.2% @ Cos. ϕ = 1.0 & Cos. ϕ = 0.5ind

## 3.5 Test of Influence of Heating IEC 62052-11 X-Ref. 7.2

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Heating |
|---|---|
| Heating / 340000002002 | 19EMA TP11 |

Test conditions: *115%Un: 3x318.5/551.7V* *Imax: 6A* *Fn: 50Hz*

Ambient Temperature : 40°C
Test Duration : 2 hours
Surface Temperature Rise: 2K

Permissible temperature rise: 25K

Surface temperature of the meter was measured on the meter back, approximately 10mm above the meter current circuit and voltage circuit terminal block.

On completion of the above test, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions, with no signs of damage or degradation in the meter's insulation properties.

## 4 ELECTROMAGNETIC COMPATIBILITY (E.M.C.) IEC 62052-11 X-Ref. 7.5

### 4.1 Immunity to Electrostatic Discharges (ESD) X-Ref. 7.5.2

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Electrostatic Discharge |
|---|---|
| ESD / JB1310214000072 | 19EMA TP14 |

The meter was tested in accordance with IEC 61000-4-2 as follows:

**Environmental Conditions**

| | |
|---|---|
| Power Supply | 230V, 50Hz |
| Temperature | 19°C |
| Relative Humidity | 40% |
| Barometric Pressure | 998mB |

E.S.D Generator specification:
Test level severities: 8kV contact, conductive surfaces / coupling planes
15kV air gap discharge - non conducting surfaces
Positive / Negative polarity
Number of discharges: 10 at each polarity
Rise time of discharge current: <1ns
Pulse duration (50%) 30ns
Time between discharges: 1s

Meter in operating condition with the voltage and auxiliary circuits energised. Current circuits open.

The application of the electrostatic discharge did not produce a change in the meter registers of more than ***x*** kWh, and the test output did not produce a signal equivalent of more than ***x*** kWh, where ***x*** is given by

$$x = 10^{-6} \cdot m \cdot Un \cdot Imax$$

where

*x* is the critical change value in kWh
*m* is the number of measuring elements
*Un* is the reference voltage
*Imax* is the maximum current

## 4.2 Immunity to Electromagnetic RF Fields X-Ref. 7.5.3

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Radiated Immunity |
|---|---|
| RI / JB1310214000072 | 19EMA TP15 |

The meter was tested in accordance with IEC 61000-4-3 in the SGS Anechoic chamber as follows:

**Environmental Conditions**

| | |
|---|---|
| Power Supply | 230V, 5A, 50Hz |
| Temperature | 23°C |
| Relative Humidity | 38% |
| Barometric Pressure | 1011mB |

**Port:** Enclosure
**Test Level:** 10 V/m (test 1) & 30 V/m (test 2)
**Frequency Range:** 80-2000 MHz
**Dwell Time:** 6 Secs (test 1), 2 Secs (test 2)
**Frequency Step Size:** 1%
**Modulation:** 80%, 1 kHz Amplitude Modulation.

**Operating Mode:**

Mode 1) Voltage and auxiliary circuits energised with reference voltage and basic current Ib applied
Mode 2) Voltage and auxiliary circuits energised with reference voltage, with no current applied

Test Results (Radiated Immunity 80-2000MHz)

| EUT Face | Polarity | *Test 1 Maximum % Error Observed* | *Test 2* | Limit of % Error Variation | |
|---|---|---|---|---|---|
| | | | | Accuracy | |
| | | | | Class 0.5s | Class 0.2s |
| Front | Horizontal | *0.30* | *Note 1* | ±2.0 | ±1.0 |
| Front | Vertical | *0.18* | *Note 1* | ±2.0 | ±1.0 |
| Rear | Horizontal | *0.18* | *Note 1* | ±2.0 | ±1.0 |
| Rear | Vertical | *0.18* | *Note 1* | ±2.0 | ±1.0 |
| LHS | Horizontal | *0.18* | *Note 1* | ±2.0 | ±1.0 |
| LHS | Vertical | *0.30* | *Note 1* | ±2.0 | ±1.0 |
| RHS | Horizontal | *0.18* | *Note 1* | ±2.0 | ±1.0 |
| RHS | Vertical | *0.18* | *Note 1* | ±2.0 | ±1.0 |

**Note 1:** The application of the RF electromagnetic field did not produce a change in the meter registers of more than ***x*** kWh, and the test output did not produce a signal equivalent of more than ***x*** kWh, where ***x*** is given by

$$\boldsymbol{x} = 10^{-6} \cdot m \cdot Un \cdot Imax$$

where

*x* is the critical change value in kWh
*m* is the number of measuring elements
*Un* is the reference voltage
*Imax* is the maximum current

## 4.3 Fast Transient Burst Test X-Ref. 7.5.4

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Fast Transient Bursts |
|---|---|
| FTB / JB1310426000105 | 19EMA TP16 |

The meter was tested in accordance with IEC 61000-4-4 as follows:

**Environmental Conditions**

| | |
|---|---|
| Power Supply | 230V, 5A, 50Hz |
| Temperature | 20°C |
| Relative Humidity | 44% |
| Barometric Pressure | 992 mB |

Transient/Burst specification: Pulse level severity 2kV & 4kV
Rise time 5ns
Width 50ns
Repetition Rate 5 kHz & 2.5 kHz
Burst Duration 15ms
Burst Period 300ms
Burst Generation Asynchronous (Common mode)

**Operating mode:** The meter voltage circuits were energised at reference voltage Un, with Ib/In Cos. $\phi$ = 1.0 in the current circuits.

Test voltage severity level ±4kV, Repetition Rate 5kHz voltage and current circuits
Test voltage severity level ±2kV, Repetition Rate 5kHz auxiliary circuits > 40V

The test voltage was applied on the current and voltage circuits in common mode, for a test duration of 60 seconds at each polarity.

**Fast Transient Burst Test (cont)** X-Ref. 7.5.4

Test conditions: *Un: 3x230/400V* *Fn: 50Hz*
*In: 5A* *PF: Cos. $\phi$ = 1.0*

Test Circuit: *3 phase 4 wire*

Measurement mode - Active Import Energy kWh

| | | Limit of % Error Variation | |
|---|---|---|---|
| Test Voltage (kV) | *% Error* | Accuracy | |
| | | Class 0.2s | Class 0.5s |
| No FTB applied | *-0.007* | - | - |
| +4 Voltage Circuits | *0.065* | ±1.0 | ±2.0 |
| -4 Voltage Circuits | *-0.073* | ±1.0 | ±2.0 |
| +4 Current Circuits | *0.065* | ±1.0 | ±2.0 |
| -4 Current Circuits | *0.058* | ±1.0 | ±2.0 |
| No FTB applied | *0.005* | ±1.0 | ±2.0 |
| +2 (Auxiliary Circuits of > 40V) | *0.051* | ±1.0 | ±2.0 |
| -2 (Auxiliary Circuits of > 40V) | *-0.007* | ±1.0 | ±2.0 |

On completion of the above test, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions, with no signs of damage or corruption to meter register data.

## 4.4 Immunity to Conducted Disturbances X-Ref. 7.5.5

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Conducted Immunity |
|---|---|
| CI / JB1310214000072 | 19EMA TP17 |

The meter was tested in accordance with IEC 61000-4-6 as follows:

**Environmental Conditions**

| | |
|---|---|
| Power Supply | 230V, 5A, 50Hz |
| Temperature | 20°C |
| Relative Humidity | 44% |
| Barometric Pressure | 980mB |

**Ports:** Current, Voltage and Auxiliary Circuits
**Test Level:** 10 V
**Frequency Range:** 0.15 to 80 MHz
**Dwell Time:** 4 Secs
**Frequency Step Size:** 1%
**Modulation:** 80%, 1kHz Amplitude Modulation.

The compliance test was performed as follows:

**Operating Mode**

Voltage and auxiliary circuits energised with reference voltage and with basic current Ib applied

**Test Results**

| MUT Port | Frequency Range (MHz) | *% Error* | Limit of % Error Variation | |
|---|---|---|---|---|
| | | | Accuracy | |
| | | | Class 0.5s | Class 0.2s |
| Voltage & Current Circuits | 0.15 to 80 | *0.12* | ±2.0 | ±1.0 |
| Auxiliary Circuits | 0.15 to 80 | *0.36* | ±2.0 | ±1.0 |

## 4.5 Surge Immunity

X-Ref 7.5.6

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Surge |
|---|---|
| Surge / JB1310214000072 | 19EMA TP18 |

The meter was tested in accordance with IEC 61000-4-5 as follows:

| | |
|---|---|
| **Ports:** | Voltage and Auxiliary Circuits |
| **Test Voltage:** | 4kV mains, 1kV auxiliary |
| **Test Mode:** | Differential |
| **Phase Angle:** | 60° and 240° relative to zero crossing |
| **Number of Tests:** | 5 positive and 5 negative |
| **Repetition Rate:** | 1/min |

**Environmental Conditions**

| | |
|---|---|
| Power Supply | 230V, 50Hz |
| Temperature | 19°C |
| Relative Humidity | 40 % |
| Barometric Pressure | 998mB |

The application of the surge immunity test voltage did not produce a change in the meter registers of more than ***x*** kWh and the test output did not produce a signal equivalent of more than ***x*** kWh, where ***x*** is given by

$$x = 10^{-6} \cdot m \cdot Un \cdot Imax$$

## 4.6 Immunity to Damped Oscillatory Waves X-Ref. 7.5.7

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Damped Oscillatory Waves |
|---|---|
| DOW / JB1310426000105 | 19EMA TP19 |

The meter was tested in accordance with IEC 61000-4-12 as follows:

**Environmental Conditions**

| | |
|---|---|
| Temperature | 20°C |
| Relative Humidity | 42% |
| Barometric Pressure | 996mB |

**Ports:** Voltage and Auxiliary Circuits
**Test Level:** Common Mode: 2.5kV
Differential Mode: 1kV
**Test Frequencies:** 100 kHz, repetition rate: 40Hz
1 MHz, repetition rate: 400Hz
**Test Duration:** 60s (15 cycles with 2s on, 2s off, for each frequency

**Operating Mode:** The meter voltage and auxiliary circuits were energised at reference voltage Un, with Ib/In
Cos. $\phi$ = 1.0 in the current circuits.

The test voltage was applied on the voltage circuits in common & differential coupling, for a test duration of 60 seconds at each polarity.

Test a)100kHz Test Frequency Results:

| 3 Phase Voltage Supply | | | Limit of % Error Variation | |
|---|---|---|---|---|
| Test Voltage(kV) | Coupling | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| No DOW's applied | - | *0.020* | - | - |
| ±1 | *L1-N* | *0.226* | ±1.0 | ±2.0 |
| ±1 | *L2-N* | *0.219* | ±1.0 | ±2.0 |
| ±1 | *L3-N* | *0.226* | ±1.0 | ±2.0 |
| ±1 | *L1-L2* | *0.027* | ±1.0 | ±2.0 |
| ±1 | *L1-L3* | *0.034* | ±1.0 | ±2.0 |
| ±1 | *L2-L3* | *0.034* | ±1.0 | ±2.0 |
| ±2.5 | *L1,L2,L3,N* | *0.167* | ±1.0 | ±2.0 |

| Auxiliary Power Supply | | | Limit of % Error Variation | |
|---|---|---|---|---|
| Test Voltage(kV) | Coupling | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| ±1 | *L1-L2* | *0.027* | ±1.0 | ±2.0 |
| ±2.5 | *L1 & L2* | *0.034* | ±1.0 | ±2.0 |

Test b) 1MHz Test Frequency Results:

| 3 Phase Voltage Supply | | | Limit of % Error Variation | |
|---|---|---|---|---|
| Test Voltage(kV) | Coupling | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| No DOW's applied | - | *0.020* | - | - |
| ±1 | *L1-N* | *0.226* | ±1.0 | ±2.0 |
| ±1 | *L2-N* | *0.234* | ±1.0 | ±2.0 |
| ±1 | *L3-N* | *0.226* | ±1.0 | ±2.0 |
| ±1 | *L1-L2* | *0.049* | ±1.0 | ±2.0 |
| ±1 | *L1-L3* | *0.034* | ±1.0 | ±2.0 |
| ±1 | *L2-L3* | *0.042* | ±1.0 | ±2.0 |
| ±2.5 | *L1,L2,L3,N* | *0.182* | ±1.0 | ±2.0 |

| Auxiliary Power Supply | | | Limit of % Error Variation | |
|---|---|---|---|---|
| Test Voltage(kV) | *Coupling* | *% Error* | Accuracy | |
| | | | Class 0.2s | Class 0.5s |
| ±1 | *L1-L2* | *0.027* | ±1.0 | ±2.0 |
| ±2.5 | *L1 & L2* | *0.020* | ±1.0 | ±2.0 |

## 4.7 Radio Interference Measurement X-Ref. 7.5.8

### Radiated Emissions

| Sample No.: | Test Procedure: IEC62052-11 Radiated Emissions |
|---|---|
| JB1310214000072 | 19EMA TP21 |

The meter was tested in accordance with EN55022 as follows:

#### Environmental Conditions

| | |
|---|---|
| Power Supply | 230V, 50Hz |
| Temperature | 21°C |
| Relative Humidity | 39% |
| Barometric Pressure | 1014mB |

The MUT compliance measurements were performed in the SGS Semi-Anechoic chamber (which is in compliance with the site attenuation requirements of EN55016-1-4:2007, A1:2008).

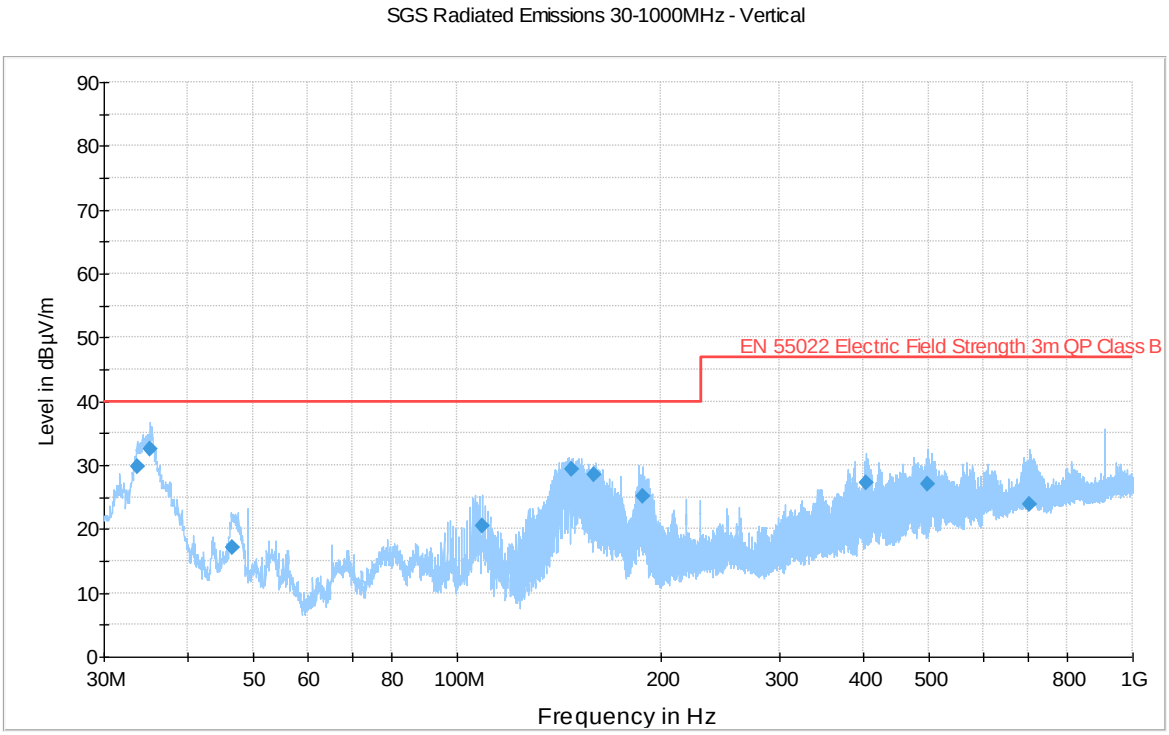
The measurement distance was 3m and the limit has been adjusted using inverse proportionality factor of 20dB per decade.

**Operating Mode:** The MUT was operated with voltage and auxiliary circuits energised with reference voltage and a current of between 0.1Iref and 0.2Iref and 1m leads attached to all terminals.

## Radiated Emissions (cont)

## Results:

## Vertical Polarisation Worst Case Emissions Compliance Measurements 30-1000MHz



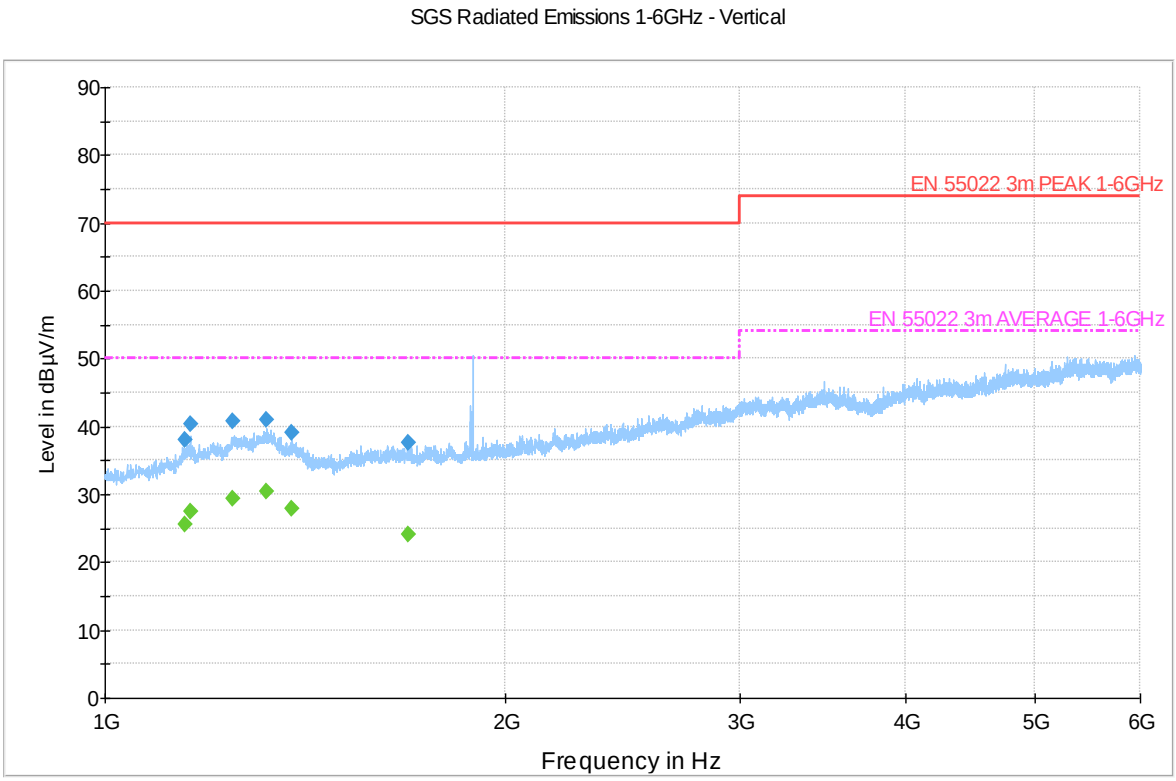

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 33.640000 | 29.8 | 15000.0 | 120.000 | 100.0 | V | 198.0 | 18.8 | 10.2 | 40.0 |
| 35.120000 | 32.6 | 15000.0 | 120.000 | 100.0 | V | 16.0 | 17.8 | 7.4 | 40.0 |
| 46.520000 | 17.1 | 15000.0 | 120.000 | 100.0 | V | 51.0 | 10.8 | 22.9 | 40.0 |
| 109.040000 | 20.5 | 15000.0 | 120.000 | 100.0 | V | 111.0 | 8.0 | 19.5 | 40.0 |
| 148.000000 | 29.5 | 15000.0 | 120.000 | 100.0 | V | 86.0 | 9.7 | 10.5 | 40.0 |
| 159.520000 | 28.4 | 15000.0 | 120.000 | 100.0 | V | 76.0 | 10.5 | 11.6 | 40.0 |
| 188.360000 | 25.1 | 15000.0 | 120.000 | 100.0 | V | 80.0 | 11.1 | 14.9 | 40.0 |
| 403.640000 | 27.3 | 15000.0 | 120.000 | 138.0 | V | 0.0 | 16.2 | 19.7 | 47.0 |
| 497.160000 | 27.1 | 15000.0 | 120.000 | 100.0 | V | 86.0 | 18.6 | 19.9 | 47.0 |
| 703.760000 | 23.8 | 15000.0 | 120.000 | 100.0 | V | 274.0 | 22.0 | 23.2 | 47.0 |

## Radiated Emissions (cont)

## Results:

## Vertical Polarisation Worst Case Emissions Compliance Measurements 1-6GHz

## Note: Emissions between 1.85-2Ghz are ambient emissions and are not produced by the MUT




### Max Peak

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| 1148.400000 | 38.0 | 15000.0 | 1000.000 | 100.0 | V | 22.0 | -13.4 | 32.0 | 70.0 | |
| 1158.800000 | 40.3 | 15000.0 | 1000.000 | 100.0 | V | 26.0 | -13.3 | 29.7 | 70.0 | |
| 1247.200000 | 40.7 | 15000.0 | 1000.000 | 100.0 | V | 358.0 | -12.5 | 29.3 | 70.0 | |
| 1323.600000 | 40.9 | 15000.0 | 1000.000 | 111.0 | V | 12.0 | -11.9 | 29.1 | 70.0 | |
| 1383.200000 | 39.1 | 15000.0 | 1000.000 | 111.0 | V | 6.0 | -11.4 | 30.9 | 70.0 | |
| 1690.800000 | 37.6 | 15000.0 | 1000.000 | 111.0 | V | 280.0 | -9.0 | 32.4 | 70.0 | |

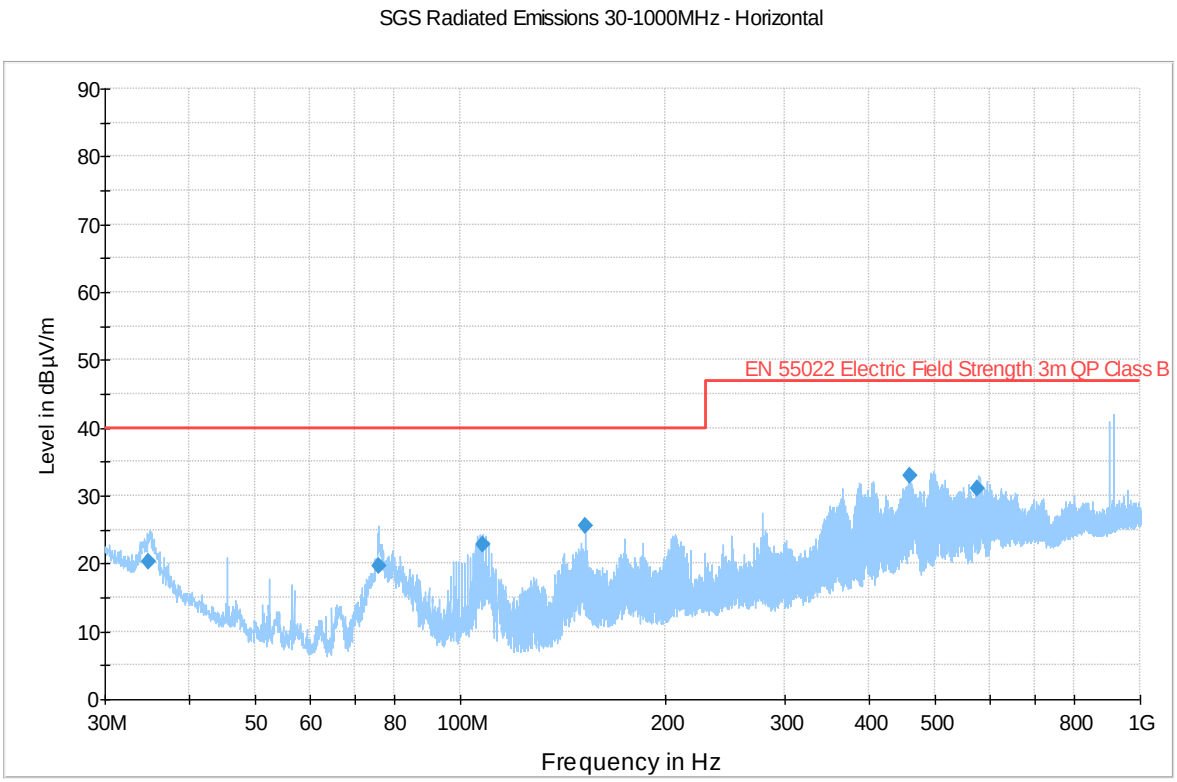
### Averages

| Frequency (MHz) | CAverage (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| 1148.400000 | 25.6 | 15000.0 | 1000.000 | 100.0 | V | 22.0 | -13.4 | 24.4 | 50.0 | |
| 1158.800000 | 27.4 | 15000.0 | 1000.000 | 100.0 | V | 26.0 | -13.3 | 22.6 | 50.0 | |
| 1247.200000 | 29.3 | 15000.0 | 1000.000 | 100.0 | V | 358.0 | -12.5 | 20.7 | 50.0 | |
| 1323.600000 | 30.4 | 15000.0 | 1000.000 | 111.0 | V | 12.0 | -11.9 | 19.6 | 50.0 | |
| 1383.200000 | 27.9 | 15000.0 | 1000.000 | 111.0 | V | 6.0 | -11.4 | 22.1 | 50.0 | |
| 1690.800000 | 24.1 | 15000.0 | 1000.000 | 111.0 | V | 280.0 | -9.0 | 25.9 | 50.0 | |

## Radiated Emissions (cont)

## Results:

## Horizontal Polarisation Worst Case Emissions Compliance Measurements 30-1000MHz



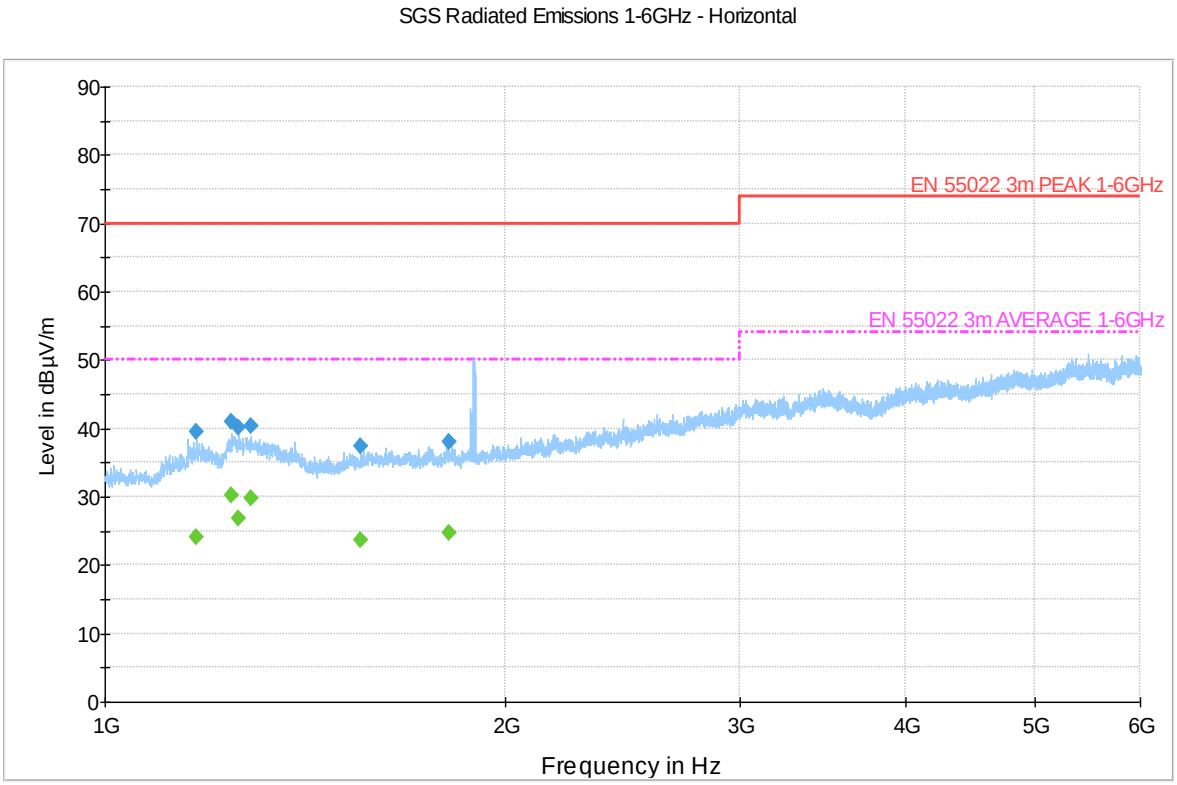

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 34.840000 | 20.3 | 15000.0 | 120.000 | 192.0 | H | 136.0 | 18.0 | 19.7 | 40.0 |
| 75.840000 | 19.7 | 15000.0 | 120.000 | 302.0 | H | 324.0 | 7.2 | 20.3 | 40.0 |
| 108.000000 | 22.9 | 15000.0 | 120.000 | 209.0 | H | 293.0 | 8.1 | 17.1 | 40.0 |
| 152.760000 | 25.6 | 15000.0 | 120.000 | 136.0 | H | 110.0 | 10.2 | 14.4 | 40.0 |
| 458.320000 | 32.9 | 15000.0 | 120.000 | 158.0 | H | 33.0 | 17.4 | 14.1 | 47.0 |
| 576.200000 | 31.0 | 15000.0 | 120.000 | 111.0 | H | 46.0 | 19.8 | 16.0 | 47.0 |

## Radiated Emissions (cont)

## Results:

## Horizontal Polarisation Worst Case Emissions Compliance Measurements 1-6GHz

## Note: Emissions between 1.85-2Ghz are ambient emissions and are not produced by the MUT




### Max Peak

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1172.400000 | 39.6 | 15000.0 | 1000.000 | 100.0 | H | 71.0 | -13.2 | 30.4 | 70.0 |
| 1245.200000 | 41.1 | 15000.0 | 1000.000 | 100.0 | H | 293.0 | -12.5 | 28.9 | 70.0 |
| 1260.800000 | 40.2 | 15000.0 | 1000.000 | 100.0 | H | 290.0 | -12.4 | 29.8 | 70.0 |
| 1286.800000 | 40.4 | 15000.0 | 1000.000 | 100.0 | H | 285.0 | -12.2 | 29.6 | 70.0 |
| 1557.200000 | 37.4 | 15000.0 | 1000.000 | 150.0 | H | 18.0 | -9.8 | 32.6 | 70.0 |
| 1815.200000 | 38.0 | 15000.0 | 1000.000 | 293.0 | H | 0.0 | -8.4 | 32.0 | 70.0 |

### Averages

| Frequency (MHz) | CAverage (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1172.400000 | 24.0 | 15000.0 | 1000.000 | 312.0 | H | 103.0 | -13.2 | 26.0 | 50.0 |
| 1245.200000 | 30.2 | 15000.0 | 1000.000 | 100.0 | H | 285.0 | -12.5 | 19.8 | 50.0 |
| 1260.800000 | 26.8 | 15000.0 | 1000.000 | 100.0 | H | 309.0 | -12.4 | 23.2 | 50.0 |
| 1286.800000 | 29.8 | 15000.0 | 1000.000 | 100.0 | H | 285.0 | -12.2 | 20.2 | 50.0 |
| 1557.200000 | 23.6 | 15000.0 | 1000.000 | 233.0 | H | 104.0 | -9.8 | 26.4 | 50.0 |
| 1815.200000 | 24.6 | 15000.0 | 1000.000 | 150.0 | H | 52.0 | -8.4 | 25.4 | 50.0 |

## Conducted Emissions

| Sample No.: | Test Procedure: IEC62052-11 Conducted Emissions |
|---|---|
| JB1310214000072 | 19EMA TP21 |

The meter was tested in accordance with EN55022 as follows:

### Environmental Conditions

| | |
|---|---|
| Power Supply | 230V, 50Hz |
| Temperature | 20°C |
| Relative Humidity | 40% |
| Barometric Pressure | 998mB |

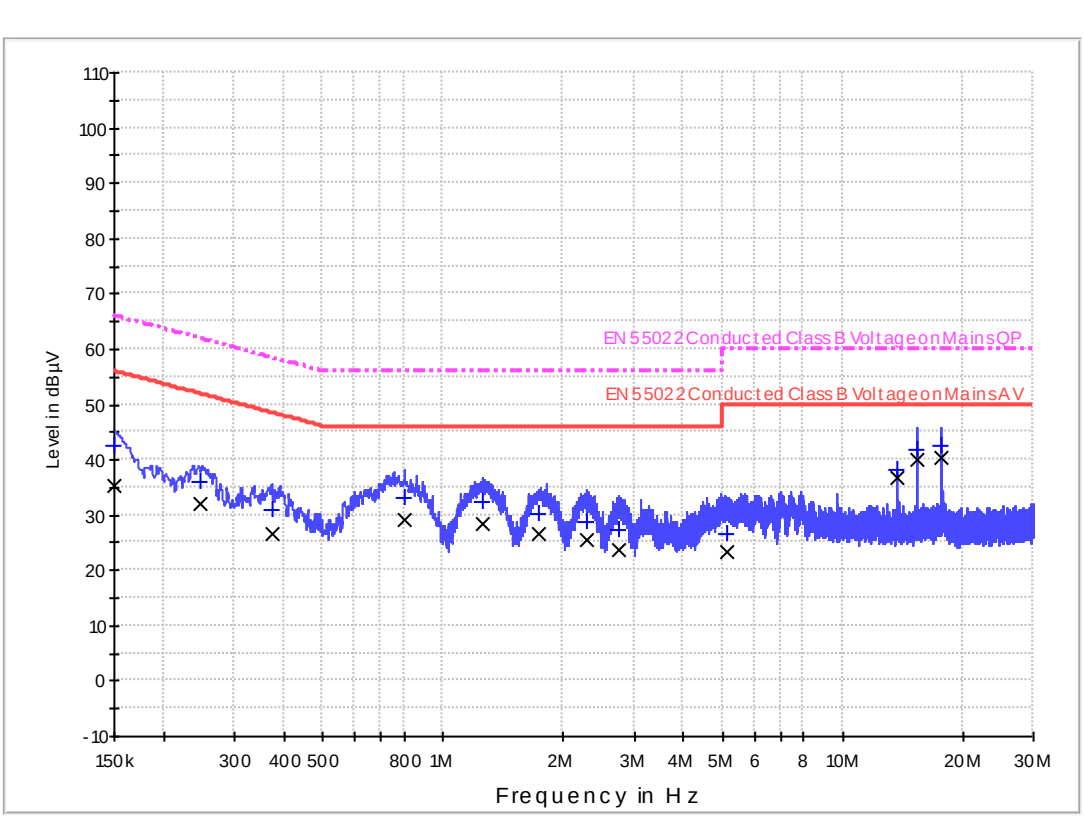
The emissions on the AC mains were measured in the frequency range 0.15 – 30 MHz

**Operating Mode:** The MUT was operated with voltage and auxiliary circuits energised with reference voltage and a current of between 0.1Iref and 0.2Iref and 1m leads attached to all terminals.

## Conducted Emissions (cont)

## Results:

## Line 1 Terminal Worst Case Emissions Compliance Measurements

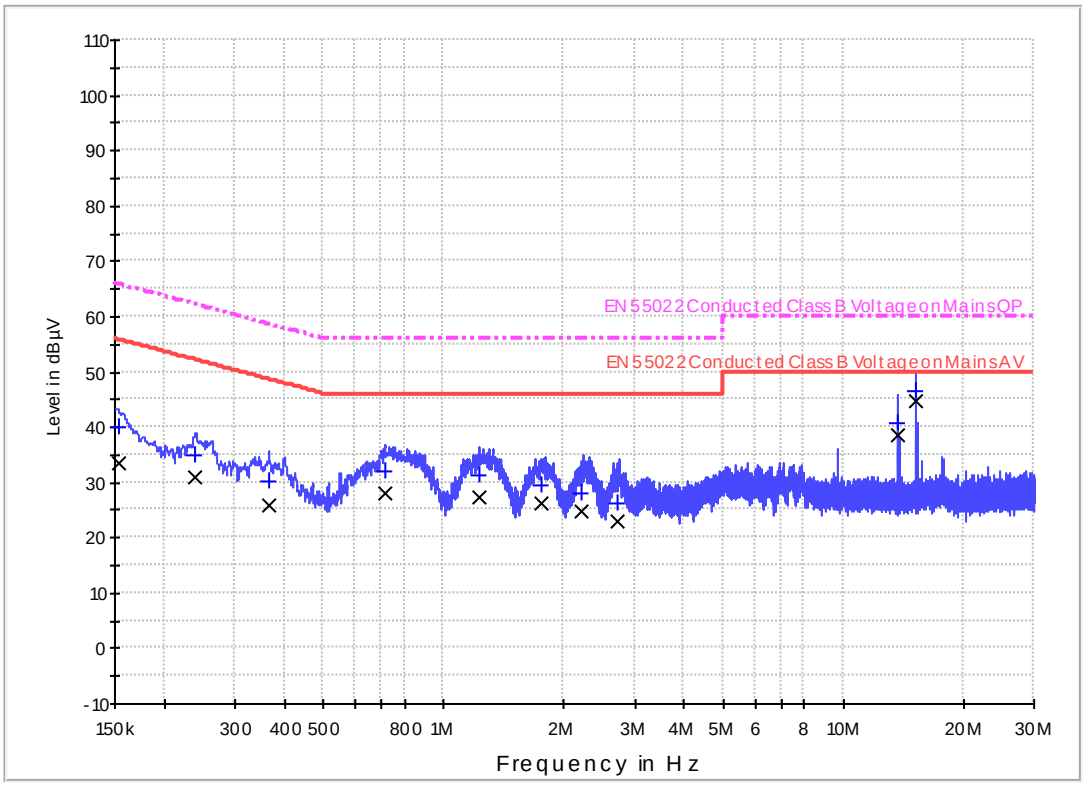



| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Corr. (dB) | Comment |
|---|---|---|---|---|---|---|
| 0.150481 | 42.7 | 35.2 | 15000.0 | 9.000 | 9.1 | |
| 0.245288 | 36.1 | 32.1 | 15000.0 | 9.000 | 9.2 | |
| 0.372819 | 31.1 | 26.8 | 15000.0 | 9.000 | 9.2 | |
| 0.798244 | 33.1 | 29.1 | 15000.0 | 9.000 | 9.3 | |
| 1.250619 | 32.4 | 28.5 | 15000.0 | 9.000 | 9.3 | |
| 1.731388 | 30.3 | 26.8 | 15000.0 | 9.000 | 9.3 | |
| 2.278569 | 28.8 | 25.4 | 15000.0 | 9.000 | 9.3 | |
| 2.744900 | 27.3 | 23.6 | 15000.0 | 9.000 | 9.4 | |
| 5.146750 | 26.7 | 23.3 | 15000.0 | 9.000 | 9.9 | |
| 13.711250 | 38.1 | 36.7 | 15000.0 | 9.000 | 10.6 | |
| 15.409000 | 41.8 | 40.2 | 15000.0 | 9.000 | 10.7 | |
| 17.630000 | 42.5 | 40.3 | 15000.0 | 9.000 | 10.6 | |

## Conducted Emissions (cont)

## Results:

## Line 2 Terminal Worst Case Emissions Compliance Measurements

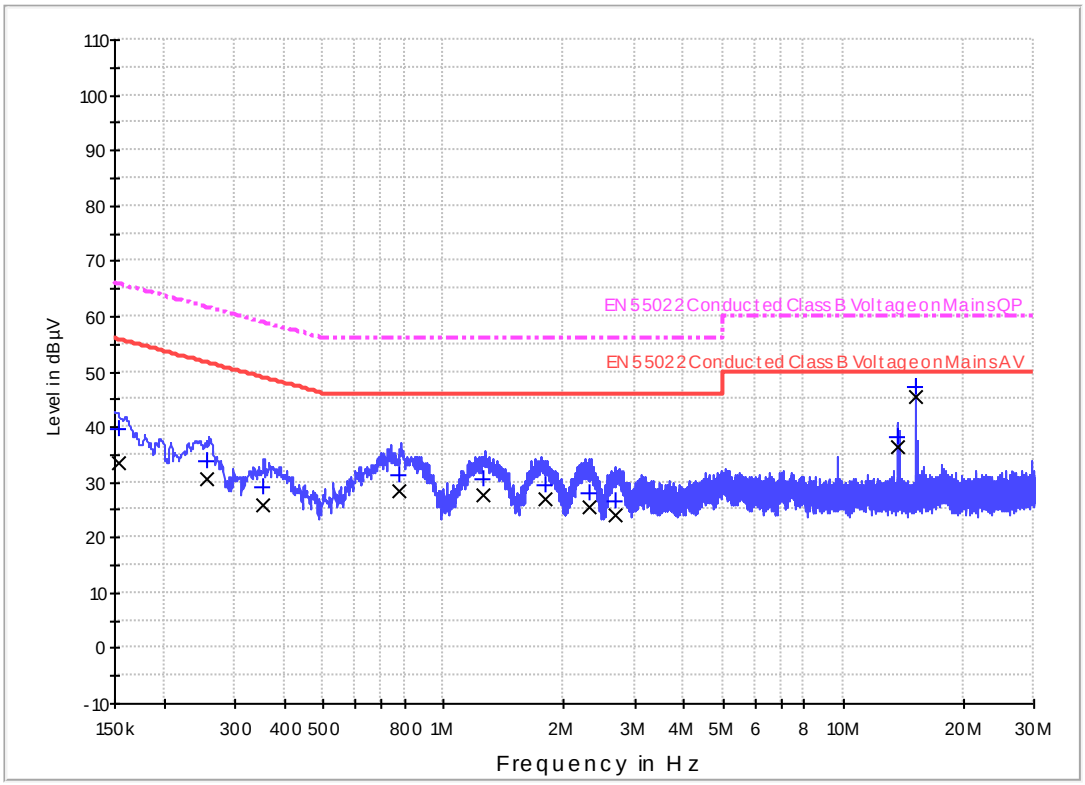



| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Corr. (dB) | Comment |
|---|---|---|---|---|---|---|
| 0.153850 | 40.1 | 33.4 | 15000.0 | 9.000 | 9.1 | |
| 0.237106 | 35.0 | 31.0 | 15000.0 | 9.000 | 9.2 | |
| 0.709212 | 32.0 | 27.9 | 15000.0 | 9.000 | 9.3 | |
| 1.228481 | 31.2 | 27.4 | 15000.0 | 9.000 | 9.3 | |
| 1.753525 | 29.7 | 26.4 | 15000.0 | 9.000 | 9.3 | |
| 2.214081 | 27.9 | 24.8 | 15000.0 | 9.000 | 9.3 | |
| 2.727575 | 26.3 | 22.8 | 15000.0 | 9.000 | 9.4 | |
| 13.682375 | 40.6 | 38.6 | 15000.0 | 9.000 | 10.6 | |
| 15.243000 | 46.4 | 44.6 | 15000.0 | 9.000 | 10.7 | |
| 0.366562 | 30.1 | 25.9 | 15000.0 | 9.000 | 9.2 | |

## Conducted Emissions (cont)

## Results:

## Line 3 Terminal Worst Case Emissions Compliance Measurements



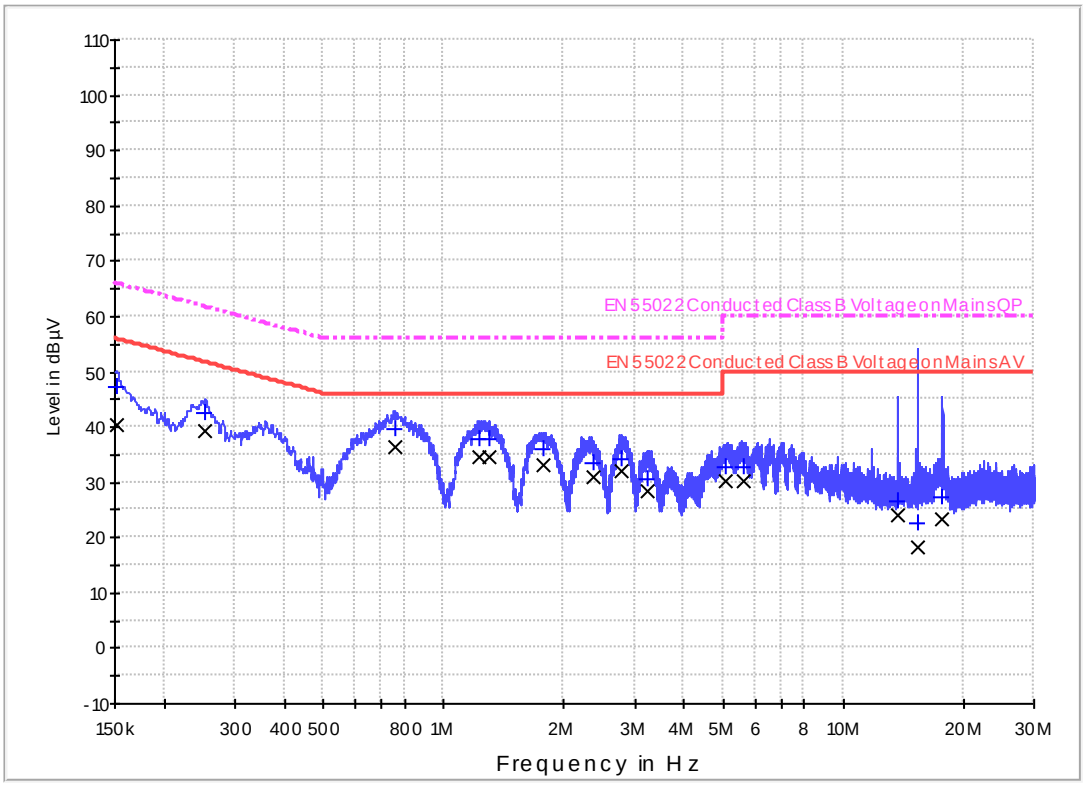

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Corr. (dB) | Comment |
|---|---|---|---|---|---|---|
| 0.154331 | 39.5 | 33.4 | 15000.0 | 9.000 | 9.1 | |
| 0.254431 | 34.0 | 30.7 | 15000.0 | 9.000 | 9.2 | |
| 0.353569 | 29.0 | 25.7 | 15000.0 | 9.000 | 9.2 | |
| 0.775625 | 31.4 | 28.2 | 15000.0 | 9.000 | 9.3 | |
| 1.251100 | 30.7 | 27.8 | 15000.0 | 9.000 | 9.3 | |
| 1.786250 | 29.4 | 26.9 | 15000.0 | 9.000 | 9.3 | |
| 2.313219 | 28.2 | 25.6 | 15000.0 | 9.000 | 9.3 | |
| 2.673194 | 26.5 | 24.0 | 15000.0 | 9.000 | 9.4 | |
| 13.678875 | 38.3 | 36.5 | 15000.0 | 9.000 | 10.6 | |
| 15.242000 | 47.4 | 45.3 | 15000.0 | 9.000 | 10.7 | |

## Conducted Emissions (cont)

## Results:

## Neutral Terminal Worst Case Emissions Compliance Measurements

Mains Terminals 0.15-30MHz PEAKS

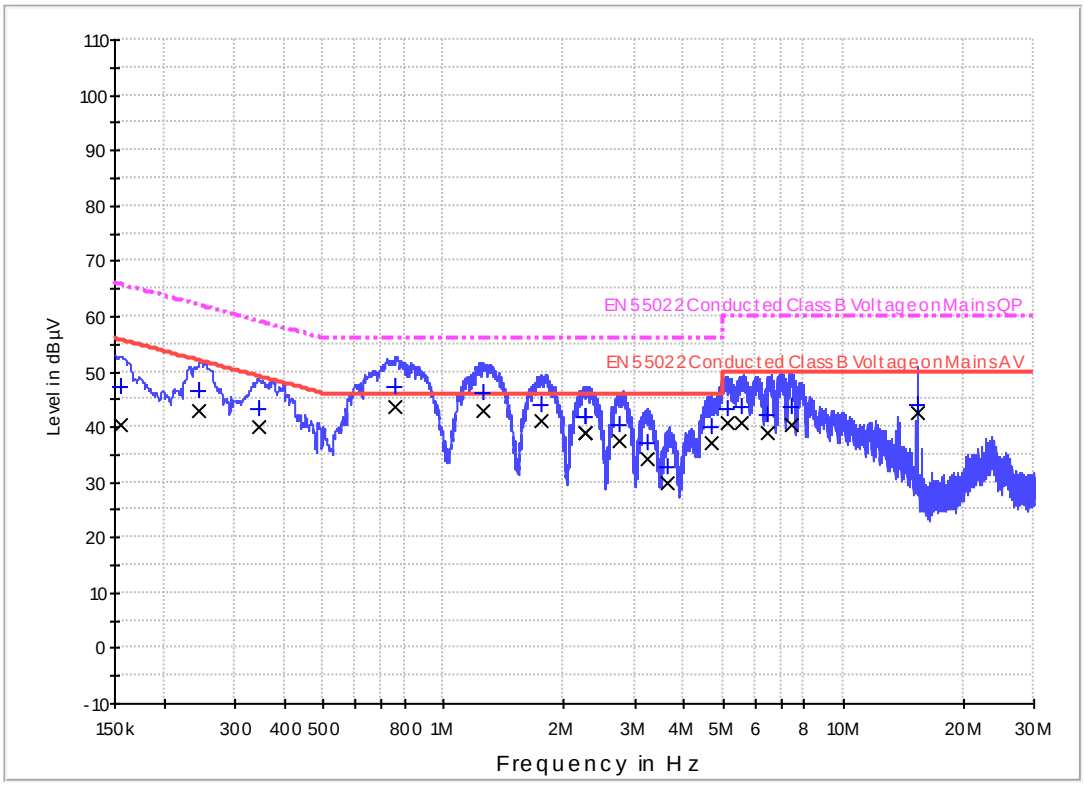



| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Corr. (dB) | Comment |
|---|---|---|---|---|---|---|
| 0.151925 | 47.2 | 40.5 | 15000.0 | 9.000 | 9.1 | |
| 0.251062 | 42.5 | 39.4 | 15000.0 | 9.000 | 9.2 | |
| 0.753488 | 39.5 | 36.2 | 15000.0 | 9.000 | 9.3 | |
| 1.219338 | 37.8 | 34.7 | 15000.0 | 9.000 | 9.3 | |
| 1.299225 | 37.8 | 34.7 | 15000.0 | 9.000 | 9.3 | |
| 1.764112 | 36.1 | 33.3 | 15000.0 | 9.000 | 9.3 | |
| 2.371931 | 33.4 | 30.9 | 15000.0 | 9.000 | 9.3 | |
| 2.770406 | 34.4 | 31.9 | 15000.0 | 9.000 | 9.4 | |
| 3.240588 | 30.8 | 28.3 | 15000.0 | 9.000 | 9.5 | |
| 5.078875 | 32.8 | 30.1 | 15000.0 | 9.000 | 9.9 | |
| 5.620750 | 32.7 | 30.1 | 15000.0 | 9.000 | 10.0 | |
| 13.712125 | 26.8 | 24.1 | 15000.0 | 9.000 | 10.6 | |
| 15.409000 | 22.6 | 18.4 | 15000.0 | 9.000 | 10.7 | |
| 17.629000 | 27.5 | 23.3 | 15000.0 | 9.000 | 10.6 | |

## Conducted Emissions (cont)

## Results:

## Line 1 Auxiliary Voltage Terminal Worst Case Emissions Compliance Measurements



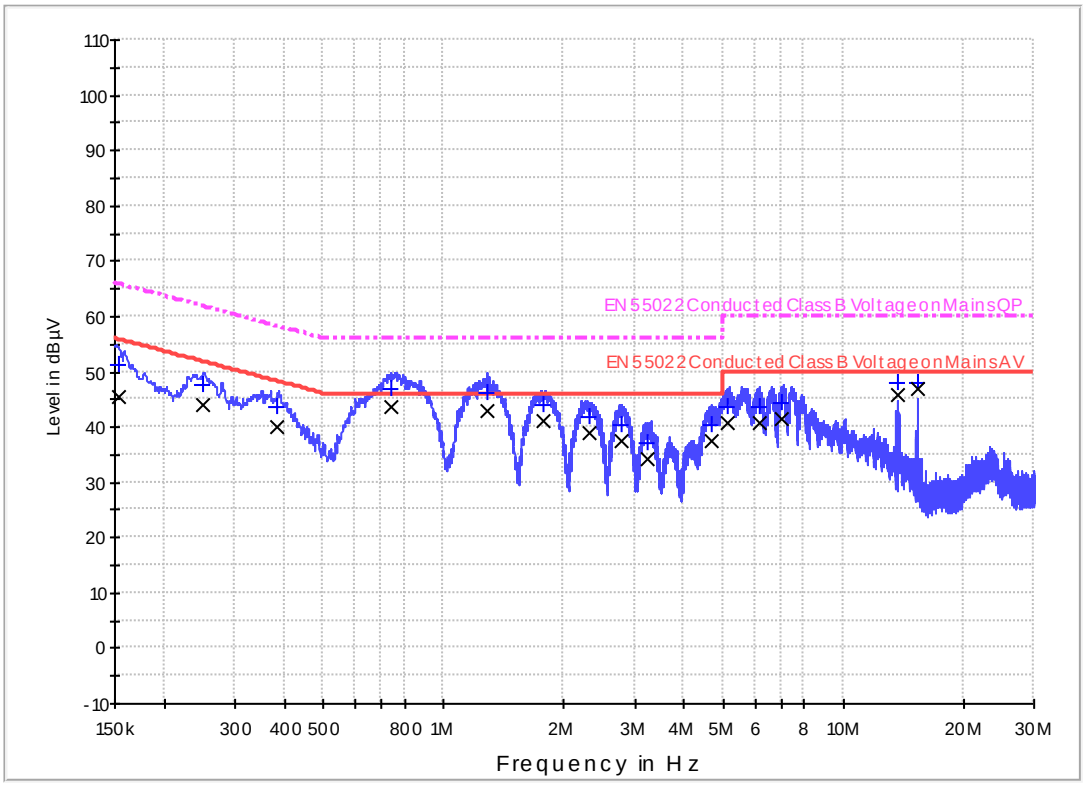

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Corr. (dB) | Comment |
|---|---|---|---|---|---|---|
| 0.155294 | 47.4 | 40.5 | 15000.0 | 9.000 | 9.2 | |
| 0.244806 | 46.5 | 43.0 | 15000.0 | 9.000 | 9.2 | |
| 0.343944 | 43.4 | 39.9 | 15000.0 | 9.000 | 9.3 | |
| 0.754450 | 47.2 | 43.8 | 15000.0 | 9.000 | 9.3 | |
| 1.253025 | 46.2 | 43.0 | 15000.0 | 9.000 | 9.3 | |
| 1.751119 | 44.0 | 41.1 | 15000.0 | 9.000 | 9.3 | |
| 2.256431 | 41.7 | 39.0 | 15000.0 | 9.000 | 9.4 | |
| 2.259800 | 41.7 | 39.0 | 15000.0 | 9.000 | 9.4 | |
| 2.744900 | 40.5 | 37.6 | 15000.0 | 9.000 | 9.4 | |
| 3.226150 | 37.2 | 34.3 | 15000.0 | 9.000 | 9.5 | |
| 3.640506 | 32.8 | 29.8 | 15000.0 | 9.000 | 9.6 | |
| 4.660000 | 39.9 | 37.1 | 15000.0 | 9.000 | 9.7 | |
| 5.112250 | 43.4 | 40.6 | 15000.0 | 9.000 | 9.7 | |
| 5.576500 | 43.5 | 40.6 | 15000.0 | 9.000 | 9.8 | |
| 6.496000 | 42.3 | 38.8 | 15000.0 | 9.000 | 9.9 | |
| 7.393750 | 43.6 | 40.4 | 15000.0 | 9.000 | 9.9 | |
| 15.433000 | 44.1 | 42.7 | 15000.0 | 9.000 | 10.3 | |

## Conducted Emissions (cont)

## Results:

## Line 2 Auxiliary Voltage Terminal Worst Case Emissions Compliance Measurements

Mains Terminals 0.15-30MHz PEAKS




| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Corr. (dB) | Comment |
|---|---|---|---|---|---|---|
| 0.154331 | 51.4 | 45.6 | 15000.0 | 9.000 | 9.2 | |
| 0.249619 | 47.7 | 44.2 | 15000.0 | 9.000 | 9.2 | |
| 0.381962 | 43.7 | 39.9 | 15000.0 | 9.000 | 9.3 | |
| 0.736644 | 47.1 | 43.7 | 15000.0 | 9.000 | 9.3 | |
| 1.279494 | 46.2 | 43.0 | 15000.0 | 9.000 | 9.3 | |
| 1.764112 | 44.0 | 41.1 | 15000.0 | 9.000 | 9.3 | |
| 2.306481 | 41.8 | 39.1 | 15000.0 | 9.000 | 9.4 | |
| 2.769925 | 40.5 | 37.6 | 15000.0 | 9.000 | 9.4 | |
| 3.243475 | 37.1 | 34.2 | 15000.0 | 9.000 | 9.5 | |
| 4.658125 | 40.4 | 37.5 | 15000.0 | 9.000 | 9.7 | |
| 5.151250 | 43.6 | 40.8 | 15000.0 | 9.000 | 9.7 | |
| 6.139750 | 43.5 | 40.7 | 15000.0 | 9.000 | 9.8 | |
| 7.043750 | 44.3 | 41.3 | 15000.0 | 9.000 | 9.9 | |
| 13.762000 | 47.9 | 46.0 | 15000.0 | 9.000 | 10.3 | |
| 15.437000 | 48.2 | 46.9 | 15000.0 | 9.000 | 10.3 | |

## 5 CLIMATIC INFLUENCES IEC 62052-11 X-Ref. 6

### 5.1 Dry Heat Test X-Ref. 6.3.1

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Dry Heat |
|---|---|
| Dry Heat / 340090000120 | 19EMA TP07 |

The meter was tested in accordance with IEC 60068-2-2 as follows:

Meter in the non-operating condition
Temperature +85°C ± 2°C
Duration of the test 72h

On completion of the above test the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions with no signs of damage or degradation in the meter's insulation properties.

### 5.2 Cold Test X-Ref. 6.3.2

| Test Results ID / Sample No. | Test Procedure: EN62052-11 Cold |
|---|---|
| Cold / 340000002001 | 19EMA TP08 |

The meter was tested in accordance with IEC 60068-2-1 as follows:

Meter in the non-operating condition
Temperature -40°C ± 3°C
Duration of the test 72h

On completion of the above test the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions, with no signs of damage or corruption to meter register data.

### 5.3 Damp Heat, Cyclic Test X-Ref. 6.3.3

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Damp Heat |
|---|---|
| Damp Heat / 340060001062 | 19EMA TP09 |

The meter was tested in accordance with IEC 60068-2-30 as follows:

Meter with reference voltage applied
Upper Temperature of +40°C
Duration of the test: 6 cycles

On completion of the above test the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions with no signs of damage or degradation in the meter's insulation properties.

## 6 MECHANICAL REQUIREMENTS IEC 62052-11 X-Ref. 5.2.2

### 6.1 Spring Hammer Test X-Ref. 5.2.2.1

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Spring Hammer |
|---|---|
| Spring Hammer / 340000002002 | 19EMA TP01 |

**Environmental Conditions**

| | |
|---|---|
| Temperature | 22°C |
| Relative Humidity | 42% |
| Barometric Pressure | 1001mB |

The meter was tested in accordance with IEC 60068-2-75 as follows:

Kinetic Energy of Spring Hammer 0.2 Nm ± 0.05 Nm

The meter case and terminal cover where acted upon all external surfaces, including the display window. After the test no damage was evident and the meter continued to function correctly.

## 6.2 Shock Test X-Ref. 5.2.2.2

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Shock |
|---|---|
| Shock / 340060001062 | 19EMA TP02 |

**Environmental Conditions**

| | |
|---|---|
| Temperature | 21°C |
| Relative Humidity | 51% |
| Barometric Pressure | 1008mB |

The meter was tested in accordance with IEC 60068-2-27 as follows:

Meter in the non-operating condition
Half Sine Pulse
Peak Acceleration of 30 gn (300 $m/s^2$)
Pulse Duration of 18 ms

On completion of the above tests the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions.

## 6.3 Vibration Test X-Ref. 5.2.2.3

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Vibration |
|---|---|
| Vibration / 340060001062 | 19EMA TP03 |

**Environmental Conditions**

| | |
|---|---|
| Temperature | 21°C |
| Relative Humidity | 51% |
| Barometric Pressure | 1008mB |

The meter was tested in accordance with IEC 60068-2-6 as follows:

Meter in the non-operating condition
Test Procedure A
Frequency Range of 10 Hz to 150 Hz (Transition frequency of 60 Hz)
For F < 60 Hz, constant amplitude of movement 0.075 mm
For F > 60 Hz, constant acceleration of 9.8 $m/s^2$ (1g)
10 sweep cycles per axis

On completion of the above test the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions.

## 6.4 Resistance to Heat & Fire

X-Ref. 5.8

| Test Results ID / Sample No. | Test Procedure: IEC62052-11 Heat & Fire |
|---|---|
| Heat & Fire / 340090000114 & New Case Sample No. 1 | 19EMA TP04 |

The meter was tested in accordance with IEC 60695-2-11 as follows:

Terminal block tested at 960°C for 30 seconds.

**Result:** Flames extinguish with 30 seconds when glow wire removed.

Terminal cover and meter case tested at 650°C for 30 seconds.

**Result:** No flames or drips occur.

## 6.5 Penetration of Dust & Water X-Ref. 5.9

At the request of Schneider the meter was fitted to an IP66 rated enclosure for the dust and water ingress tests

### Penetration of Dust

| | |
|---|---|
| Sample No:<br>Sample 340000002002 | Test Procedure: IEC50470-1 Dust & Water<br>19EMA TP05 |

The penetration of dust test was conducted at an external accredited laboratory as given in the supporting documentation

The ac/impulse voltage tests were performed at SGS (UK)

The meter was tested in accordance with IEC 60529 as follows:

Dust Test: IP5X, non-operating condition, Neither under, nor over pressure

On completion of the above test, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions with no signs of damage or degradation in the meter's insulation properties.

### Penetration of Water

| | |
|---|---|
| Sample No:<br>Sample 340000002003 | Test Procedure: IEC50470-1 Dust & Water<br>19EMA TP05 |

The meter was tested in accordance with IEC 60529 as follows:

Water Test: IPX1, non-operating condition

On completion of the above test, the meter was found to function correctly and within the accuracy specification when subsequently operated under reference operating conditions with no signs of damage or degradation in the meter's insulation properties.

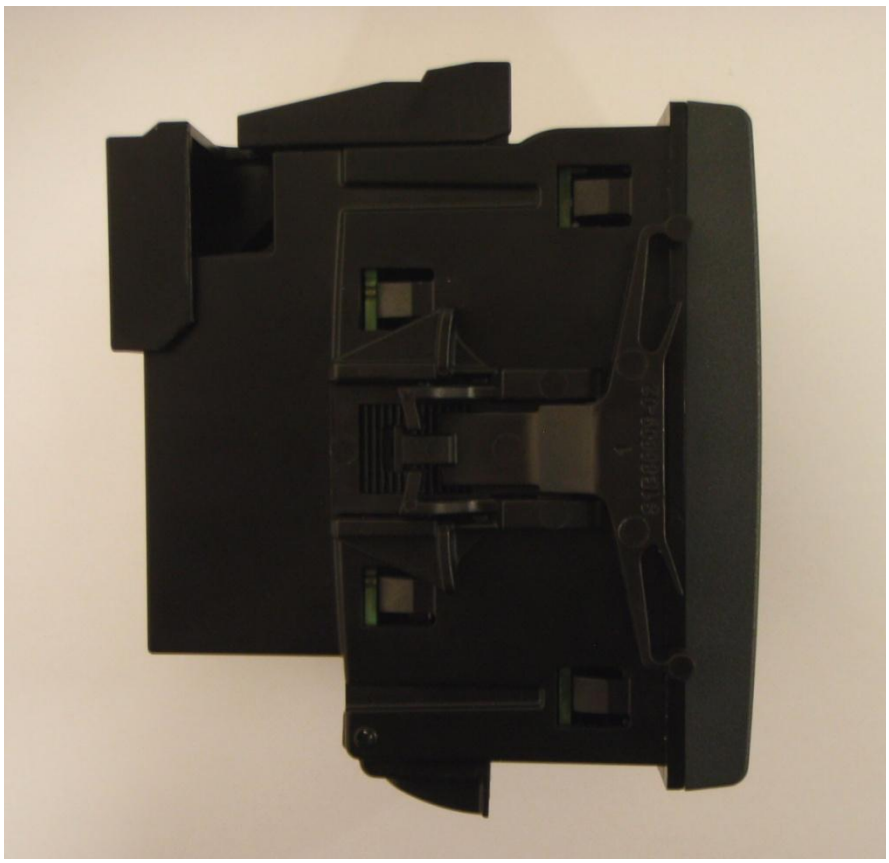
## ANNEX A Photographs of Meter Under Test

**Front View**


**Rear View**

## Photographs of Meter Under Test (cont)

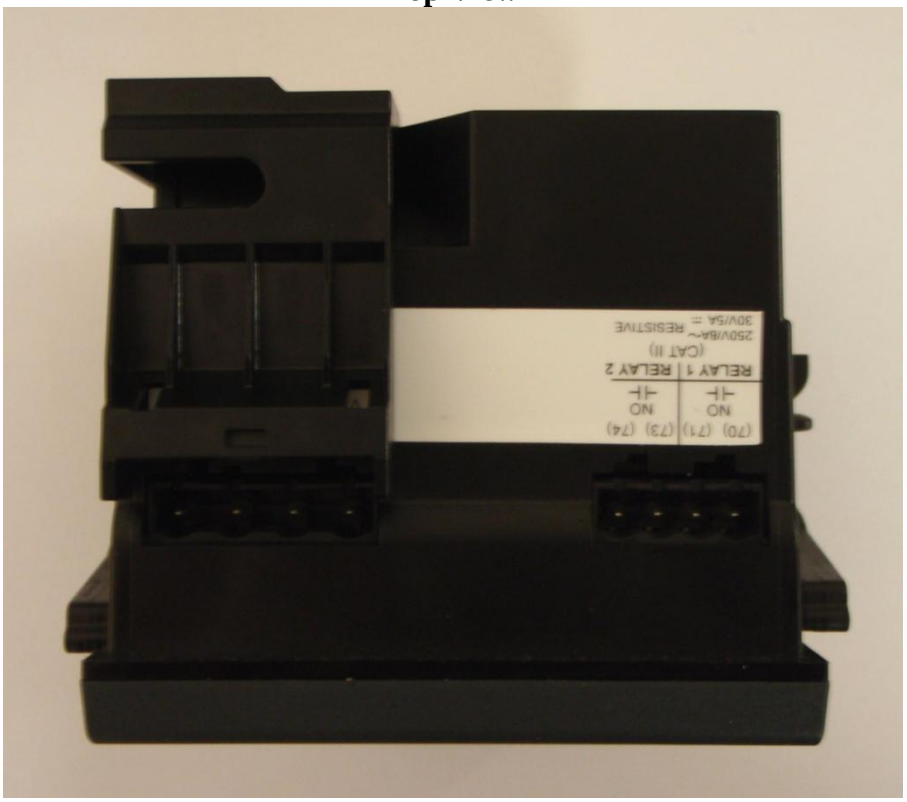
**LHS View**



**RHS View**

## Photographs of Meter Under Test (cont)

### Top View




### Bottom View