TEST REPORT

Report reference No	289240-1
Tested by (printed name and signature)	Mikko Välimäki
Approved by (printed name and signature)	Jari Karlsson
Date of issue	20.9.2017

Testing Laboratory Name	SGS Fimko Ltd.
Address	Särkiniementie 3 (P.O. Box 30), 00211 Helsinki, Finland
Testing location	☐ SGS Fimko ☒ Client's premisis ☐ Other lab
Address	Eaton Power Quality Oy, Koskelontie 13, FI-02920 Espoo, Finland

Client's Name	Eaton Power Quality Oy
Address	Koskelontie 13,
.....	FI-02920 Espoo, Finland

Test specification	
Standard	IEC 62040-3:2011
Procedure deviation	Measurements described in Annex J are performed in 10% load steps and in addition to Normal mode/Double conversion mode also in Energy Saver System (ESS) mode
Non-standard test method	N/A

Test item description	UPS
Manufacturer	Eaton Power Quality Oy
Trademark	EATON Powering Business Worldwide
Model and/or type reference	93PM-500(500)
Serial number	GIPA-PROTO4
Rating(s)	380/400/415 VAC; 50/60 Hz; 800/800/800 A
Date of receipt of test item	-
Remarks of test item	-
Date(s) of performance of test	6 - 8.9.2017

General remarks

This partial testing does not prove that the product fulfils all the requirements of the standard or EU directives

Throughout this report a comma (point) is used as the decimal separator.

Additional information of test items:

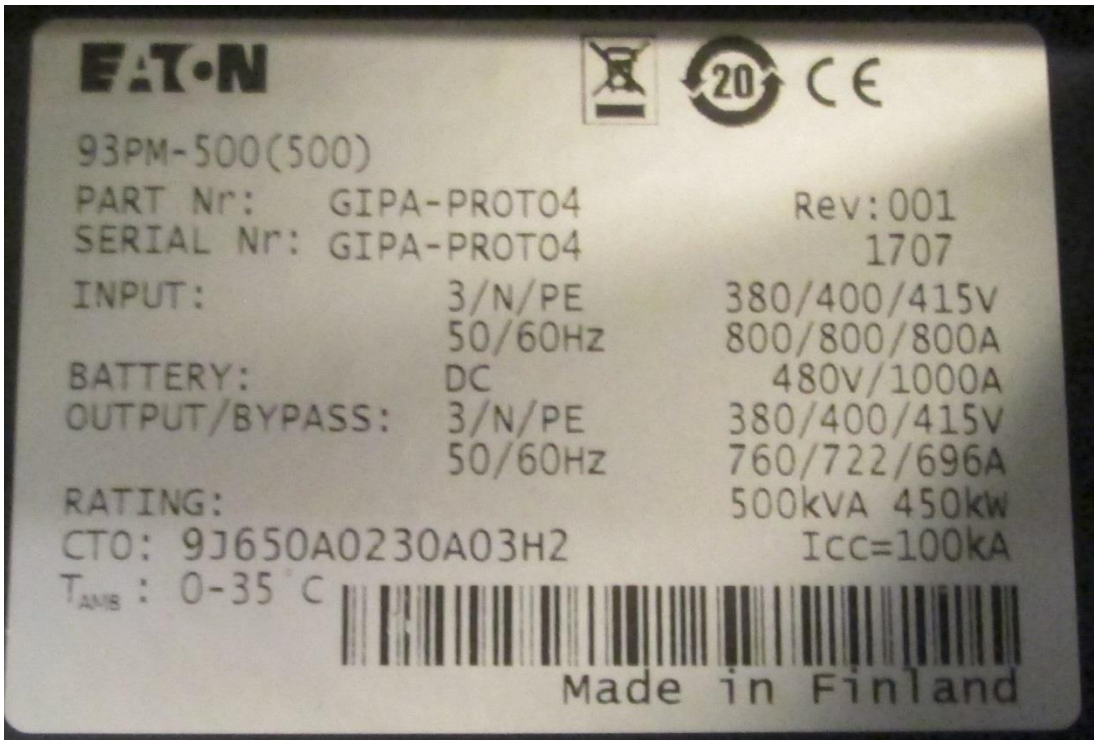
EUT description:	**Serial nr:**
93PM 500 kVA	GIPA-PROTO4

FW versions

MCU:	**MCU PLD**	**UPM:**	**UPM PLD**	**CSB:**	**Display**
1.38.03	0.23	1.38.03	0.90	1.38.04	1.38

HW versions:
Proto

Copy of marking plate:



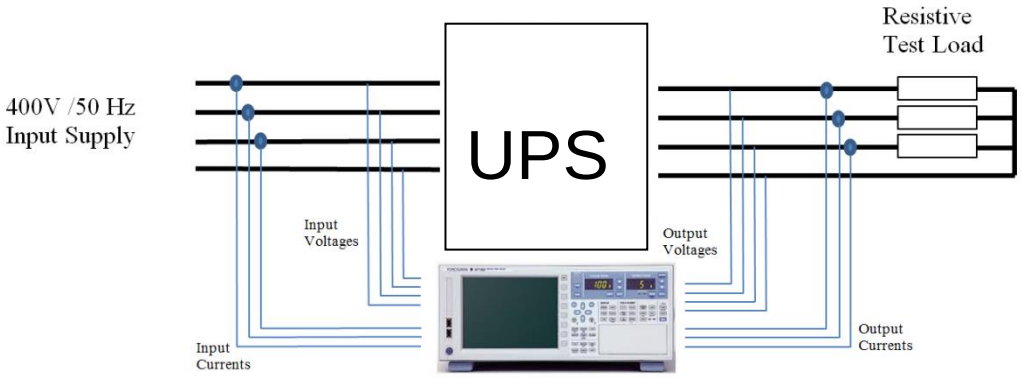
Summary of test results:

The efficiency tests are performed according to IEC 62040-3:2011 Annex J and are tested in client's premesis under the supervision of SGS Fimko Ltd. The UPS efficiency is tested in Double conversion mode and Energy Saver System (ESS) mode. Double conversion mode is same as normal mode described in IEC 62040-3:2011 Annex J. On ESS mode the UPS provides mains current directly to load. Recorded test result are shown on page 5 and all test data in Attachment-1. Load levels defined by the standard are written in bold on page 5.

Eaton Efficiency Measurement Method:

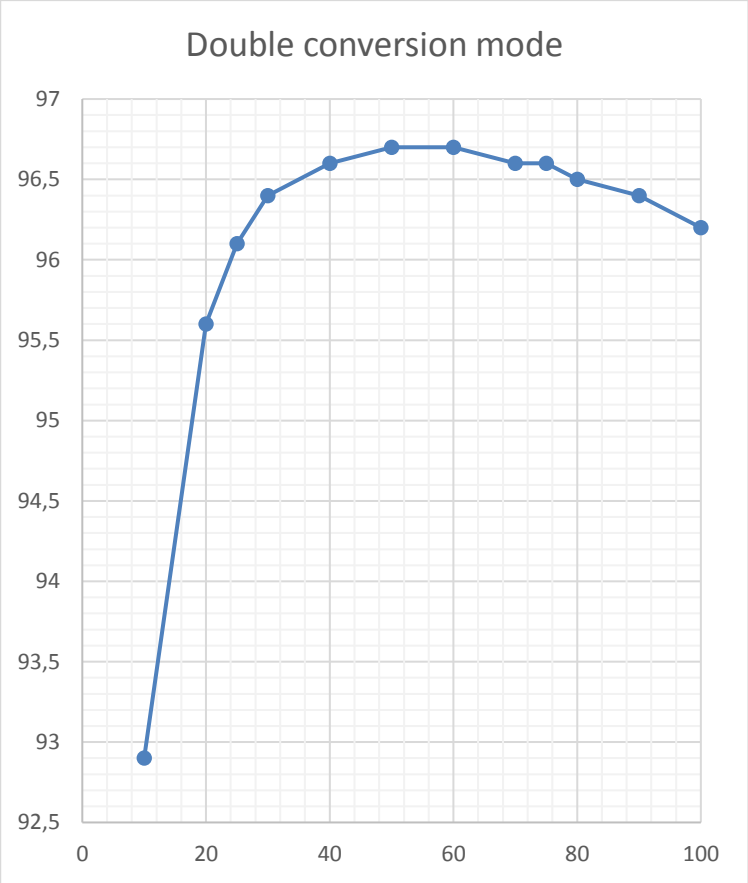
Test procedure published in standard IEC 62040-3:2011, Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements, is used to determine the UPS efficiency.

Efficiency measurement is performed while the UPS operates in normal mode at 25%, 50%, 75%, and at 100% load levels as required by the standard. Efficiency measurement is also performed with 10% load steps. 3 phase input phase-to-neutral supply voltage is stabilized to 230VAC ± 3% and frequency is stabilized to 50Hz ± 1% as required by the standard. An adjustable resistive load with unity power factor is used. At each load level the load is adjusted to create a loading condition within 95% to 105% of the intended load. During measurements of double conversion mode the battery is disconnected to prevent transfer of energy to and from the battery. During measurements of ESS mode the batteries are connected but the charger is turned off. At each load level the UPS is allowed to operate until the temperatures have stabilized. The efficiencies are measured starting from 100% load level and sequentially stepping the load down to 10%. Yokogawa WT1800 6-channel power analyzer is used to measure both input and output power of the UPS. Ambient temperature and relative humidity are measured during testing. Rectifier input and bypass input have been connected together and their combined power draw is considered the input power. Power measurements are based on measuring all phase-to-neutral voltages and all phase currents. Zero-flux measuring system is used for current measurements. The active (W) and apparent (VA) input and output power are measured simultaneously in three successive readings. UPS efficiency is calculated for each reading, and the arithmetic mean of these 3 readings is obtained. This result is declared as the UPS efficiency at the specific load level.

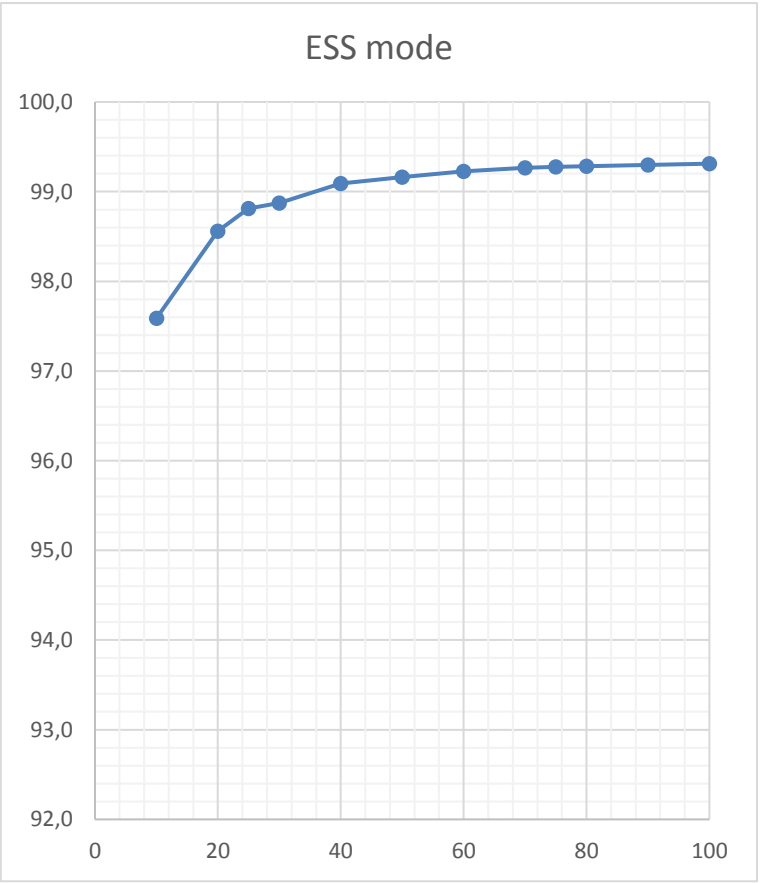


6-ch 3-phase Power Analyzer

Double conversion mode		
Load (%)	**Power (kW)**	**Efficiency (%)**
100	**444,8**	**96,2**
90	400,1	96,4
80	357,5	96,5
75	**334,9**	**96,6**
70	312,3	96,6
60	267,4	96,7
50	**224,4**	**96,7**
40	179,4	96,6
30	134,5	96,4
25	**113,0**	**96,1**
20	90,3	95,6
10	45,1	92,9



ESS mode		
Load (%)	**Power (kW)**	**Efficiency (%)**
100	**444,8**	**99,3**
90	400,1	99,3
80	357,5	99,3
75	**334,9**	**99,3**
70	312,3	99,3
60	267,4	99,2
50	**224,5**	**99,2**
40	179,4	99,1
30	134,5	98,9
25	**113,0**	**98,8**
20	90,3	98,6
10	45,1	97,6



Test method:	IEC 62040-3:2011 Annex J
Test equipments used:	Power meter Yokogawa WT1800, Asset no. TK-0250, Calibration valid 02/2018 Humidity and temperature meter Fluke 971, Asset no. TK-0289, Calibration valid 3/2018 Digital recorder Yokogawa DR230 Thermometer/printer, Asset no. TU-0708, Calibration valid 4/2018 Zero-flux measuring system Hitec CURACC, Asset no. TK-149, Calibration valid 1/2018 Zero-flux measuring system Hitec CURACC, Asset no. TK-150, Calibration valid 1/2018
Ambient temperature and relative humidity during testing:	Double conversion mode: Temperature 24,6 °C to 25,2 °C and relative humidity 24,2 % to 32,4 %. ESS mode: Temperature 24,3 °C to 24,7 °C and relative humidity 32,4 % to 33,9 %.
Input phase-to-neutral voltage during testing:	Double conversion mode: 232,4 VAC to 234,9 VAC ESS mode: 231,3 VAC to 235,4 VAC