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Staatliche Versuchsanstalt

Elektrotechnik und Elektronik

FEDERAL INSTITUTE OF TECHNOLOGY
 ELECTRICAL AND
 ELECTRONIC ENGINEERING

MEASURING - REPORT

TGM – VA EE 33407A

Power measurement on
 energy saving systems
 Manufacturer: Keseco
 Type: Ultra



Commissioned by:

Address:

Order reached:

Sign of order:

Receiving of test sample(s): 3317 / 2010-06-15

Test period: KW 24-26/2010

TGM-number: 515/10

chartner GmbH & CoKG

erstrasse 60

g, Industriestraße 19



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tgm

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MEASURING - REPORT

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Power measurement on
energy saving systems
Manufacturer: Keseco
Type: Ultra

| | |
|------------------------------|--|
| Commissioned by: | Dodeka Ltd. / Elektro Schartner GmbH & CoKG |
| Address: | A-8045 Graz, Satteggerstrasse 60 / A-5600 St. Johann i. Pg., Industriestraße 19 |
| Order reached: | 2010-09-22 |
| Sign of order: | Hr. S. Nestler |
| Receiving of test sample(s): | 3317 / 2010-06-15 |
| Test period: | KW 24-26/2010 |
| TGM-number: | 515/10 |



1 Test order

As ordered we carried out the power consumption and the performance of the energy saving system “Keseco Ultra” by measuring sample applications. The measurements were carried out on the same sample applications with- and without the energy saving system “Keseco Ultra”.

2 Test item

Energy saving system: Keseco Ultra

Manufacturer: Keseco

8F, Namyong Bldg., 284-49 Sung Su-Dong 2Ga, Sung Dong-Gu, Seoul, Korea

Type: U-803; U-804

Number of test samples: one per type

Ratings: U-803: nominal voltage: 100-600 V, 50/60 Hz

nominal power: 5 kVA

supply line length: 102 cm

serial number: H51004201K 107 N

dimensions: (140x90,3x40,6) mm

U-804: nominal voltage: 100-6000 V, 50/60 Hz

nominal power: 1 kVA

supply line length: 20 cm

serial number: M11006081K 049 N

dimensions: (111x80,5x32,5) mm



3 Test procedure

Every measurement was carried out under the same conditions with and without the energy saving system “Keseco Ultra” to compare the power consumption with and without the energy saving system. The energy saving system was activated with load cycles according to the manufacturers specifications (application time) before the measurement with the saving system was done.

Application 1: induction cooker – temperature controlled mode

Test assembly: the power supply (AC 230 V, 50 Hz) was connected to a voltage stabiliser and an isolating transformer. The measurement was carried out with a digital multimeter. During the measurement with the energy saving system, the energy saving system U-803 was installed parallel to the induction cooker. The test procedure and the switching cycles during the tests were specified by the manufacturer.

Load: induction cooker, manufacturer: CASO, type: Basic 2002, Art.Nr.: 2005

During every test the induction cooker was operated in the temperature control mode (reference value 120 °C).

Measurement 1: switching cycles: 4
On- / Off time: 10 min / 5 min

Measurement 2: switching cycles: 3
On- / Off time: 15 min / 5 min

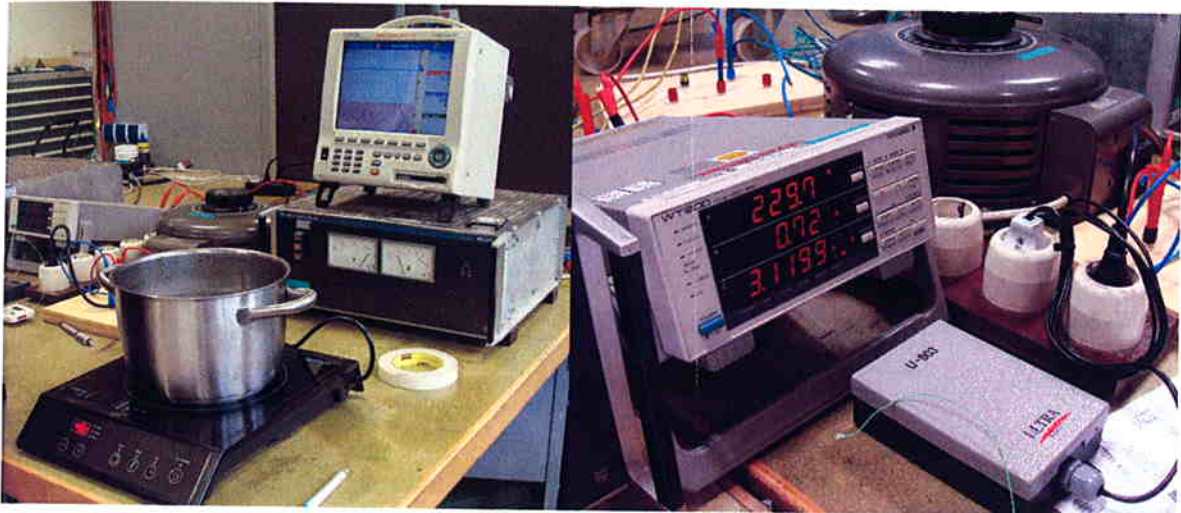
Measurement 3: switching cycles: 3
On- / Off time: 30 min / 5 min



Measurement 1-3 was carried out without an interrupt. The water in the pot was changed after each switching cycle.

Ambient air temperature: 23 ± 2 °C; amount of water: 2l

Application time: Ultra U-803: 7 h



Application 2.1: air conditioner– temperature controlled mode

Test assembly: the power supply (AC 230 V, 50 Hz) was connected to a voltage stabiliser and an isolating transformer. The measurement was carried out with a digital multimeter. During the measurement with the energy saving system, the energy saving system U-804 was installed parallel to the air conditioner. The test procedure and the switching cycles during the tests were specified by the manufacturer.

Load: air conditioner, manufacturer: ARTEL, type: HP09RL14R (module: indoor, outdoor)

During each test the air conditioner was operated in the temperature control mode (reference value 16 °C). The temperature in the test chamber during the whole test was constant 35 °C.

Measurement 1: switching cycles: 3
 On- / Off time: 5 min / 5 min

Measurement 2: switching cycles: 3
 On- / Off time: 8 min / 8 min

Measurement 3: switching cycles: 4
 On- / Off time: 10 min / 5 min

Application time: Ultra U-804: 5 h

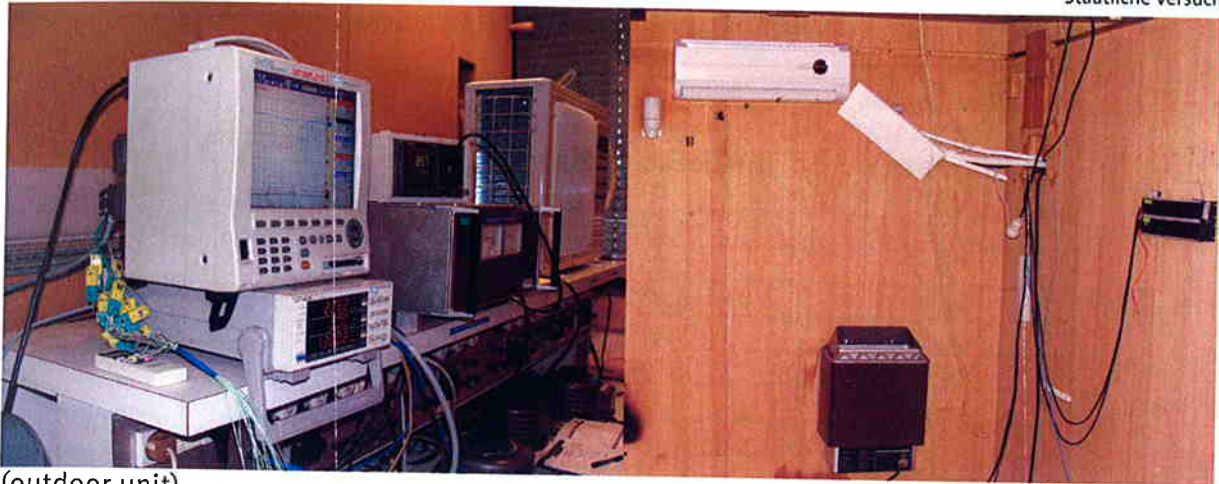
Application 2.2: air conditioner– cooling efficiency

Test assembly: the power supply (AC 230 V, 50 Hz) was connected to a voltage stabiliser and an isolating transformer. The measurement was carried out with a digital multimeter. During the measurement with the energy saving system, the energy saving system U-804 was installed parallel to the air conditioner. The test procedure and the switching cycles during the tests were specified by the manufacturer.

Load: air conditioner, manufacturer: ARTEL, type: HP09RL14R (module: indoor, outdoor)

During each test the air conditioner was operated in the temperature control mode (reference value 16 °C). The temperature in the test chamber at the beginning of the test was 35 °C, the test room was not heated during the test.

Measurement : Operating time until the temperature of the test chamber reached 16,8 °C.
 Dimensions of the test room: (3850x2500x2100) mm



(outdoor unit)

(indoor unit)

Test equipment:

| designation | manufacturer | type | TGM-VA EE ID |
|------------------------------|--------------|------------|--------------------------|
| stop watch | Quantum | 440 9798 | SW.00.633Ü |
| wattmeter | Yokogawa | WT 200 | IL.11.024Ü IL.11.026Ü |
| recorder | Yokogawa | MV 210 | IL.11.027Ü IL.11.025Ü |
| isolating transformer | Ben. & Jäger | W 32/13 | HG.00.289H SW.00.606H |
| voltage stabiliser | Philips | PE 1611/00 | IL.00.064H IL.11.023H |
| climate measuring instrument | Testo | 635-2 | SW.00.639Ü |

4. Test result

Application 1: induction cooker – temperature controlled mode

Measurement without energy saving system:

| measurement | cycle | energy consumption [Wh] | accumulated energy consumption [Wh] |
|-------------|-------|-------------------------|-------------------------------------|
| 1 | 1 | 225,8 | 225,8 |
| | 2 | 214,7 | 440,5 |
| | 3 | 223,4 | 663,9 |
| | 4 | 225,7 | 889,6 |
| 2 | 1 | 284,1 | 1173,7 |
| | 2 | 288,2 | 1461,9 |
| | 3 | 280,2 | 1742,1 |
| 3 | 1 | 493,0 | 2235,1 |
| | 2 | 471,7 | 2706,8 |
| | 3 | 487,2 | 3194,0 |



Measurement with energy saving system Ultra, U-803:

| measurement | cycle | energy consumption [Wh] | accumulated energy consumption [Wh] |
|-------------|-------|-------------------------|-------------------------------------|
| 1 | 1 | 234,6 | 234,6 |
| | 2 | 224,3 | 458,9 |
| | 3 | 224,3 | 683,2 |
| | 4 | 219,7 | 902,9 |
| 2 | 1 | 289,5 | 1192,4 |
| | 2 | 281,6 | 1474,0 |
| | 3 | 276,2 | 1750,2 |
| 3 | 1 | 450,9 | 2201,1 |
| | 2 | 468,3 | 2669,4 |
| | 3 | 450,2 | 3119,6 |

Comparison:

| measurement | energy consumption [Wh] without Ultra U-803 | energy consumption [Wh] with Ultra U-803 | comparison ΔE | |
|-------------|---|--|-----------------------|-------|
| | | | [Wh] | [%] |
| 1 | 889,6 | 902,9 | 13,3 | 1,50 |
| 2 | 852,5 | 847,1 | -5,4 | -0,63 |
| 3 | 1451,9 | 1369,4 | -82,5 | -5,68 |

Application 2.1: air conditioner– temperature controlled mode

Measurement without energy saving system:

| measurement | cycle | energy consumption [Wh] | accumulated energy consumption [Wh] |
|-------------|-------|-------------------------|-------------------------------------|
| 1 | 1 | 26,73 | 26,73 |
| | 2 | 26,82 | 53,55 |
| | 3 | 27,02 | 80,57 |
| 2 | 1 | 66,87 | 147,44 |
| | 2 | 66,47 | 213,91 |
| | 3 | 66,10 | 280,00 |
| 3 | 1 | 91,60 | 371,60 |
| | 2 | 91,93 | 463,53 |
| | 3 | 91,53 | 555,06 |
| | 4 | 91,43 | 646,49 |



Measurement with energy saving system Ultra, U-804:

| measurement | cycle | energy consumption [Wh] | accumulated energy consumption [Wh] |
|-------------|-------|-------------------------|-------------------------------------|
| 1 | 1 | 25,70 | 25,70 |
| | 2 | 25,64 | 51,34 |
| | 3 | 25,28 | 76,62 |
| 2 | 1 | 61,40 | 138,02 |
| | 2 | 61,35 | 199,37 |
| | 3 | 61,78 | 261,15 |
| 3 | 1 | 85,39 | 346,54 |
| | 2 | 86,02 | 432,56 |
| | 3 | 86,40 | 518,96 |
| | 4 | 88,35 | 607,31 |

Comparison:

| measurement | energy consumption [Wh] without Ultra U-804 | energy consumption [Wh] with Ultra U-804 | comparison ΔE | |
|-------------|---|--|-----------------------|-------|
| | | | [Wh] | [%] |
| 1 | 80,57 | 76,62 | -3,95 | -4,90 |
| 2 | 199,43 | 184,53 | -14,9 | -7,47 |
| 3 | 366,49 | 346,16 | -20,33 | -5,55 |

Application 2.2: air conditioner– cooling efficiency

Measurement without energy saving system:

| operating time [min] | ambient temperature indoor – modul [°C] | ambient temperature outdoor – modul [°C] | energy consumption | |
|----------------------|---|--|---------------------------------------|-------------------------------------|
| | | | energy consumption time interval [Wh] | accumulated energy consumption [Wh] |
| 0 | 35,1 | 26,7 | 0 | 0 |
| 30 | 26,7 | 26,7 | 361 | 361 |
| 60 | 21,7 | 27,1 | 387 | 748 |
| 75 | 19,8 | 27,4 | 190 | 938 |
| 90 | 18,6 | 27,7 | 199 | 1137 |
| 105 | 17,8 | 27,6 | 163 | 1300 |
| 120 | 17,2 | 27,8 | 158 | 1458 |
| 135 | 17,1 | 27,6 | 123 | 1581 |
| 150 | 16,8 | 27,5 | 132 | 1713 |



Measurement with energy saving system Ultra, U-804:

| operating time [min] | ambient temperature indoor – modul [°C] | ambient temperature outdoor – modul [°C] | energy consumption | |
|----------------------|---|--|---------------------------------------|-------------------------------------|
| | | | energy consumption time interval [Wh] | accumulated energy consumption [Wh] |
| 0 | 35,2 | 25,6 | 0 | 0 |
| 30 | 27,0 | 26,4 | 348 | 348 |
| 60 | 21,8 | 27,1 | 389 | 737 |
| 75 | 19,8 | 26,8 | 192 | 929 |
| 90 | 18,7 | 27,0 | 192 | 1121 |
| 105 | 17,5 | 27,5 | 193 | 1314 |
| 120 | 16,8 | 27,2 | 154 | 1468 |
| 135 | 16,8 | 27,1 | 125 | 1593 |
| 150 | 16,4 | 27,2 | 129 | 1722 |

Comparison:

The target temperature (16,8 °C) was reached 30 min earlier with the energy saving system U-804. The ambient temperature of the test chamber after the whole operating time (150 min) was 16,4 °C. During the whole operating time the accumulated energy consumption with the energy saving system U-804 was 9 Wh (= 0,53%) higher.

5 Summary

Assuming the conditions described in clause 3 of this report, the following peak values of saved energy were measured:

- Application 1: induction cooker – temperature controlled mode:
Peak value of saved energy at measurement 3 with Ultra U-803: 5,68%
- Application 2.1: air conditioner– temperature controlled mode
Peak value of saved energy at measurement 2 with Ultra U-804: 7,47%
- Application 2.2: air conditioner– cooling efficiency:
Target temperature was reached 30 min (20%) earlier, with a slightly higher energy consumption of 9 Wh (+0,53%).

The measured values are not applicable for interpretation of other load situations.



The present report

is including 8 Pages
 0 Appendix(es) (with 0 pages)

Official in charge: Ing. Dominic Litzka

Vienna, 2010-10-20



Prof. Dipl.-Ing. Dr. Wolfgang Nitsche
Head of Department

Dipl.-Ing. Karl Reischer
Principal

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