Specification of the Test Object (Oggetto Del Test)	
CEI 11-20 (2004-08) e alla norma ENEL DK 5940 Ed. 2.2 (Aprile 2007)	
Automatic disconnecting facility for photovoltaic installations	
Rapporto prove numero. .....:	10TH0045-YURA-DK5940_0
Testato da (nome e firma) .....:	Frank Hesmer F. Hesmer
Approvato da (nome e firma) .....:	Bernd Kreitmeier B. Kreitmeier
Data d`emanazione .....:	2010-05-19
Testing Laboratory Name ..... : **Nome del laboratorio di certificazione**:	**Bureau Veritas Consumer Product Services GmbH**
Indirizzo .....:	Businesspark A96, 86842 Türkheim, Germania
Prove effetuate in.....:	**Bureau Veritas E&E Product Services GmbH**
Indirizzo .....:	Businesspark A96, 86842 Türkheim, Germania
Nome del Richiedente .....:	**Yuraku S.r.l.**
Indirizzo .....:	Via Fratelli Rosselli 3/2, 20019 Settimo Milanese, Italia
Specifica del test:	
Standard .....:	Test in accordo alla norma italiana CEI 11-20 (2004-08) e alla norma ENEL DK 5940 Ed. 2.2 (Aprile 2007) e GUIDA PER LE CONNESSIONI ALLA RETE ELETTRICA DI ENEL DISTRIBUZIONE (2008-12)
Tipo di rapporto per il test .....:	ENEL DK 5940 Ed. 2.2 (Aprile 2007)
TRF creatore.....:	Bureau Veritas
Master TRF .....:	Marzo-2008
Descrizione dell`oggeto del test	Solar Inverter
Marchio.....:	YURAKU
Modell e/o referenza .....:	YUR.POWER I-6000
Numero di serie .....:	Prototype
Versione Firmware……:	J1.0
Valore nominale.....:	**YUR.POWER I6000**
Input Voltage-Tensione d´entrate:	100 – 600V_{DC}, MPPT: 150 – 600V_{DC}
Input Current- Corrente d´entrata:	30A_{DC}
Output Voltage - Tensione d´uscita:	230V_{AC}, 50/60Hz
Output current - Corrente d´uscita:	nom./max. 26,1A_{AC}
Output Power - Potenza d´uscita:	nom./max. 6000W_{AC}

Copy of marking plate:
Copia della piastra della marcatura:

Model : YUR.POWER I6000

DC	Tensione nominale Nominal operating voltage	360V	AC	Frequenza nominale Nominal operating frequency	50/60Hz	Temperatura di funzionamento Operating temperature range	-20~55°C
DC	Range di tensione Operating voltage range	100~600V	AC	Potenza nominale d'uscita Nominal output power	6000W	Grado di protezione Enclosure	IP65
DC	Corrente massima d'ingresso Max. input current	30A	AC	Potenza nominale d'uscita Max. output power	6000W	CE	
AC	Tensione nominale Nominal operating voltage	230V	AC	Corrente massima d'uscita Max. output current	26.1A	ENEL DK 5940 Ed. 2.2	

History Sheet Storico del foglio			
Frank Hesmer	2010-05-19	Initial report was written	Rev. 0

Address of the manufacturer sites: Indirizzo dello stabilimento di produzione:
Powercom Co., Ltd. **8F, NO. 246, Lien Chen Road,** **Chung Ho City** **Taipei Hsien,** **Taiwan, R.O.C.**

Particulars: test item vs. test requirements / Dettagli: oggetto del test vs requisti del test	
Equipment mobility ..... : mobilità dell'apparecchiatura..... :	For building-in
Operating condition ..... : Modo d´ operazione ..... :	Continuous
Mains supply tolerance (%)..... : Tolleranza dell'alimentatore principale :	Input (Solar): 100-600V_{DC}, MPPT: 150-600V_{DC} Output (mains): 230V_{AC}
Class of equipment ..... : Classe del dispositivo..... :	Class I
Mass of equipment (kg)..... : Peso del dispositivo..... :	**YUR.POWER I6000** 27kg
Protection against ingress of water ..... : Grado di protezione contro l'acqua ..... :	IP65 according to IEC 60529
Test case verdicts / Risultati dei test	
Test case does not apply to the test object : Il test non si applica all'oggetto del test..... :	**N/A**
Test item does meet the requirement ..... : Il test rispetta il requisito..... :	**P(ass)**
Test item does not meet the requirement .. : Il test non rispetta il requisito..... :	**F(ail)**
Test:	
Date of receipt of test item ……. ..... : Data di Ricezione del test ..... :	2010-02-08
Date(s) of performance of test ..... : Data(e) di esecuzione del test..... :	2010-03-02 to 2010-03-16

General remarks:

The test result presented in this report relate only to the object(s) tested. This report shall not be reproduced, except in full, without the written approval of the applicant.

”(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

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

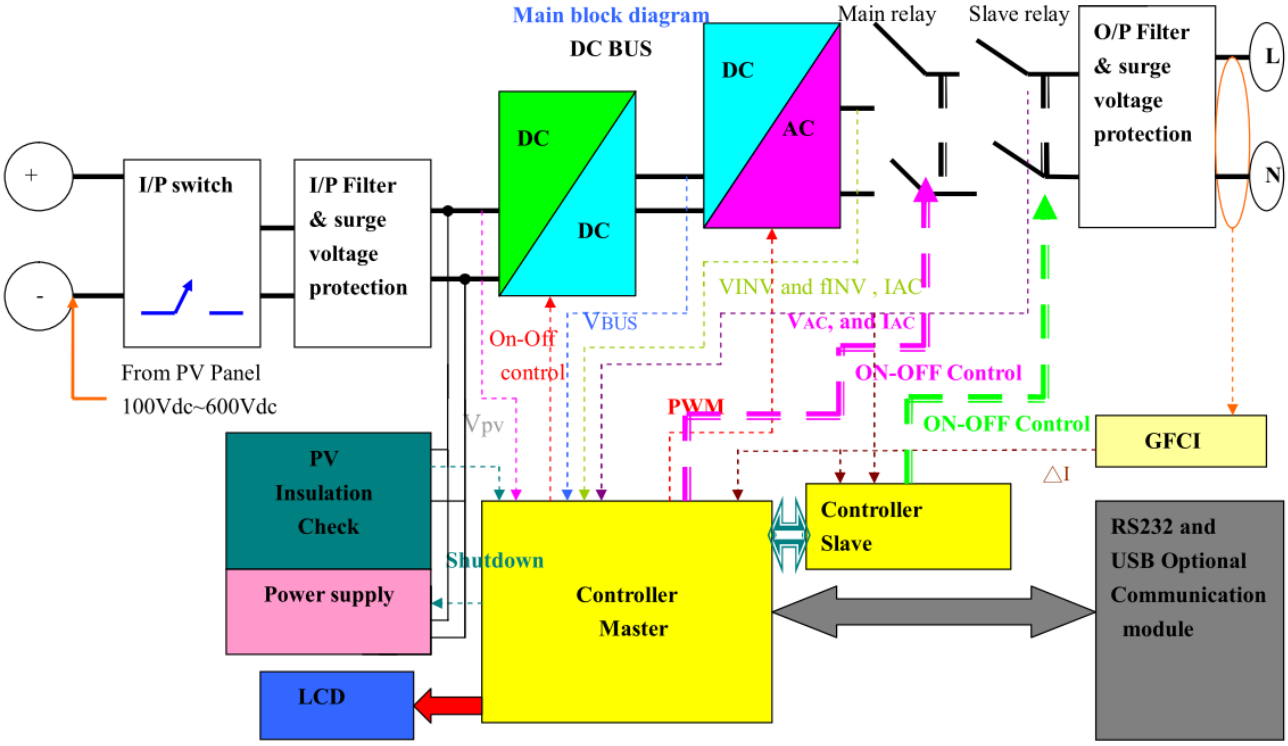
This Test Report consists of the following documents:

1. Test Report
2. Annex 1 – ISO certificate
3. Annex 2 – EMC Test Report
4. Annex 3 – Datasheet of the relays
5. Annex 4 – Pictures of the units
6. Annex 5 – Test equipment

General product information: / Informazione generali sul prodotto:

The Solar converter converts DC voltage into AC voltage.

The input and output are protected by capacitors and varistors to earth. The unit is providing EMC filtering at the input and output towards mains. The unit does not provide galvanic separation from input to output but provides a RCMU and an insulation measurement DC – PE. The output is switched off by two independent relays in series to assure, that the output circuit will also operate in case of one error. The whole control system is build up redundant.



TEST SHEET:

C4.1 CEI 11-20 V1, 5: Criteria of connection to the public network (CEI 11-20 V1, 5: Criteri di collegamento alla rete pubblica)

C4.1.1 CEI 11-20 V1, 5.1: Production installations in Cat I networks – Power Factor (CEI 11-20 V1, 5.1:Funzionamento in parallelo alla rete pubblica di I categoria – Fattore di Potenza)

Power factor test (Fattore di potenza)				**P**
Operating conditions: (Condizioni di funzionamento)		Power factor: (Factor di potenza)	Reactive Power: (Potenza reattiva)	
Grid voltage: (V)	Output Power: (%)	Measurement: (Misurazione) [1]	Measurement: (Misurazione) (kvar)	Limiting value: (Valore limite) (Kvar)
YUR.POWER I6000				
230V	100% P_N	0,999(c)	0,306	1,0
230V	50% P_N	0,996(c)	0,276	1,0
230V	20% P_N	0,976(c)	0,269	1,0
Limits of CEI 11-20 V1, Section 5.1 (c) capacitive (i) inductive				

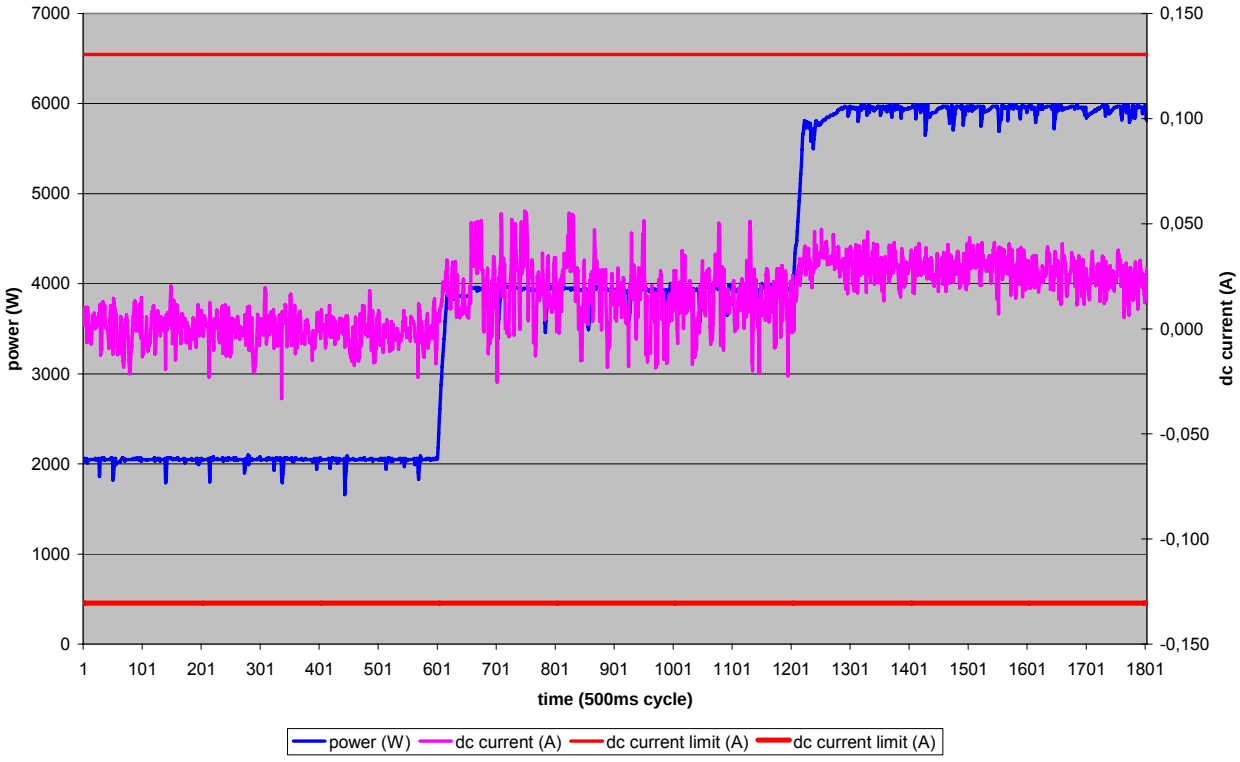
8. Protection against DC components in the output current
(8. Criteri generali di allacciamento)

Protection against DC-Injection, I_{DC}<0,5% of I_{max}, within max. 0,1s (Protezione corrente continua, 0,5% della corrente massima, max. 0,1 s)				**P**
Grid voltage: (Vac)	Idc polarity (Polarita c.c.)	Measurement: (Misurazione) (mA)	Limiting value: (Valore limite) (mA)	Disconnection time (Tempo de intervento) (ms)
YUR.POWER I6000				
230V	+	100*	130	87
230V	-	100*	130	77

Limits of DK5940 Ed. 2.2, Allegato AIB 2.3.1.1

* The unit provides an auto-correction of the DC part on the output current. Beyond the capability of the auto-correction the unit detects and disconnects due to high DC current.

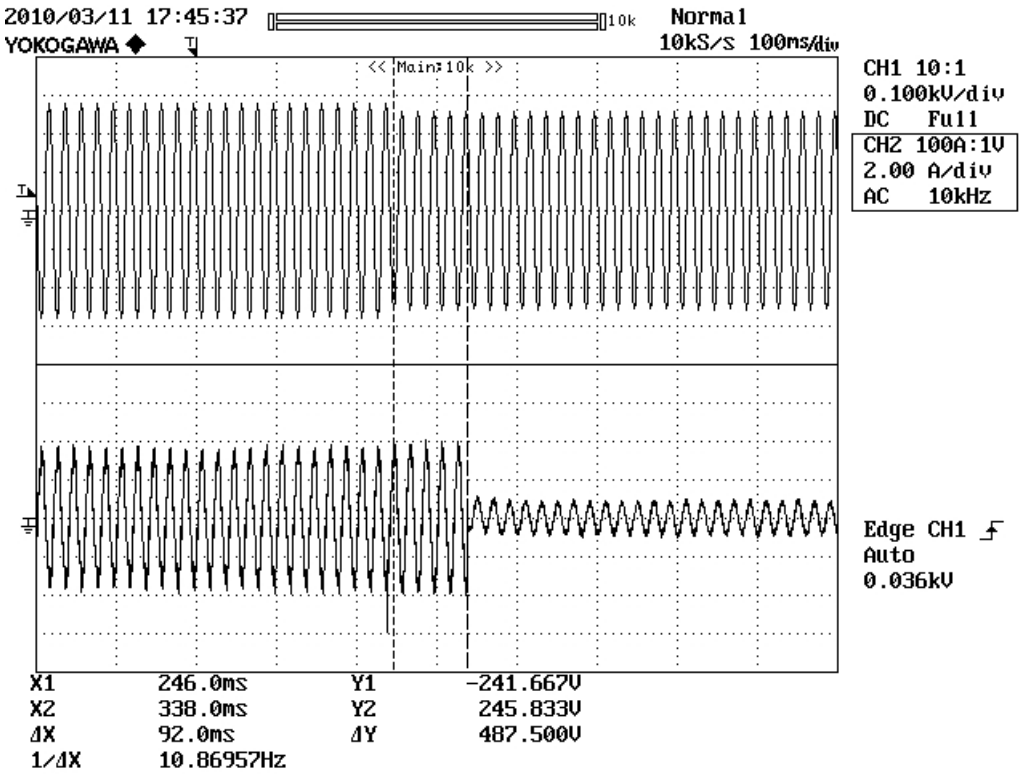
Diagram of permanent DC-Injection



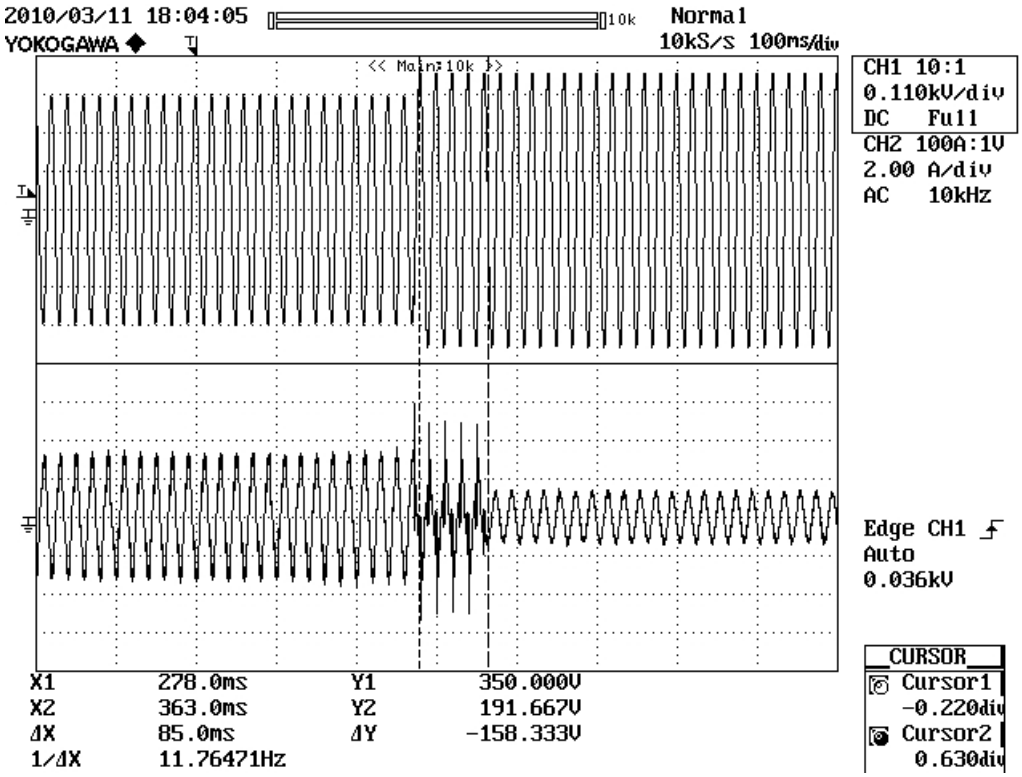
9.4 Automatic protection –test results
(Protezioni di interfaccia – risultati di prova)

9.5 Massima tensione e minima tensione									**P**
Condizioni di funzionamento:	Frequenza: 50Hz								
	Protezioni minima tensione				**Protezioni massima tensione**				
Parametro	Voltaggio	Tempo di intervento (ms)			Voltaggio	Tempo di intervento (ms)			
Valore limite	**0,8 U_N (184 V_{AC})**	**<= 200**			**1,2 U_N (276 V_{AC})**	**<= 100**			
Valore misurato	189,7								
Tempo di sconnessione	195 -> 181V	77	73	92	267 -> 279V	74	84	84	
	230 -> 181V	87	83	69	230 -> 279V	67	67	85	
Tempo di riconnessione	>= 5s	34			>= 5s	34			
Note: Limits of DK 5940, ED. 2.2 (Aprile 2007), Table 3									

Protezioni minima tensione:



Protezioni massima tensione:



9.5 Massima frequenza e minima frequenza					**P**			
Condizioni di funzionamento:	Qualunque livello di potere di uscita							
	Protezioni minima frequenza				**Protezioni massima frequenza**			
Parametro	Frequenza (Hz)	Tempo di intervento (ms)			Frequenza (Hz)	Tempo di intervento (ms)		
voltaggio di uscita		80%U_N	U_N	120%U_N		80%U_N	U_N	120%U_N
Valore limite	49,7	senza ritardo intenzionale			50,3	senza ritardo intenzionale		
Valore misurato		49,80	49,80	49,80		50,21	50,21	50,21
Tempo di sconnessione	50,00 → 49,00	senza ritardo intenzionale			50,00 → 51,00	senza ritardo intenzionale		
Tempo di riconnessione	>= 5s	34			>= 5s	34		
Note: Limits of DK 5940, ED. 2.2 (Aprile 2007), Table 2								

9.5 Frequency derivative (Rate of Change of Frequency) test (Derivata di frequenza)

Frequency derivative protection –Frequency variation = + 0,5Hz/s (increasing) (Protezioni derivata di frequenza, , valore d'intervento 50,3Hz)				**N/A**
Operating conditions: (Condizioni di funzionamento)		Disconnection time: (Tempo di intervento)		
Grid voltage: (V)	Power: (%)	Measurement: (Misurazione) (Hz)	Measurement: (Misurazione) (ms)	Limiting value: (Valore limite) (s)
230V	(10% P_N)			senza ritardo intenzionale
230V	(50% P_N)			
230V	(100% P_N)			
Limits of DK 5940 Ed. 2.2 (Aprile 2007), Table 2				

Frequency derivative protection –Frequency variation = - 0,5Hz/s (decreasing) (Protezioni derivata di frequenza, valore d'intervento 49,7Hz)				**N/A**
Operating conditions: (Condizioni di funzionamento)		Disconnection time: (Tempo di intervento)		
Grid voltage: (V)	Power: (%)	Measurement: (Misurazione) (Hz)	Measurement: (Misurazione) (ms)	Limiting value: (Valore limite) (s)
230V	(10% P_N)			senza ritardo intenzionale
230V	(50% P_N)			
230V	(100% P_N)			
Limits of DK 5940 Ed. 2.2 (Aprile 2007), Table 2				

ALLEGATO AIB:
APPARECCHIATURE DI INTERFACCIA CON LA RETE BT

2.1.3 Verifiche

Auto Test Function

In “Working Mode” press the button over 5 seconds. The LCD will show “Setting”. Than the PV inverter will enter “Function Setting Mode”. Toggle the button afterwards, you will see the setting items in the following order:

Contrast Set
Language Set
Auto Test Set

When you see the “Auto Test Set”, press the button over 5 seconds. The LCD will show “Setting” then the inverter will start the “Auto Test Procedure”.

The “Auto Test Procedure” starts with the over voltage from 270V to 229V. After this step the relays are opened. It will be shown “OK 229V – 0,05S” stating that the limit matched the measured value and showing the disconnection time. At the next step the PV inverter will start with under voltage from 190V to 230V. The Relays are opened. The result is shown on the LCD: “OK 230V – 0,05S”. In the following step the test will start with upper and lower frequency check. After each test the relays are opened and the result is shown on the LCD “OK 49,9Hz – 0,05S” (upper frequency) and “OK 50Hz – 0,05S” (lower frequency).

The summary result will show on LCD “Test Pass”.

During the “Auto Test Procedure” the PV inverter will not supply with current into the grid.

During the “Auto Test Procedure”, if user press button over 5 seconds. The LCD will show “Escape Auto Test” then PV inverter will finish “Auto Test Procedure”

3.1 Protezione di interfaccia (PIB)

Rigidità dielettrica			P
Location	Tensione di prova	Breakdown Yes/No	
AC to PE	2kVac / 2,8kVdc	No	
DC to PE	2kVac / 2,8kVdc	No	

Prova ad impulso			P
Location	Tensione di prova 1,2/50µs surge impulse	Breakdown Yes/No	
Relay RY1 (Song Chuan 512-841P-1AB)	2kV CM	No	
Relay RY1 (Song Chuan 512-841P-1AB)	1kV DM	No	

Misura della resistenza di isolamanti			P
Location	Tensione di prova	Limite	Resistenza di isolamenti
Relay RY1 (Song Chuan 512-841P-1AB) between input/output contacts	500V c.c.	1GOhm	>150MOhm

Prove di assestamento		P
Temperatura	Umidita relativa	Durata
55°C	50%	16h
40°C	93%	4 giorni
-10°C	---	10h
-10°C -> +40°C	---	3h @ -10°C, 3h @ +40°C
Note: No deterioration of the unit.		

Prove ad apparato funzionante		P
Temperatura	Umidita relativa	Durata
55°C	50%	16h
40°C	93%	4 giorni
-10°C	---	10h
-7°C -> +40°C	---	3h @ -10°C, 3h @ +40°C
Note: No deterioration of the unit.		

Prove di sovraccaricabilità dei circuti voltmetrici di misura		P
Tensione	Durata	
≥130%U_N	permanente	P
≥200%U_N	1s	P

Annex 1
ISO certificate

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2008

This is to certify that:

Powercom Co., Ltd.
8F, No. 246, Lien Chen Road
Chung Ho City
Taipei County
Taiwan

科風股份有限公司
台灣
台北縣
中和市
連城路246號
8樓

Holds Certificate No: **FM 33690**

and operates a Quality Management System which complies with the requirements of ISO 9001:2008 for the following scope:

The design, manufacture and servicing of UPS, PV Inverter and AVR.
The manufacture and servicing of solar module.

For and on behalf of BSI:

Managing Director BSI Taiwan, Dr. Yi Min Gao

Originally registered: **15/03/1996** Latest Issue: **03/09/2009** Expiry Date: **13/08/2010**

Page: 1 of 2

Certificate No: **FM 33690**

Location	***Registered Activities***
Powercom Co., Ltd. 8F, No. 246, Lien Chen Road Chung Ho City Taipei County Taiwan 科風股份有限公司 台灣 台北縣 中和市 連城路246號 8樓	The design, manufacture and servicing of UPS, PV Inverter and AVR.
Powercom Co., Ltd 6F, No.168, Jian Kang Road Jhonghe City Taipei County Taiwan 科風股份有限公司 台灣 台北縣 中和市 健康路168號 6樓	The manufacture and servicing of solar module.
Ke Huang Co., Ltd. Huang Jiang of Dongguan Dong Guan Powercom Electronics Co., Ltd. Tian Mei Industry North Zone Huang Jiang Town Dongguan City Guangdong China 東莞黃江科皇電子廠 科風電子有限公司 中國 廣東省 東莞市 黃江鎮 田美工業北區	The manufacture of uninterruptable power supplier (UPS) and transformer.

Originally registered: **15/03/1996** Latest Issue: **03/09/2009** Expiry Date: **13/08/2010**

Annex 2
EMC Report

(The whole Report is stored by Bureau Veritas E&E Product Services GmbH Tuerkheim)

Verification of Compliance

Product Name	:	**PV Inverter**
Model Number	:	**SLK-6000 (Terminal block output type),** **SLK-6000 (AC Connector output type)**
Applicant	:	**Powercom Co., Ltd.**
Address	:	**8F., No. 246, Lien Chen Road, Chung Ho City, Taipei Hsien, Taiwan**
Report Number	:	**C61-P180-1002-037**
Issue Date	:	**March 11, 2010**
Applicable Standards	:	**EN 61000-6-3:2007** **EN 55014-1:2006+A1:2009** **EN 61000-3-12:2005** **EN 61000-3-11:2000** **EN 61000-6-2:2005** IEC 61000-4-2:2001 IEC 61000-4-3:2006 IEC 61000-4-4:2004 IEC 61000-4-5:2005 IEC 61000-4-6:2006 IEC 61000-4-8:2001 IEC 61000-4-11:2004

Based on the EMC Directive 2004/108/EC and the specifications of the customer, one sample of the designated product has been tested in our laboratory and found to be in compliance with the EMC standards cited above.

CE

TAF 0905
FCC CAB Code TW1053
NVLAP Lab Code 200575-0
IC Code 4699A
VCCI Accep. No. R-1527, C-1609, T-131, T-1441, G-10

Central Research Technology Co.
EMC Test Laboratory
11, Lane41, Fushuen St., Jungshan Chiu,
Taipei, Taiwan, 104, R.O.C.
Tel : 886-2-25984568
Fax: 886-2-25984546

(Sam Chien/ Laboratory Head)

Date: March 11, 2010

Annex 3
Datasheet of the relays

841

Features

- Heavy duty 30A 240VAC, 25A 240VAC power type.
- AC & DC coils are both available.
- PCB terminals and quick terminal types.
- Optional for special large contact gap 3.0mm version. SPNO-ST & DPNO-ST contact configuration.
- Comply with RoHS-Directive 2002/95/EC.

Type List

Terminal style	Contact form	Enlarge spacing type	Designation			
			Dust cover	Flux tight	Flanged cover	Sealed type washable
S (Quick terminal)	1A (SPDM)	--------	841-S-1A-D	841-S-1A-C	841-S-1A-C1	841-S-1A-S
		H	841-S-1A-D-H	841-S-1A-C-H	841-S-1A-C1-H	841-S-1A-S-H
	2A (DPDM)	--------	841-S-2A-D	841-S-2A-C	841-S-2A-C1	841-S-2A-S
		H	841-S-2A-D-H	841-S-2A-C-H	841-S-2A-C1-H	841-S-2A-S-H
P (PCB terminal)	1A (SPDM)	--------	841-P-1A-D	841-P-1A-C	--------	841-P-1A-S
		H	841-P-1A-D-H	841-P-1A-C-H	--------	841-P-1A-S-H
	2A (DPDM)	--------	841-P-2A-D	841-P-2A-C	--------	841-P-2A-S
		H	841-P-2A-D-H	841-P-2A-C-H	--------	841-P-2A-S-H

Ordering Information

841 - S - 1A - F - C - H

1 2 3 4 5 6

1. 841 -- Basic series designation
2. S -- Quick terminal
   P -- PCB terminals
3. 1A -- Form A, single-pole, double-make (SPDM)
   2A -- Form A, double-pole, double-make (DPDM)
4. Blank -- Standard type
   F -- Class F
5. C -- Flux tight
   D -- Dust cover
   V -- Sealed type
   S -- Sealed type washable
   C1 -- Flanged cover
   D1 -- Dust cover with flange
   S1 -- Plastic sealed washable with flange
6. Blank -- Standard type
   H -- Enlarged insulation spacing type

Contact Rating

Load type	1A (SPDM)	2A (DPDM)
Rated load (Resistive)	30A 220VAC	25A 220VAC
Max. Switching Current	30A	25A
Max. Switching Voltage	277VAC	277VAC
Max. Switching Capacity	6600VA	5500VA

Coil Rating (DC)

Rated voltage (V)	Rated current ±10 % at 23° C (mA)	Coil resistance ±10 % at 23° C (Ω)	Max. continuous voltage at 70° C	Pick up voltage(Max) at 23° C	Drop out voltage(Min) at 23° C	Power consumption at rated voltage
3	638	4.7	160 % of rated voltage	75 % of rated voltage	10 % of rated voltage	approx. 1.92W
6	319	18.8				
12	160	75				
24	80	300				
48/50	40/41.6	1200				
100	19.2	5200				
110	17.4	6300				
200	9.5	21000				

Coil Rating (AC)

Rated voltage (V)	Rated current +15/-20% at 23° C (mA)	Coil resistance +15/-20% at 23° C (Ω)	Max. continuous voltage at 70° C	Pick up voltage(Max) at 23° C	Drop out voltage(Min) at 23° C	Power consumption at rated voltage
6	275	15	160 % of rated voltage	80 % of rated voltage	10 % of rated voltage	approx. 1.7VA ~ 2.7VA
12	138	75				
24	74	300				
48/50	39/40	1,200				
100/120	18.7/22.1	5,200				
200/240	9.1/10.8	21,000				

Specification

Contact material	AgSnO alloy	
Contact resistance (1)	100 mΩ Max.	
Operate time (1)	30 ms Max.	
Release time (1)	30 ms Max.	
Insulation resistance (1)	1000 MΩ Min. (DC 500V)	
Dielectric strength (1)	Between open contact : AC 2000V , 50/60Hz 1 min.	
	Between contact and coil : AC 4000V , 50/60Hz 1 min.	
	Between contact circuits : AC 2000V , 50/60Hz 1 min.	
Vibration resistance	Operating extremes	10～55Hz , amplitude 1.5 mm
	Damage limits	10～55Hz , amplitude 1.5 mm
Shock resistance	Operating extremes	10G
	Damage limits	100G

Life expectancy	Mechanical	5,000,000 operations (frequency 18,000 operations/hr)
	Electrical	100,000 operations (frequency 900 operations/hr)
Operating ambient temperature	-55～+70°C (no freezing)	
Weight	Approx. 90 g	

Note： (1) initial value.

Safety Approval

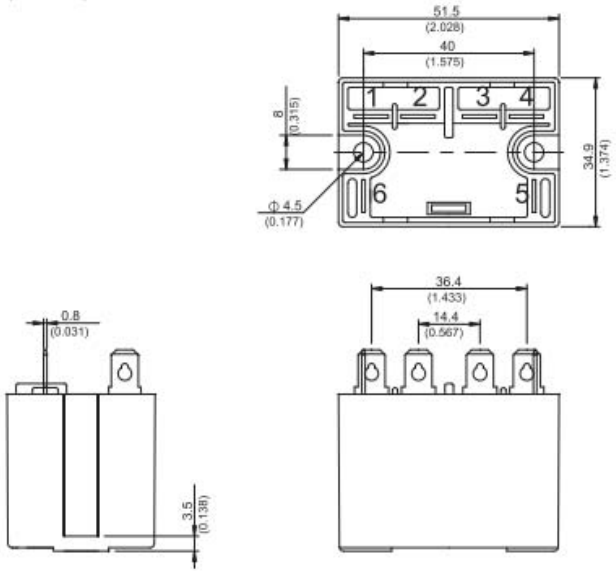
Certified	UL / CUL	TUV
File No.	E88991	R9653713

Safety Approval Rating

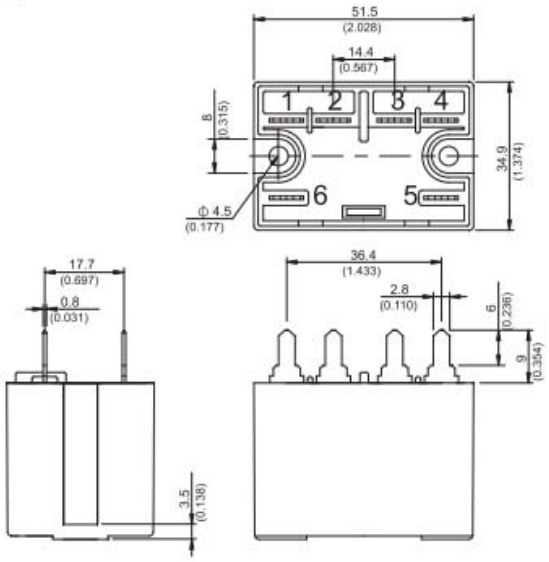
UL / CUL		TUV	
1A	2A	1A	2A
30A 277VAC TV-10 10A 277VAC 1.5HP 20FLA, 125VAC 3HP 14.1FLA, 277VAC	25A 277VAC TV-10 10A 277VAC 1HP 16FLA, 125VAC 2HP 9.96FLA, 277VAC	30A 250VAC 25A 250VAC cosϕ0.4 30A 125VAC cosϕ0.4	25A 250VAC 25A 250VAC cosϕ0.4

Outline Dimensions

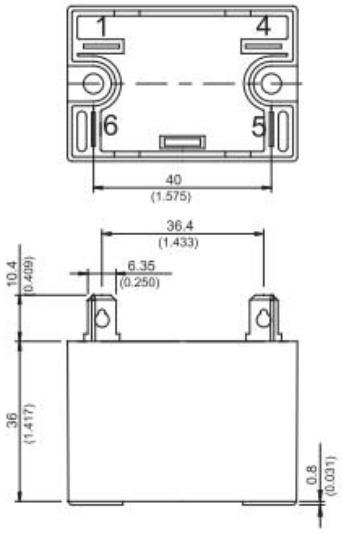
◆841-S-2A (C,D,V,S)



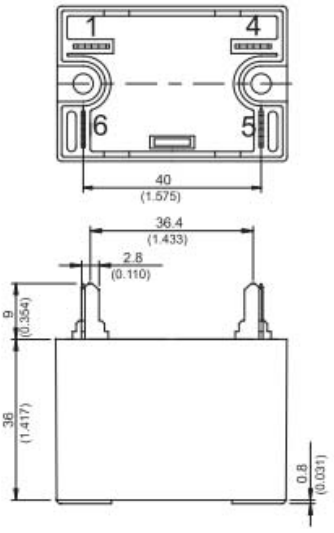
◆841-P-2A (C,D,V,S)



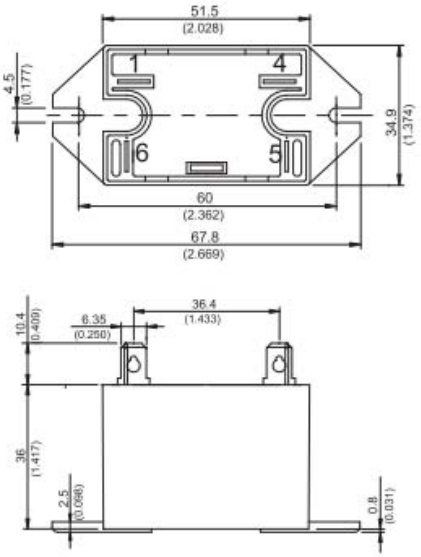
◆841-S-1A (C,D,V,S)



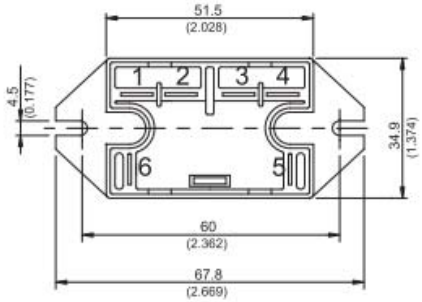
◆841-P-1A (C,D,V,S)

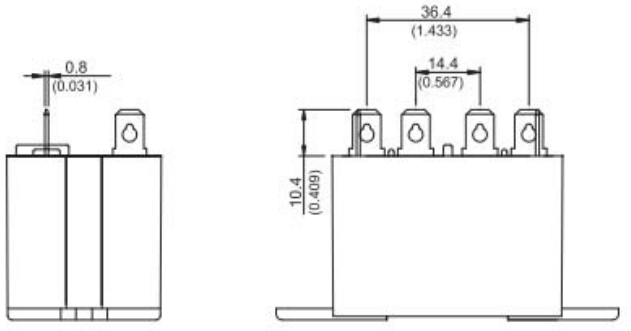


◆841-S-1A (C1,D1,S1)



◆841-S-2A (C1,D1,S1)

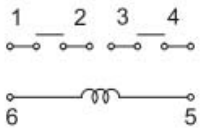




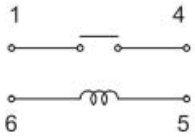
Wiring Diagram

BOTTOM VIEW

2A



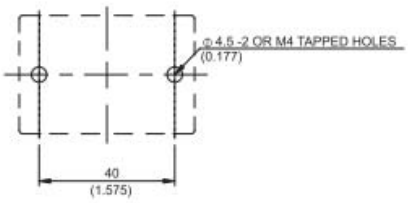
1A



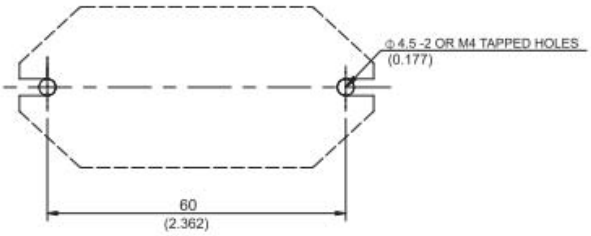
Mounting Holes

BOTTOM VIEW

◆841-S



◆841-S (C1,D1,S1)

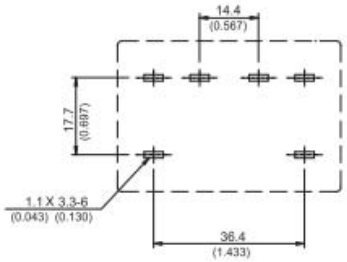


PC Board Layout

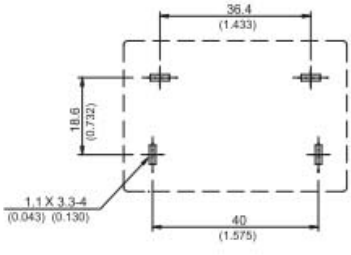
BOTTOM VIEW

◆841-P

2A

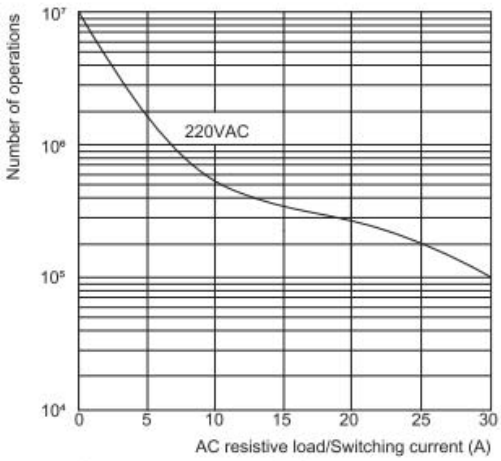


1A

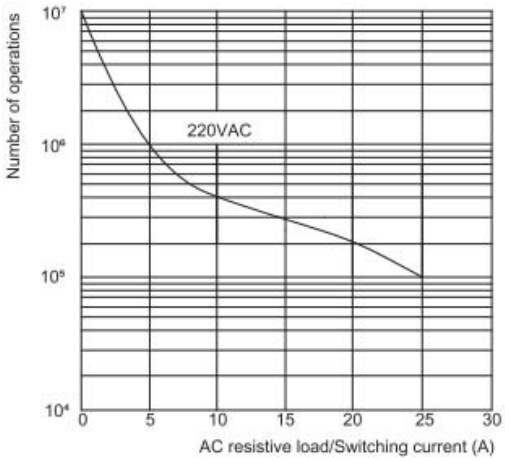


Engineering Data

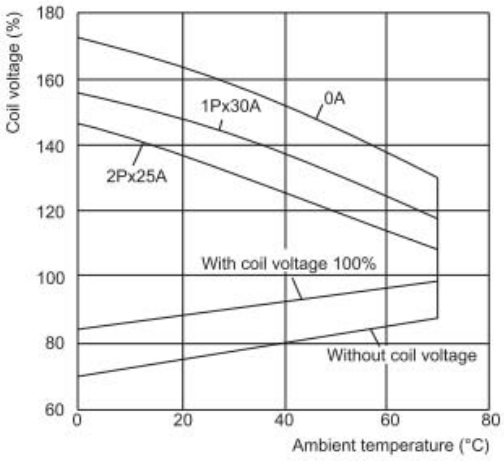
Life expectance (1P)



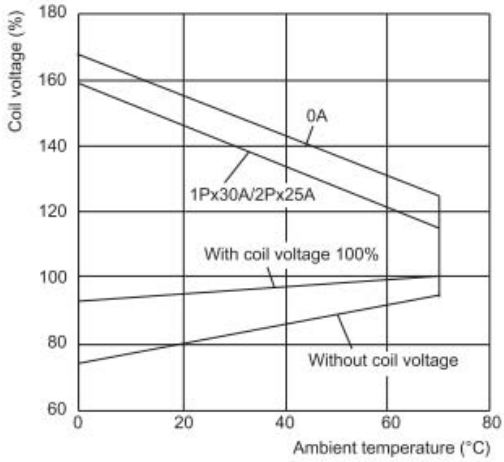
Life expectance (2P)



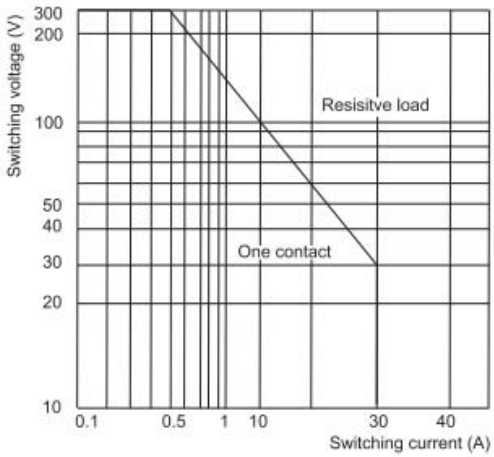
Coil operating range DC



Coil operating range AC

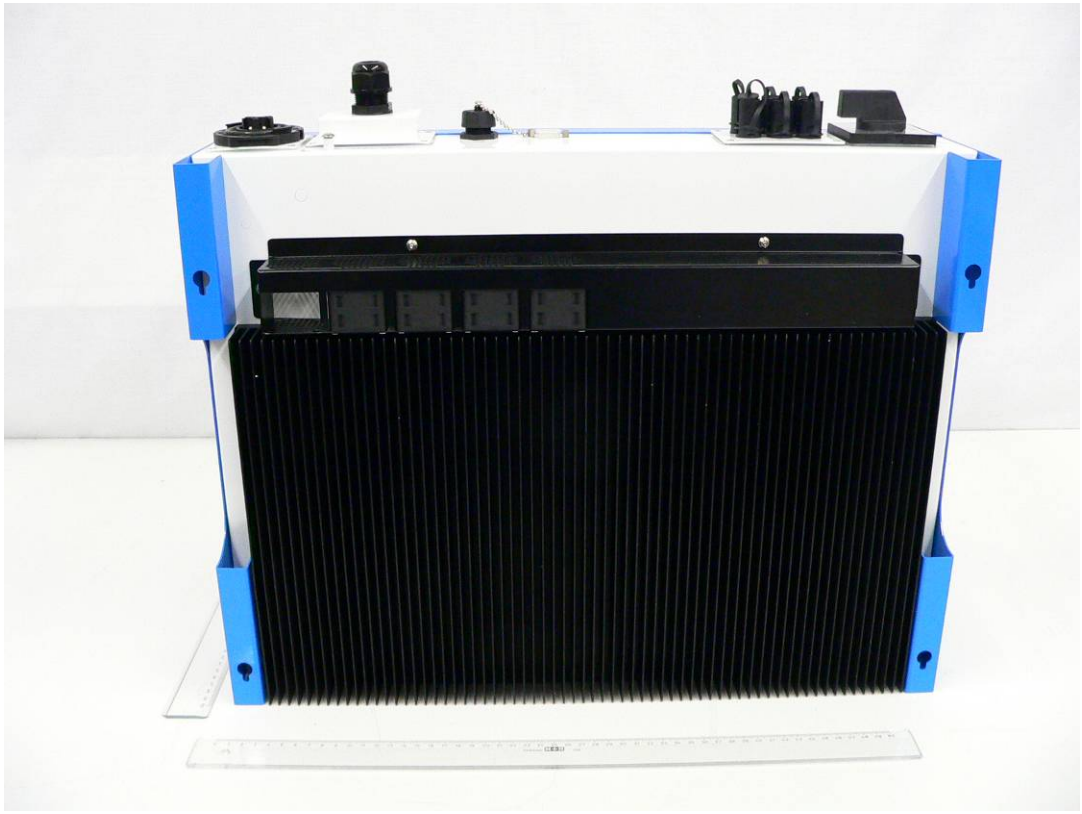


Max. DC load breaking capacity



Annex 4
Pictures of the unit

Enclosure of YUR.POWER I6000



Inside YUR.POWER I6000

Annex 5
Test Equipment list

Equipment	Internal No.	Manufacturer	Type	Serial No.	Last Calibration
Transformer	92	TTH	ETR 160 V		
Current Clamp	110	Chauvin Arnoux	YPAC12	118609YDV	Mai 2009
AC Source	323	Chroma	6590	0225	
Oscilloscope	324	Yokogawa	DL1620	91EB06225	Mai 2008
Power Meter	335	ZES Zimmer Electronic Syst.	LMG 500-3	00940605	Sep 2009
Variable Resistor	374	Ruhstrat	4Ω 26A		
3-Phasen Trenntrafo	446	Statron	5316.1	9507001	
climate chamber	657	WEISS Umwelttechnik GmbH	WK11-180/40	58226037330010	Jan 2010
Digital Multimeter	663	GMC-I Gossen-Metrawatt GmbH	METRAHit 29S	SF4220	Aug 2009
Dielectric tester	730	SPS electronic	HA 2201G	04032304	Feb 2010
DC- source	870	Regatron	Model T.C.P.	0941CC133	
Transducer Powersupply	906	SIGNALTEC	TPS	37-010-008	Jan 2010
Currenz Transducer	907	Danfysik	Ultrstab 867	10076239	Jan 2010