TEST REPORT

Test Report No.	:	11 0528
Date	:	27.10.2021
Page No.	:	1 of 19
Location of Testing	:	SCIENTIFIC AND INDUSTRIAL TESTING AND RESEARCH CENTRE (Si'Tarc) 83 & 84, Avarampalayam Road, K R Puram Post COIMBATORE – 641 006.
Name and Address of the Customer	:	Tag Solar System LLP D 54 Subhash Marg, Chomu House, C-Scheme, Jaipur- 302 001.
Customer Doc. Ref. No. & Date	:	CH013, 12.10.2021
Item Description	:	2.2kW/ 3.0 HP Universal Solar Pump Controller
Sample Identification Details Grade/Variety/Type/Size/Class. Batch No./Date of Manuf./Brand	:	Model: KISAN UNIVERSAL 3HP S. No. 1020_4030_000847
Item Received on	:	19.10.2021
Sample Drawn By	:	Customer
Seal/Signature/QR Code No.	:	-
Any Other Information	:	Test as per Ministry of New and Renewable Energy Testing Procedure for Universal Solar Pump Controller (USPC) Annexure-iii of circular no. F. No. 41/3/2018-spv division dated 17.7.2019.

Tests Authorised By

D.ANGURAJ
Electrical Testing Laboratory

---------- **For SITARC Office use only**----------

Si'Tarc Invoice No. & Date : Invoice No. 1464/21-22, dated 27.10.2021

M/s Tag Solar System LLP
D 54 Subhash Marg, Chomu House, C-Scheme,
Jaipur- 302 001.

Always look up for HOLOGRAM on each pages of this report to confirm genuine Test Report.

Report Issued By

R.JEYABHARATHI
Manager (Customer Care)

Scientific and Industrial Testing and Research Centre ★ Si Tarc

Approved By

Dr.K.ULAGANATHAN
Director.

Note : This Report is Subjected to the Terms and Conditions Mentioned Overleaf.

TEST REPORT FOR UNIVERSAL SOLAR PUMP CONTROLLER

MINISTRY OF NEW AND RENEWABLE ENERGY

UNIVERSAL SOLAR PUMP CONTROLLER (USPC) SPECIFICATIONS FOR STAND-ALONE APPLICATIONS

Annexure-III of Circular No. F. No. 41/3/2018-SPV Division dated 17.7.2019

1.0 DETAILS OF THE SAMPLE

Name of the Sample	UNIVERSAL SOLAR PUMP CONTROLLER (USPC)				
Rating in kW / HP	2.2 / 3.0	Volts (Nom)	370V	Sl.No	1020_4030_100847
Make	TAG Solar System LLP			Model No	KISAN UNIVERSAL 3HP
Description of the sample and specified requirements as received in data sheet enclosed with customer's Letter.					

2.0 SUPPLEMENTARY INFORMATION

2.1	Test Method	As per Ministry of new and Renewable Energy Testing Procedure for Universal Solar Pump Controller (USPC) Annexure-iii of circular no. F. No. 41/3/2018-spv division dated 17.7.2019
2.2	Above sample as received in physically satisfactory condition.	
2.3	Only the tests requested by the customer have been carried out.	
2.4	The specified ambient conditions were maintained during the test.	
2.5	The tests declared in the Sl.No (--) are/were sub contracted according to the established procedure of this laboratory.	
2.6	Reference to the sampling procedure, wherever applicable	NIL
2.7	Supporting documents for the measurements taken and results derived like graphs, tables, sketches and / or photographs as appropriate to test report, if any (to be attached)	Page. No 10 to 19
2.8	Deviations from test methods are prescribed in relevant IS / Work instruction if any	NIL
2.9	Measurement of uncertainty of test equipment is considered while testing	
2.10	"(see remark #)" refers to a remark appended to the report,"(see appended table)" refers to a table appended to the report.	
2.11	Under the test results the following indication (PASS, FAIL, N/A,"----') is marked against suitably.	

Test item does meet the requirement	PASS	Test item does not meet the requirement	FAIL
No Pass / Fail Decision Taken	"----"	Test case does not apply to the test object	N/A

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J.E(Electrical testing)

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Engineer(Electrical testing)

SLFE341/01-00/ 10-21

TEST REPORT No. : 11 0528

Test Started on: 21.10.2021

Test Completed on:26.10.2021

3.0 TEST DETAILS

SL.NO.	NAME OF THE TEST	TEST AS PER
3.1.	Selection and automatic operation of different solar based agriculture application	As per MNRE Testing Procedure for Universal Solar Pump Controller (USPC)
3.2.	Total Harmonics Distortion test	-DO-
3.3.	Protection(s) tests	-DO-
3.4.	Remote Monitoring	-DO-
3.5.	Measurement of Dynamic MPPT efficiency	-DO-
3.6.	Measurement of Converter efficiency	-DO-
3.7.	Torque observation on rated motor power	-DO-

4.0 TEST RESULTS

4 A SELECTION AND AUTOMATIC OPERATION OF DIFFERENT SOLAR BASED AGRICULTURE APPLICATION

SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS
1.	Application description on screen and selection of applications	LCD screen provided on controller shows various applications which can be selected by keypad using up-down and enter key.	Provided	
2.	Automatic operation of applications	Universal solar Agriculture controller comes with multiple outputs which can be permanently connected to the application by selecting appropriate options of the following application Automatically started • Water Pumping • Chaff Cutter • Atta Chakki • Deep fridge/ Cold storage/ Compressor No manual change over required	Provided, No manual change over observed in USPC	At a time, single application operates by the selection among all the connected applications
3.	Application Specific output (Application specific software)	USPC should have inbuilt individual application specific software to run the agrarian applications other than pumps	Provided	USPC is found to have satisfactory operation for above applications

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		and output of the controller should be suitable for above mentioned applications		
SL.NO.	**NAME OF THE TEST**	**SPECIFICATION / TEST REQUIREMENTS**	**TEST RESULTS**	**REMARKS**
4.	Overload torque test.	Up to 150% of rated torque of the connected motor.	Satisfactory	Ref Table – 8
5.	Constant torque test	Constant Load given to motor within 100% of rated torque of the motor	Satisfactory	Ref Table – 7
6.	Constant power test	At variable load i.e. from No load to 150%	Satisfactory	Ref Table – 8
7.	Quadratic load test	Load given to motor within 100% of rated torque of the motor	Satisfactory	Ref Table – 2
8.	Impact load test	Load given to motor within 150% of rated torque of the motor	Satisfactory	Ref Table – 8
9.	Hydraulic load test	Load given to pump set having rated capacity of the controller.	Satisfactory	Ref Table – 2

4B	**APPLICATION: SOLAR WATER PUMPING**			
SL.NO.	**NAME OF THE TEST**	**SPECIFICATION / TEST REQUIREMENTS**	**TEST RESULTS**	**REMARKS**
1.	Input voltage range Minimum- Voc at STC Nominal - Voc at STC Maximum – Voc at STC	 320 V 370 V 420 V	Tested on 320,370,420 VOC	Satisfactory Ref Table – 1, 2 and 3
2.	Ripple and Total Harmonic distortion at output on full load	Below 3%	< 2.98%	Satisfactory Ref Table 1, 2 and 3
3.	Insulation resistance	700 M ohm 500 V applied for 1 minute	820 MΩ @ 500V applied for 1 minute	Observed at 28.4°C & 71.7% RH
4.	Output Voltage (Sine Wave)	Three phase output with up to 400 V rms pure Sine Wave	Sin Wave CFU 1.49	Satisfactory

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5.	Low radiation mode protection	Provided		Observed	USPC shutdown at the low radiation if power is not sufficient to drive the particular application and indicates low radiation and Voc value on LCD and operation RANGE for Voc
6.	Dry run protection	Provided		Observed	Shutdown and Dry run protection on LCD
7.	Reverse Polarity Protection	Provided		Observed	Satisfactory
8.	Short Circuit protection	Provided		Observed	Satisfactory
9.	Open circuit protection	Provided		Observed	Satisfactory
10.	Remote monitoring	Provided		Built in RMU Observed with data storage	Satisfactory (Ref photograph – 2)
11.	Average MPPT tracking efficiency in Hot profile	To be measured		99.6%	Hot profile operated with 370 Voc and 3000 Wp array
12.	Average MPPT tracking efficiency in Cold Profile	To be measured		99.7%	Cold profile operated with 370 Voc and 3000 Wp array
13.	Output voltage THD at rated PV	To be measured		< 2.01%	Satisfactory
14.	Instantaneous output voltage and voltage spikes	Sinusoidal & no voltage spikes		Observed	Satisfactory
15.	Crest Factor in output at rated PPV	1.6 maximum		CFU: 1.49 CFI: 1.51	Satisfactory Ref Photograph No. 1
16.	Efficiency Tests of the Controller at Voc 370 V To be Measured	Controller Efficiency (%)	MPPT Efficiency (%)	Overall charge controller Efficiency (%) Ref Table - .2	
16.1.	At 10% of input power	73.26	99.12	72.62	
16.2.	At 25% of input power	86.35	99.43	85.86	
16.3.	At 50% of input power	90.79	99.62	90.44	
16.4.	At 75% of input power	92.46	99.57	92.06	
16.5.	At 100% of input power	93.57	99.57	93.17	

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4C.	APPLICATION: SOLAR BASED CHAFF CUTTER			
SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS (REF. TABLE – 4)
1.	Input PV voltage range Minimum-Voc at STC Nominal- Voc at STC Maximum-Voc at STC	 320 V 370 V 420 V	Observed	Satisfactory
2.	Output voltage waveform	Sinusoidal at rated conditions 380 to 400 V Ac rms	Observed	Satisfactory
3.	Input PV power range P Nominal	3000 Watts STC	Tested with 3000 Wp	Satisfactory
4.	Motor Rating	2 hp, 3 Phase, 50 Hz, 6 pole, 910 RPM	2 hp	Loads as per chaff cutter load .
5.	Continuous operation started @ power output from array	To be measured	1613 Wp	Operation starts at 50 Hz above this power with chaff cutter loading
6.	Cutter rotation speed for 6 pole type Motor	To be measured	975 RPM at motor pully	Satisfactory
7.	DC power in loading condition	To be measured	734-1614 Wp	Totally depended on loading condition
8.	Cutter Operation at different output from 3000 Wp array At 40% Power At 50% Power At 75% Power At 100% Power	To be measured (cutter will not stop functioning)	Observed	Above 734 Wp output from array chaff cutter operates satisfactory, else low radiation protection shutdown system and display on LCD
9.	Production Rate	kg/ hour	560 kg/hour	Produced 9.3 kg in 1 minute
10.	Total circuit protection	Provided	Observed	Soft Start up, low radiation protection
11.	Overload protection	Provided	Observed	Satisfactory
12.	Short Circuit protection	Provided	Observed	Satisfactory
13.	Open circuit protection	Provided	Observed	Satisfactory
14.	Reverse polarity protection	Provided	Observed	Satisfactory
15.	PV source operating condition during cutter operation	Operates in constant voltage of PV curve	Constant	Satisfactory

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4C.	APPLICATION: SOLAR BASED CHAFF CUTTER			
SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS (REF. TABLE – 4)
16.	Cutter acceleration	Smooth	Soft start provided	Satisfactory

4 D	APPLICATION: SOLAR BASED COLD STORAGE/ DEEP FRIDGE/ COMPRESSOR			
SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS (REF TABLE - 5)
1.	Input PV voltage range Minimum-Voc at STC Nominal-Voc at STC Maximum-Voc at STC	 320 V 370 V 420 V	Observed	Satisfactory
2.	Output voltage waveform	Sinusoidal at rated conditions 380 to 400 V Ac rms	Observed	Satisfactory
3.	Input PV power range P Nominal	3000 Watts STC	Tested with 3000 Wp	Satisfactory
4.	Compressor rating	Capacity 220 litre,	Volume 220 litre	
5.	Motor rating	2.5 hp, 3 Phase, 50 Hz, 4 pole , 1440 RPM	2.5 hp	
6.	Continuous operation started @ power output from array	To be measured	1970 Wp	Satisfactory operation starts at 50 Hz above this power with compressor loading
7.	Compressor operation at different output from 3000 Wp array At 40% Power At 50% Power At 75% Power At 100% Power	To be measured (Compressor will not stop functioning)	Observed	Above 739 Wp output from array compressor operates satisfactory, else low radiation protection shutdown system and display on LCD
8.	Time Required for Air Pressure (0 to 10 bar)	In minute	7 minutes and 20 second	Electrical observation continuous operation found after 739 Wp
9.	Total circuit protection	Provided	Observed	Soft Start up, low radiation protection
10.	Short Circuit protection	Provided	Observed	Satisfactory

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4 D	APPLICATION: SOLAR BASED COLD STORAGE/ DEEP FRIDGE/ COMPRESSOR			
SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS (REF TABLE - 5)
11.	Open circuit protection	Provided	Observed	Satisfactory
12.	Reverse polarity protection	Provided	Observed	Satisfactory
4 E	APPLICATION: SOLAR BASED ATTA CHAKKI			
SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS (REF TABLE -6)
1.	Input PV voltage range Minimum-Voc at STC Nominal-Voc at STC Maximum-Voc at STC	 320 V 370 V 420 V	Observed	Satisfactory
2.	Output voltage waveform	Sinusoidal at rated conditions 380 to 400 V Ac rms	Observed	Satisfactory
3.	Input PV power range P Nominal	3000 Watts	Tested with 3000 W/p	Satisfactory
4.	Atta Chakki type	14 inches, open hopper store type, Production rate 14 to 18 kg/hour wheat flour, hopper size 15 to 20 kg	Observed	16 kg/hour
5.	Atta Chakki motor	3 hp, 3 Phase, 50 Hz, 6 pole, 910 RPM	3 hp	Loads as per Atta Chakki load
6.	Continuous operation started @ power output from array	To be measured	2296 Wp	Operation starts at 50 Hz above this power for full loading
7.	Rotation speed	To be measured	Motor: 937 RPM	Satisfactory
8.	Atta Chakki operation at different output from 3000 Wp array At 40% Power At 50% Power At 75% Power At 100% Power	To be measured (Atta Chakki will not stop functioning)	Observed	Above 708 Wp output from array Atta Chakki operates at full load satisfactory, else below low radiation protection shut downs the system and display on LCD
9.	Production rate with wheat	kg/ hour	10 kg/hour	Produced 5.0 kg in 30 minutes
10.	Total circuit protection	Provided	Observed	Soft Start up, low radiation protection
11.	Overload protection	Provided	Observed	Satisfactory

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4 D	APPLICATION: SOLAR BASED COLD STORAGE/ DEEP FRIDGE/ COMPRESSOR			
SL.NO.	NAME OF THE TEST	SPECIFICATION / TEST REQUIREMENTS	TEST RESULTS	REMARKS (REF TABLE - 5)
12.	Short Circuit protection	Provided	Observed	Satisfactory
13.	Open circuit protection	Provided	Observed	Satisfactory
14.	Reverse polarity protection	Provided	Observed	Satisfactory

DETAILS OF EQUIPMENTS USED AS LOAD				
S.NO.	EQUIPMENT USED	MODEL	SERIAL NO	REMARKS
1.	Motor and Pump (submersible)	Motor- 3 HP S.S. Pump- 12 stage S.S.	D152522	3 Phase
2.	Chaff Cutter	2 HP, 6 pole	103219	3 Phase
3.	Compressor	2.5 HP, 4 pole	12634	3 Phase
4.	Atta Chakki	3 HP, 6 pole	103219	3 Phase

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TABLE 1	CONVERTER EFFICIENCY AT MINIMUM VOLTAGE (TESTED AT VOLTAGE AT 320 Voc)					
S.NO.	INPUT POWER %	10	25	50	75	100
1.	Udc-1-Total	293.4	258.2	251.9	257.5	283.5
2.	Idc-1-Total	0.82	2.88	5.81	8.56	9.55
3.	P-1-Total	241	738	1462	2204	2706
4.	FreqU-Total (Hz)	12.88	20.36	32.71	39.95	43.16
5.	Uthd-2-Total	-	1.60	1.33	1.30	1.26
6.	Ithd-2-Total	-	1.46	1.62	2.76	1.67
7.	Uthd-3-Total	-	1.79	1.40	1.45	1.40
8.	Ithd-3-Total	-	2.54	1.62	2.19	1.39
9.	Uthd-4-Total	-	1.88	1.43	1.48	1.47
10.	Ithd-4-Total	-	2.47	2.35	2.39	1.84
11.	Urms-SigmaA-Total	105.95	162.8	265.9	322.16	348.78
12.	Irms-SigmaA-Total	4.00	4.20	5.00	5.50	6.00
13.	P-SigmaA-Total (W)	180	650	1340	2040	2520
14.	PF-SigmaA-Total	0.2456	0.5445	0.5824	0.6595	0.6973
15.	S-SigmaA-Total (VA)	730	1190	2300	3090	3610
16.	Q-SigmaA-Total (VA)	710	1000	1870	2330	2600
17.	Controller efficiency (%)	74.69	88.08	91.66	92.56	93.13
18.	Mppt efficiency (%)	99.21	99.18	99.24	99.51	99.57
19.	Overall system efficiency	74.10	87.35	90.96	92.11	93.10

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TABLE 2	CONVERTER EFFICIENCY AT NOMINAL VOLTAGE (TESTED AT VOLTAGE AT 370 Voc)					
S.NO.	LOAD %	10	25	50	75	100
1.	Udc-1-Total	313.23	281.1	298.3	285.1	307.1
2.	Idc-1-Total	0.83	2.59	4.96	7.63	9.38
3.	P-1-Total	273	718	1476	2174	2939
4.	FreqU-Total (Hz)	16.04	17.82	31.02	38.38	43.09
5.	Uthd-2-Total	-	1.71	1.25	1.28	1.30
6.	Ithd-2-Total	-	2.46	1.67	1.95	0.63
7.	Uthd-3-Total	-	1.89	1.35	1.40	1.46
8.	Ithd-3-Total	-	2.10	1.41	0.81	1.36
9.	Uthd-4-Total	-	2.01	1.36	1.39	1.47
10.	Ithd-4-Total	-	2.98	1.61	1.46	1.42
11.	Urms-SigmaA-Total	133.42	152.40	269.90	334.79	371.20
12.	Irms-SigmaA-Total	4.2	4.7	5.6	6.1	6.6
13.	P-SigmaA-Total (W)	200	620	1340	2010	2750
14.	PF-SigmaA-Total	0.2089	0.4988	0.5134	0.5644	0.6439
15.	S-SigmaA-Total (VA)	970	1240	2620	3550	4270
16.	Q-SigmaA-Total (VA)	950	1080	2250	2940	3290
17.	Controller efficiency (%)	73.26	86.35	9.79	92.46	93.57
18.	Mppt efficiency (%)	99.12	99.43	99.62	99.57	99.57
19.	Overall system efficiency	72.26	85.86	90.44	92.06	93.17

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TABLE 3	CONVERTER EFFICIENCY AT MAXIMUM VOLTAGE (TESTED AT VOLTAGE AT 420 Voc)					
S.NO.	LOAD %	10	25	50	75	100
20.	Udc-1-Total	339.90	328.99	331.40	334.13	361.54
21.	Idc-1-Total	0.87	2.29	4.43	6.61	8.00
22.	P-1-Total	296	730	1466	2205	2889
23.	FreqU-Total (Hz)	18.46	19.92	30.00	39.49	45.05
24.	Uthd-2-Total	-	1.83	1.29	1.27	1.25
25.	Ithd-2-Total	-	2.73	2.18	1.22	1.01
26.	Uthd-3-Total	-	2.04	1.37	1.39	1.46
27.	Ithd-3-Total	-	2.57	2.59	2.09	1.24
28.	Uthd-4-Total	-	2.20	1.42	1.40	1.49
29.	Ithd-4-Total	-	2.30	1.65	1.82	1.79
30.	Urms-SigmaA-Total	153.79	143.23	259.43	341.19	387.56
31.	Irms-SigmaA-Total	4.40	4.60	5.50	6.00	6.50
32.	P-SigmaA-Total (W)	230	620	1340	2030	2750
33.	PF-SigmaA-Total	0.2006	0.5480	0.54005	0.5685	0.6254
34.	S-SigmaA-Total (VA)	1100	1140	2490	3570	4390
35.	Q-SigmaA-Total (VA)	140	960	2080	2940	3440
36.	Controller efficiency (%)	77.70	84.93	91.41	92.06	95.19
37.	Mppt efficiency (%)	99.10	99.18	99.19	99.47	99.52
38.	Overall system efficiency	77.00	84.24	90.66	91.58	94.73

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TABLE 4	CHAFF CUTTER OPERATION						
S.NO.	POWER %	25	30	40	50	75	100
1.	Udc-1-Total	293.3	300.2	290.5	288.1	344.3	352.5
2.	Idc-1-Total	2.50	2.95	4.03	5.06	4.69	4.58
3.	P-1-Total	734	887	1170	1457	1613	1614
4.	FreqU-Total (Hz)	31.90	36.03	42.69	47.31	50.49	50.50
5.	Uthd-2-Total	2.38	2.28	2.18	1.96	1.92	1.91
6.	Ithd-2-Total	2.35	2.76	2.44	2.42	1.92	2.88
7.	Uthd-3-Total	2.56	2.34	2.24	2.00	1.95	1.95
8.	Ithd-3-Total	2.54	2.99	2.50	2.86	2.14	2.69
9.	Uthd-4-Total	2.69	2.34	2.57	2.39	2.38	2.38
10.	Ithd-4-Total	2.73	2.38	2.46	2.51	2.29	2.73
11.	Urms-SigmaA-Total	251.0	283.1	337.6	370.9	405.6	405.7
12.	Irms-SigmaA-Total	2.62	2.86	3.0	3.2	3.3	3.3
13.	P-SigmaA-Total (W)	660	810	1050	1340	1470	1460
14.	PF-SigmaA-Total	-	-	0.5892	0.6463	0.6327	0.6313
15.	S-SigmaA-Total (VA)	-	-	1780	2080	2230	2320
16.	Q-SigmaA-Total (VA)	-	-	1450	1630	1820	1820
17.	Controller efficiency (%)	89.92	91.32	89.74	91.97	92.37	93.56
18.	Speed in rpm	596	693	746	825	975	974
19.	Torque in Nm	7.862	8.861	10.03	10.72	12.01	12.17

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TEST REPORT No. : 11 0528

TABLE 5	COMPRESSOR OPERATION						
S.NO.	POWER %	25	30	40	50	75	100
1.	Udc-1-Total	300.4	285.9	295.5	300.8	332.1	346.7
2.	Idc-1-Total	2.46	3.05	3.99	4.91	5.93	5.72
3.	P-1-Total	739	870	1177	1478	1970	1984
4.	FreqU-Total (Hz)	27.46	3034	36.62	42.32	50.48	50.44
5.	Uthd-2-Total	1.85	2.09	2.00	1.86	1.76	1.76
6.	Ithd-2-Total	2.22	2.80	2.47	2.85	2.49	2.31
7.	Uthd-3-Total	1.88	2.03	1.98	1.59	1.73	1.77
8.	Ithd-3-Total	2.22	2.91	2.56	2.35	2.33	2.44
9.	Uthd-4-Total	2.07	2.42	2.32	2.02	2.18	2.18
10.	Ithd-4-Total	2.68	2.65	2.80	2.68	2.33	2.82
11.	Urms-SigmaA-Total	215.5	237.2	286.8	329.1	404.0	403.9
12.	Irms-SigmaA-Total	2.6	3.1	3.3	3.5	3.8	3.8
13.	P-SigmaA-Total (W)	670	800	1090	1390	1800	1830
14.	PF-SigmaA-Total	-	0.6299	0.6603	0.6939	0.6830	0.6887
15.	S-SigmaA-Total (VA)	-	1260	1650	2000	2640	2660
16.	Q-SigmaA-Total (VA)	-	990	1260	1480	1930	1970
17.	Controller efficiency (%)	90.66	91.95	92.61	94.05	91.37	93.25

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TABLE 6	ATTA CHAKKI OPERATION						
S.NO.	POWER %	25	30	40	50	75	100
1.	Udc-1-Total	275.4	299.9	293.4	290.8	292.5	341.0
2.	Idc-1-Total	2.57	2.96	4.00	5.04	7.51	6.73
3.	P-1-Total	708	888	1176	1462	2199	2296
4.	FreqU-Total (Hz)	24.83	28.51	31.01	35.61	46.26	50.11
5.	Uthd-2-Total	1.30	1.26	1.02	1.06	1.20	1.34
6.	Ithd-2-Total	2.64	2.88	2.40	2.93	2.73	1.96
7.	Uthd-3-Total	1.64	1.26	0.96	0.88	0.87	1.09
8.	Ithd-3-Total	2.04	2.61	2.27	1.42	1.68	2.33
9.	Uthd-4-Total	1.66	1.58	1.29	1.23	1.46	1.56
10.	Ithd-4-Total	2.81	2.91	1.88	2.73	1.36	2.09
11.	Urms-SigmaA-Total	179.6	207.2	222.2	256.6	331.5	361.3
12.	Irms-SigmaA-Total	3.0	3.2	3.8	4.0	4.7	4.5
13.	P-SigmaA-Total (W)	660	830	1100	1370	2090	2150
14.	PF-SigmaA-Total	0.7029	0.7093	0.7581	0.7662	0.7776	0.7613
15.	S-SigmaA-Total (VA)	940	1160	1450	1790	2680	2820
16.	Q-SigmaA-Total (VA)	680	830	970	1170	1710	1850
17.	Controller efficiency (%)	93.22	93.47	93.54	93.71	95.04	93.64
18.	Speed in rpm	441	528	562	654	851	937
19.	Torque in Nm	10.19	11.38	14.06	15.48	18.27	17.83

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TABLE 7	TORQUE OBSERVATION ON 3 HP MOTOR WITH DYNAMOMETER AS LOAD						
S.NO.	POWER %	25	30	40	50	75	100
1.	Udc-1-Total	275.4	290.3	303.5	300	294.7	340.8
2.	Idc-1-Total	2.57	3.02	3.90	4.92	7.47	6.78
3.	P-1-Total	708	887	1183	1477	2204	2311
4.	FreqU-4-Total (Hz)	24.70	28.34	31.01	35.86	46.10	50.26
5.	Uthd-2-Total	1.33	1.20	1.12	0.98	1.22	1.37
6.	Ithd-2-Total	1.39	2.77	2.85	2.89	1.10	1.73
7.	Uthd-3-Total	1.51	1.26	0.99	1.05	1.07	1.09
8.	Ithd-3-Total	2.77	2.65	2.88	2.13	1.33	1.92
9.	Uthd-4-Total	1.66	1.57	1.37	1.30	1.54	1.55
10.	Ithd-4-Total	2.52	1.25	1.78	2.13	1.14	2.49
11.	Urms-SigmaA-Total	179.9	204.7	224.0	257.8	332.1	361.3
12.	Irms-SigmaA-Total	2.0	3.2	3.8	4.1	4.7	4.6
13.	P-SigmaA-Total (W)	650	800	1120	1390	2080	2180
14.	PF-SigmaA-Total	-	0.7085	0.7633	0.7686	0.7767	0.7665
15.	S-SigmaA-Total (VA)	630	1130	1460	1810	2680	2850
16.	Q-SigmaA-Total (VA)	690	830	970	1180	1720	1860
17.	Controller efficiency (%)	91.81	90.19	94.67	94.11	94.37	94.33
18.	RPM	439	525	567	657	851	934
19.	Torque in Nm	10.12	11.41	14.09	15.50	18.26	17.12

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TABLE 8	TORQUE OBSERVATION ON 3 HP MOTOR WITH DYNAMOMETER AS LOAD						
S.NO.	LOAD %	25	50	75	100	125	150
1.	Udc-1-Total	362.9	357.5	350.0	339.4	322.5	321.1
2.	Idc-1-Total	1.96	3.44	5.13	6.97	8.72	8.75
3.	P-1-Total	710	1229	1796	2365	2813	2829
4.	FreqU-4-Total (Hz)	50.45	50.43	50.44	50.43	50.44	46.18
5.	Uthd-2-Total	-	1.95	1.69	1.35	1.16	1.72
6.	Ithd-2-Total	-	1.60	2.88	2.11	1.98	1.38
7.	Uthd-3-Total	-	2.0	1.50	1.10	0.88	1.09
8.	Ithd-3-Total	-	1.87	2.45	2.87	2.20	2.03
9.	Uthd-4-Total	-	2.42	2.02	1.55	1.33	1.84
10.	Ithd-4-Total	-	2.71	2.70	1.88	1.14	1.92
11.	Urms-SigmaA-Total	382.3	379.3	376.8	374.6	373.1	347.9
12.	Irms-SigmaA-Total	1.7	2.4	3.6	4.5	5.3	6.2
13.	P-SigmaA-Total (W)	640	1130	1680	2250	2660	2708
14.	PF-SigmaA-Total	-	-	0.7142	0.7709	0.7778	0.7820
15.	S-SigmaA-Total (VA)	-	-	2350	2920	3410	3520
16.	Q-SigmaA-Total (VA)	-	-	1670	1900	2170	2010
17.	Controller efficiency (%)	90.14	91.94	93.54	95.14	94.56	95.72
18.	RPM	995	979	960	936	918	881
19.	Torque in Nm	4.509	9.056	13.68	18.16	22.53	27.18

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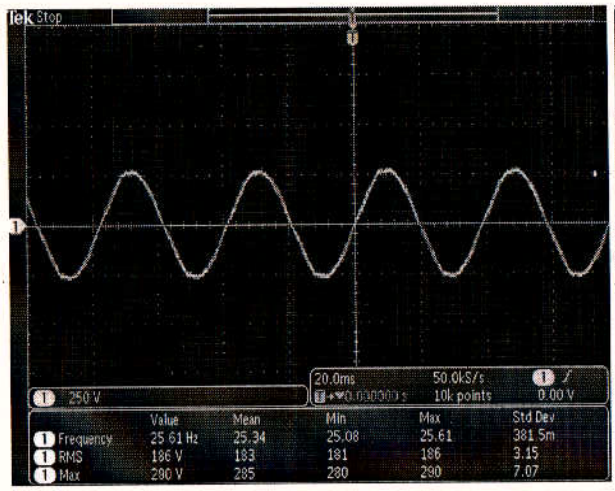
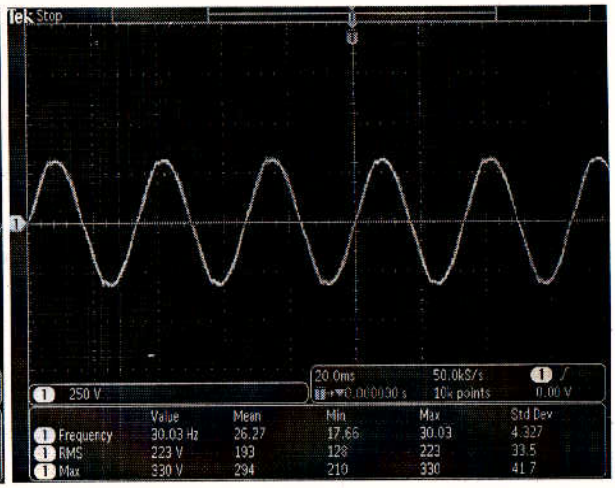
PHOTGRAPHS - 1

OUTPUT WAVE OF USPC AT DIFFERENT RADIATION / POWER

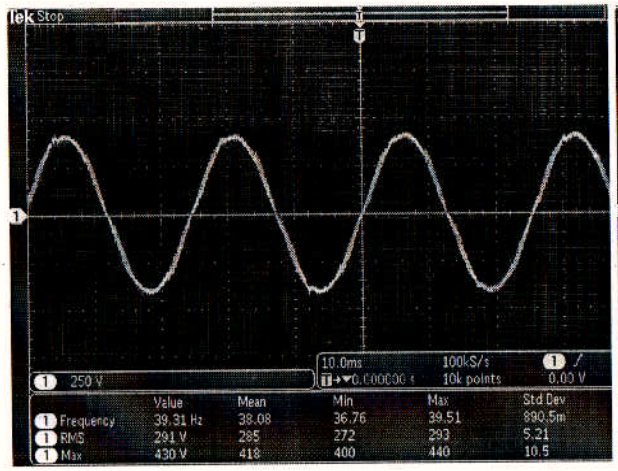
RADIATION 250 W/m^2



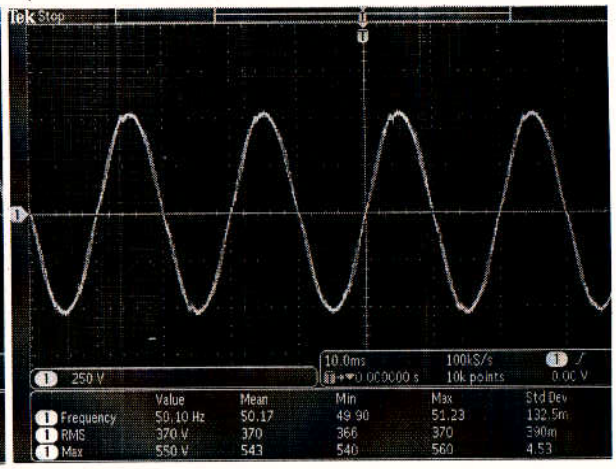
RADIATION 450 W/m^2



RADIATION 650 W/m^2



RADIATION 950 W/m^2



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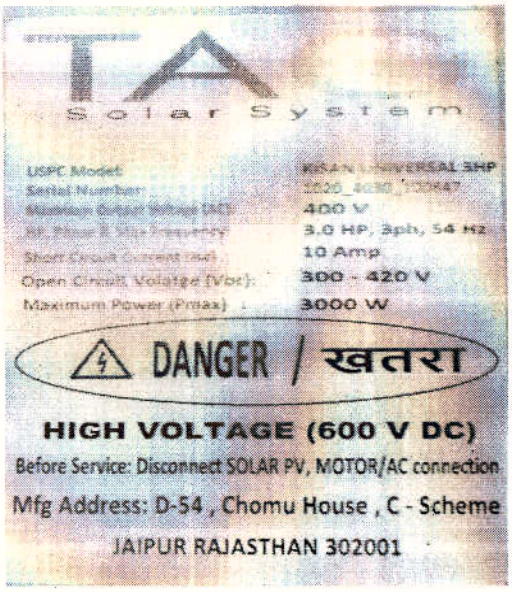
PHOTGRAPHS - 2

FRONT VIEW

VISUAL INSPECTION OF USPC

NAME PLATE OF THE CONTROLLER



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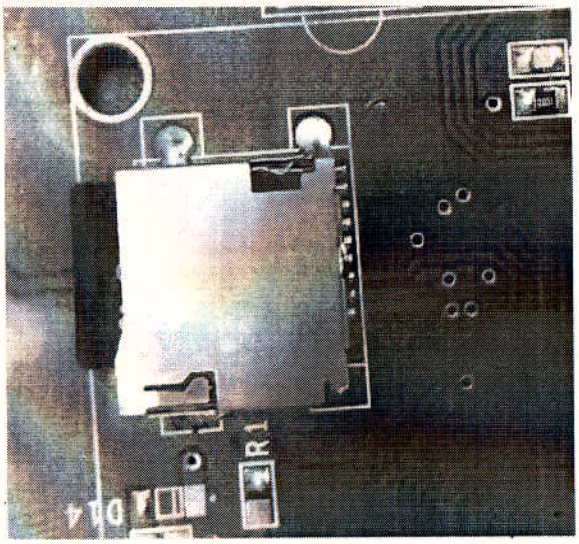

- End of the Report -

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