

NISE

National Institute of Solar Energy

(An Autonomous Institution of MNRE, GOI)
19 K.m Stone, Gurgaon-Faridabad Road, Gwal Phari, Gurgaon (Haryana)-122003

File No: 252/2015-16 /CSC/NISE /1141

Dated: 8/1/2016

To, M/S. KISAN SOLAR

A-2, ATULYA BHAVAN, NEXT TO C.E.R.C. S.G. HIGHWAY
THALTEJ, AHMEDABAD-380054.

Subject: Issue of Test Report by National Institute of Solar Energy ('NISE')

Dear Sir,

Please refer to your letter No./Order Form No. 07. Dated 7/12/15. In this connection, I am directed to enclose herewith the Test Report No: 252/2015-16/CSC/NISE Dated 8/1/2016. In respect of your submitted samples in original, for ready reference and record.

2. Discrepancies, if any observed, in respect of any of the entries contained in the above report should be brought to the notice of this office within 30 days from the date of issue of this letter, failing which it will be presumed that the entries therein are in order and no further correspondence will be entertained thereafter on this particular report.
3. We would like to solicit your views and therefore enclosing a Feedback Form, with a request to be filled up by you and then send as soon as possible. Your suggestions are valuable for us to make our further improvements and take corrective action in improving our quality of service.
4. Further, You are also requested to collect your samples at your cost within 30 days, from the date of issue of this letter falling which NISE will dispose of the sample in best possible manner and NISE will not be responsible in any manner for this sample.

Kindly acknowledge the receipt of this letter along with original test report and original Invoice.



Yours faithfully

Shweta
8/1/2016
Dr. Shweta Soam
(In-charge, Customer Service Cell)
(National Institute of Solar Energy)

Encl:

1. Test Report-Total Page 12.
2. Feedback Form

Copy forwarded for Information to:

1. PA to Director General-NISE
2. Guard File
3. Office Copy

For KISAN SOLAR

Shweta
Partner



National Institute of Solar Energy

(Formerly known as Solar Energy Centre)

(An autonomous Institute of Ministry of New & Renewable Energy)

Gurgaon-Faridabad Road, Gwalpahari, Gurgaon-122003

✉ niseinverterlab@gmail.com

☎ 0124-2579213; FAX: 0124-2579207

2015-2016

TEST REPORT ON SPCM- 5 HP

Sample ID No. : 14/0815
 Model : iACQUA-280/5
 Sl. No. : ks_0215_0050_000151
 Manufactured by: KISAN SOLAR
 Submitted by : KISAN SOLAR
 A/2, ATULYA BHAVAN, NEXT TO C.E.R.C, S.G. HIGHWAY
 THALTEJ, AHMEDABAD-380054, GUJRAT, INDIA

NOTE

This is a test report on measurements carried out on the Solar Pump Controller (sample Id no. 14/0815) submitted at National Institute of Solar Energy (NISE). The Solar Pump Controller and its remote monitoring are tested as per the user specifications and as per Remote Monitoring guidelines of MNRE 2015-16. The data reported in this TEST REPORT is valid at the time and under the stipulated conditions of measurement. The test results reported are applicable to this Solar Pump Controller only and do not apply to other PCUs even though declared to be identical. The data contents in this report do not constitute a qualification test certificate. NISE does not accept any liability for any consequences including commercial or otherwise arising out of the utilization of the information contained in this report.

The Test Report, if reproduced for any purpose, commercial or otherwise, should be reproduced in full. The contents of the report can be published only after a written approval from the Director General, NISE.

Tested by *Kambakh Mishra*

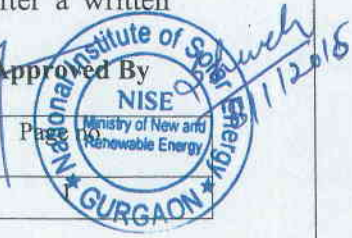
Inspected & Approved By *[Signature]*

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For KISAN SOLAR

[Signature]

Partner



(A) Remote Monitoring:

Remote monitoring of SPCM is provided with following functions and features:

1. Real time Data Logging:		Remark
a	Estimates discharge rate and cumulative discharge.	Found satisfactory
b	Critical information of solar PV voltage, current, power, motor-pump set frequency, RMS voltage and discharge rate	
c	Remote monitoring for PV generated energy log in KWHr	
d	Status of solar water pump project, eg. On or Off or under fault condition, Continuous checks for occurrence of fault conditions, e.g. short circuit, open circuit, dry run, etc. and report in real time.	
2. Statistical Information on Health of Pump:		
a	Number of days pump is operating.	Found satisfactory
b	Number of days pump is not operating.	
3. Statistical Information on Energy Utilization		
a	Graph plot of energy utilized per day, per week, per month, per six month, per one year, per two years, etc.	Found satisfactory
4. Other necessary information and provisions available for:		
a	Controller details, e.g. make, type, capacity, etc.	Found satisfactory
b	Motor Pump set details, e.g. make, type, capacity, electric specifications etc.	
c	PV Module details, e.g. make, type, capacity, other specifications, etc.	
d	Maintenance and contact details of a service provider.	
e	Map of location of project installation along with driving directions from nearest district.	
f	Status of the pump indicated by color of the marker for easy identification of working and nor working projects, e.g. Green color indicates a working pump, Red color indicates a pump that is shut down, Yellow color indicates a pump that is in fault/under-maintenance.	
5. SPCM MPPT performance under various solar radiation pattern:		
a	MPPT performance in Hot and Cold solar radiation profile	Found satisfactory
6. Other Features of Remote Monitoring of SPCM:		
A	Downloadable data and file format using RM module and server interface	Found satisfactory
B	Remote Control using RM module of SPCM	

Kamlesh Mishra
Tested by *Sinha*

Inspected & Approved By

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For KISAN SOLAR

Mishra

Partner

1. Real time Data Logging

(a.1) Actual discharge measured by flow meter: Both cold and hot profile of solar radiation pattern is applied using PV simulator and obtained following discharge results. These results can be compared with the data log for water discharge using RM module of a SPCM.

Cold Profile										
Sr.No.	Time	Head	Flow_meter	Remark	Sr.No.	Time	Head	Flow_meter	Remark	
1	9:05:00	18	3663		22	13:45:00	20	3803.3		
2	9:10:00	19	3663.9		23	14:00:00	20	3812.8		
3	9:12:00	20	3664.25	Start	24	14:15:00	20	3822.55		
4	9:15:00	20	3664.75		25	14:30:00	20	3830.6		
5	9:30:00	20	3668.15		26	14:45:00	20	3839.3		
6	9:45:00	20	3672.3		27	15:00:00	20	3848.1		
7	10:00:00	20	3678.05		28	15:15:00	20	3857.25		
8	10:15:00	20	3683.8		29	15:30:00	20	3866.1		
9	10:30:00	20	3690.25		30	15:45:00	20	3874.85		
10	10:45:00	20	3697.35		31	16:00:00	20	3883.4		
11	11:00:00	20	3704.85		32	16:15:00	20	3892.2		
12	11:15:00	20	3712.8		33	16:30:00	20	3899.7		
13	11:30:00	20	3721.1		34	16:45:00	20	3906.35		
14	11:45:00	20	3729.85		35	17:00:00	20	3914.2		
15	12:00:00	20	3738.9		36	17:15:00	20	3921.7		
16	12:15:00	20	3747.8		37	17:30:00	20	3928.6		
17	12:30:00	20	3756.5		38	17:45:00	20	3934.8		
18	12:45:00	20	3765.4		39	18:00:00	20	3940.25		
19	13:00:00	20	3775.35		40	18:15:00	20	3944.9		
20	13:15:00	20	3784.7		41	18:30:00	20	3948.45		
21	13:30:00	20	3794.2		42	18:37:00	20	3949.6	stop	
								Total Discharge	285.35	KLtr

Hot Profile										
Sr.No.	Time	Head	Flow_meter	Remark	Sr.No.	Time	Head	Flow_meter	Remark	
1	10:32:00	8	3427.8		22	15:15:00	20	3534.4		
2	10:45:00	15	3427.9		23	15:30:00	20	3542.45		
3	10:50:00	16	3428.65		24	15:45:00	20	3550.75		
4	11:00:00	17	3430.4		25	16:00:00	20	3558.9		
5	11:10:00	20	3432.15	Start	26	16:15:00	20	3567.85		
6	11:20:00	20	3433.95		27	16:30:00	20	3575.85		
7	11:30:00	20	3436		28	16:45:00	20	3583.9		
8	11:45:00	20	3439.75		29	17:00:00	20	3591.9		
9	12:00:00	20	3444.15		30	17:15:00	20	3600		
10	12:15:00	20	3449.25		31	17:30:00	20	3607.4		
11	12:30:00	20	3455		32	17:45:00	20	3613.75		
12	12:45:00	20	3460.9		33	18:00:00	20	3620.75		
13	13:00:00	20	3467.25		34	18:15:00	20	3627.5		
14	13:15:00	20	3473.9		35	18:30:00	20	3633.7		
15	13:30:00	20	3480.95		36	18:45:00	20	3639.8		
16	13:45:00	20	3488.1		37	19:00:00	20	3646.5		
17	14:00:00	20	3495.45		38	19:15:00	20	3651.85		
18	14:15:00	20	3503		39	19:30:00	20	3656.35		
19	14:30:00	20	3510.75		40	19:45:00	20	3659.85		
20	14:45:00	20	3518.6		41	20:00:00	20	3661.35		
21	15:00:00	20	3526.45		42	20:02:00	20	3661.4	stop	
								Total Discharge	229.25	KLtr

Tested by *Kamlesh Mishra*
Sinha

Inspected & Approved *[Signature]*

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For KISAN SOLAR

[Signature]

Partner

(a.2) Estimates discharge rate and cumulative discharge:

Total discharge logged by remote monitoring at the end of cold profile = 274.4 KLtr

SPCM Data Logs Use filters to refine your search

Home Solar pump project ks_0215_0060_000151

Page 56 of 58 | View 10 records | Found total 572 records

Id #	Date	Time	MPPT Power (W)	Frequency (Hz)	Flow Rate (KL)	Condition	Status
	2015		32.46 KWH		274.408 KL	All	All
	2015		(TOTAL ENERGY UTILIZED)		(TOTAL WATER DISCHARGED)		
2868	2015-12-11	18:22:51	2008	42.07	224	System OK	ON
2869	2015-12-11	18:23:54	1989	41.82	230	System OK	ON
2870	2015-12-11	18:24:58	1963	41.96	214	System OK	ON
2871	2015-12-11	18:26:01	1935	42.05	200	System OK	ON

Total discharge logged by remote monitoring at the end of hot profile = 220.231 KLtr

SPCM Data Logs Use filters to refine your search

Home Solar pump project ks_0215_0060_000151

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Id #	Date	Time	MPPT Power (W)	Frequency (Hz)	Flow Rate (KL)	Condition	Status
	2015		27.33 KWH		220.231 KL	All	All
	2015		(TOTAL ENERGY UTILIZED)		(TOTAL WATER DISCHARGED)		
2227	2015-12-10	19:40:33	1968	41.99	214	System OK	ON
2228	2015-12-10	19:41:36	1947	41.83	215	System OK	ON
2229	2015-12-10	19:42:39	1937	42.07	199	System OK	ON
2230	2015-12-10	19:43:43	1916	41.93	199	System OK	ON

(a.3) Percentage error between actual and estimated discharge by Remote Monitoring:

PV Simulator Profile	Actual Discharge (KLtr)	RM Logged Discharge (KLtr)	Error (%)	Remark
Hot Profile	229.25	220.23	3.93%	Satisfactory for estimated discharge
Cold Profile	285.35	274.4	3.84%	Satisfactory for estimated discharge

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For KISAN SOLAR

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(b) Critical information of solar PV voltage, current, power, motor-pump set frequency, RMS voltage and discharge rate

Date	Time	Vpv	Ipv	Ppv	Vdc	Duty_C	Inv_Fre	Vrms
11-12-2015	09:14:21	306	5.9	1832	458	31	41.59	214
11-12-2015	09:29:55	309	6.7	2075	426	28	42.03	219
11-12-2015	09:44:28	302	7.4	2247	406	26	42.46	223
11-12-2015	09:58:59	290	8.3	2421	395	27	42.97	222
11-12-2015	10:14:34	294	9.3	2750	403	27	43.98	231

(c) Remote monitoring for PV generated energy log in KWHr:


Both cold and hot profile of solar radiation pattern applied to SPCM using solar PV simulator and total energy is noted at the end of experiment, at both simulator and RM server and found as below:

PV Simulator Profile	PV simulator Energy (KWHr)	RM Logged Energy (KWHr)	Error (%)	Remark
Hot Profile	27.49	27.327	0.59%	Satisfactory
Cold Profile	32.66	32.46	0.61%	Satisfactory

(d) Status of solar water pump project, eg. On or Off or under fault condition.

Various protections are tested by inducing actual fault conditions on SPCM and motor-pump set. The results are found as below:

Remote Monitoring Web Interface

Sr. No.	Description	Experimental results and snapshots	Remark
1	Verification of Dry Run Condition		Dry run condition detected successfully and logged on server

SPCM Data Logs Use filters to refine your search

Home > Solar pump project: ka_0215_0950_000151

Page < 174 > of 174 | View 10 records | Found total 1735 records

Id #	Date	Time	MPPT Power (W)	Frequency (Hz)	Flow Rate (KL)	Condition	Status
			72.45 KWH (TOTAL ENERGY UTILIZED)		0.00 KL (TOTAL WATER DISCHARGED)	All	All
2262	2015-12-10	20:02:29	855	34.30	0	System OK	ON
2263	2015-12-10	20:02:29	855	34.30	0	System OK	ON
2264	2015-12-10	20:02:30	11	0.00	0	Dry Run	OFF
2265	2015-12-10	20:02:31	11	0.00	0	Dry Run	OFF

Page < 174 > of 174 | View 10 records | Found total 1735 records

Tested by *Kamlesh Mishra*

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 GURGAON

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For KISAN SOLAR
msheta

2	Verification of Short Circuit Condition		Short circuit condition detected successfully and logged on server
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SPCM Data Logs Use filters to refine your search

Home > Solar pump project ks_0215_0050_000151

Page 177 of 177 (View 96 records) Found total 1,759 records

Id #	Date	Time	MPPT Power (W)	Frequency (Hz)	Flow Rate (KL)	Condition	Status
			72.45 KWH (TOTAL ENERGY UTILIZED)		0.00 KL (TOTAL WATER DISCHARGED)	All	All
2306	2015-12-10	20:21:49	11	0.00	0	Short Circuit	OFF
2307	2015-12-10	20:21:50	11	0.00	0	Short Circuit	OFF
2308	2015-12-10	20:21:58	11	0.00	0	Short Circuit	OFF
2309	2015-12-10	20:23:06	11	0.00	0	Short Circuit	OFF
2310	2015-12-10	20:24:12	11	0.00	0	Short Circuit	OFF
2311	2015-12-10	20:26:06	11	0.00	0	System OK	OFF

3	Verification of open Circuit Condition		Open circuit condition detected successfully and logged on server
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SPCM Data Logs Use filters to refine your search

Home > Solar pump project ks_0215_0050_000151

Page 176 of 176 (View 10 records) Found total 1,757 records

Id #	Date	Time	MPPT Power (W)	Frequency (Hz)	Flow Rate (KL)	Condition	Status
			72.45 KWH (TOTAL ENERGY UTILIZED)		0.00 KL (TOTAL WATER DISCHARGED)	All	All
2296	2015-12-10	20:19:03	11	0.00	0	Open cable	OFF
2297	2015-12-10	20:19:05	11	0.00	0	Open cable	OFF
2298	2015-12-10	20:20:19	11	0.00	0	System OK	OFF

Kambath Nishikesh
 Tested by *Sikha*

[Signature]
 Inspected & Approved By *[Signature]*
 8/1/2016

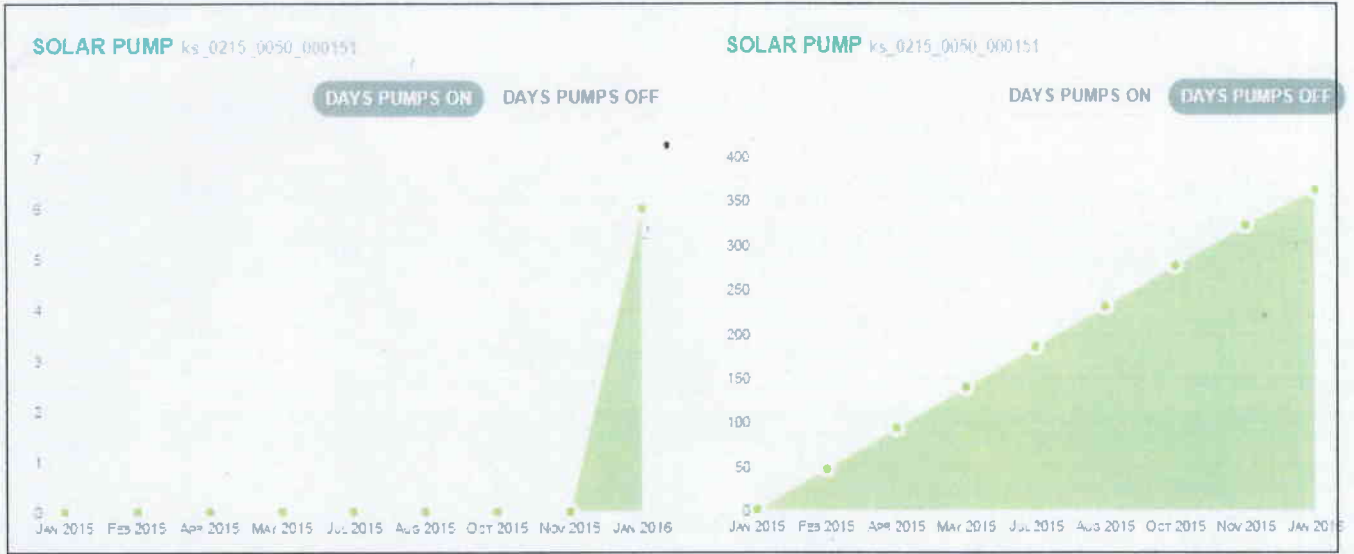
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For KISAN SOLAR
[Signature]
 Partner

2. Statistical Information on Health of Pump:

- (a) Number of days pump is operating
- (b) Number of days pump is not operating



3. Statistical Information on Energy Utilization

Graph plot of energy utilized per day, per week, per month, per six month, per one year, per two years, etc.



Kamlesh
Mishra
Lidar
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For KISAN SOLAR

Partner

ENERGY UTILIZATION Kilowatt-hour

FILTER RANGE

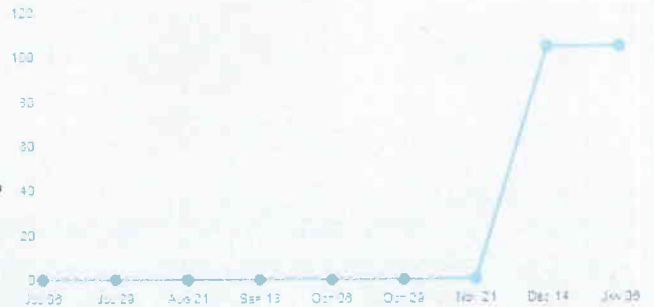


ENERGY UTILIZED: **64.537 KWH**
 WATER DISCHARGED: **539.284 KILO LITERS**

ONE MONTH

ENERGY UTILIZATION Kilowatt-hour

FILTER RANGE



ENERGY UTILIZED: **104.982 KWH**
 WATER DISCHARGED: **860.434 KILO LITERS**

SIX MONTHS

ENERGY UTILIZATION Kilowatt-hour

FILTER RANGE

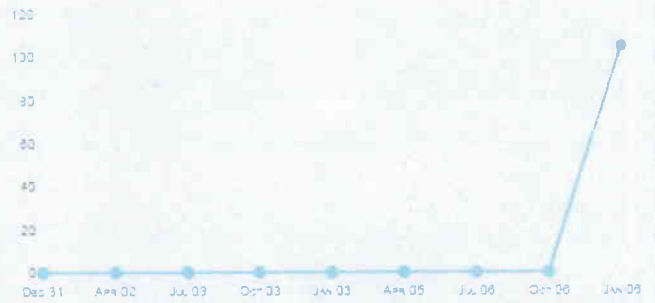


ENERGY UTILIZED: **104.982 KWH**
 WATER DISCHARGED: **860.434 KILO LITERS**

ONE YEAR

ENERGY UTILIZATION Kilowatt-hour

FILTER RANGE



ENERGY UTILIZED: **104.982 KWH**
 WATER DISCHARGED: **860.434 KILO LITERS**

TWO YEARS

For KISAN SOLAR

Mushet
 Partner

Kambath
Muthalagala
 Tested by *Sidha*

ST
 Inspected & Approved By
 NISE
 Ministry of New and Renewable Energy
 Gandhinagar, BANGALORE
 2/11/2016
Shree

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4. Other necessary information and provisions available for

- (a). Motor Pump set details, e.g. make, type, capacity, electric specifications etc.
- (b). Controller details, e.g. make, type, capacity, etc.
- (c). PV Module details, e.g. make, type, capacity, other specifications, etc.
- (d). Maintenance and contact details of a service provider.
- (e). Map of location of project installation

PROJECT DETAILS click on tab for more info

Maintenance SPV Panels Pumpset Controller

Motor Pumpset
 Manufacturer: Ansons Electro Mechanical Works
 Type: 5 hp. Designed for 20mtr head solar PV fed applications
 Motor Rating: 3Ph, 280Vrms, 12Arms, 20 to 52Hz
 Model: EAHOW527, Serial # 4503, Date Installed: 8-12-2015

PROJECT DETAILS click on tab for more info

Maintenance SPV Panels Pumpset Controller

SPCM
 Manufacturer: Kisan Solar
 Serial no: 0215_0050_000151
 Certifications: NISE(MNRE) IP54 Remote Monitoring
 Date Installed: 8-12-2015

PROJECT DETAILS click on tab for more info

Maintenance SPV Panels Pumpset Controller

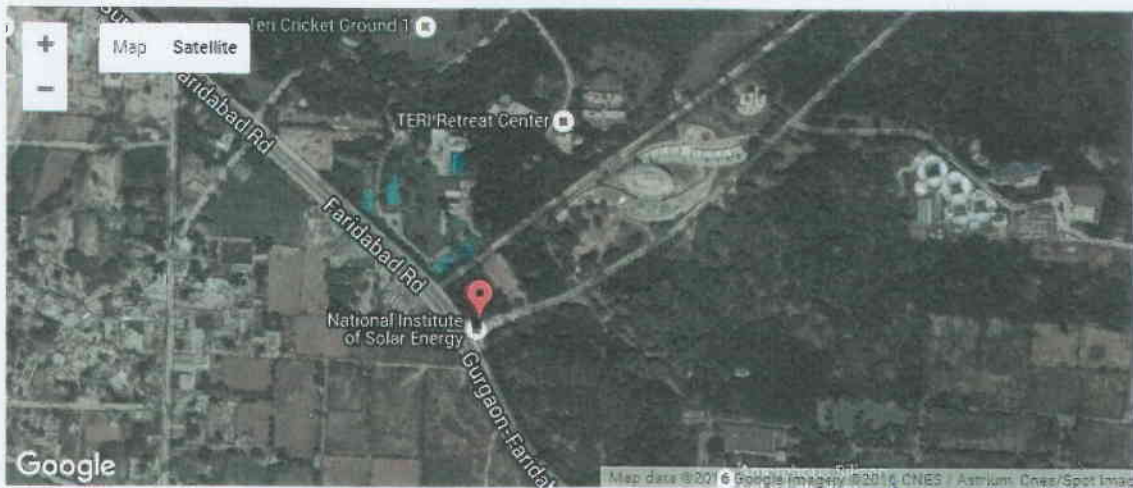
Solar Photovoltaic Panels
 Panel Configuration: 250 W, 60 Cells
 Capacity: 20 panels = 5000 Watts

PROJECT DETAILS click on tab for more info

Maintenance SPV Panels Pumpset Controller

Contact and History
 Officer: Kamlesh Yadav, Mobile: 9711893168
 Address: National Institute of Solar Energy, Gwal Pahari, Gurgaon, India
 Date of Installation: 8-12-2015

Map



Kamlesh Mishra
 Tested by *Mishra*

[Signature]
 Inspected & Approved By *[Signature]*

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Partner

5. SPCM MPPT performance under various solar radiation pattern:

a. MPPT performance in Hot and Cold solar radiation profile

Profile	MPPT performance	Remark
Cold	<p style="text-align: center;">MPPT Tracking for Cold Profile</p> <p style="text-align: center;">— Ppv track — Pmax</p>	MPPT efficiency = 99.68%
Hot	<p style="text-align: center;">MPPT Tracking for Hot Profile</p> <p style="text-align: center;">— Ppv track — Pmax</p>	MPPT efficiency = 99.79%

Tested by *Kamlesh Nishishah*
Dicker

Inspected & Approved By *[Signature]*
Shukh
8/1/16

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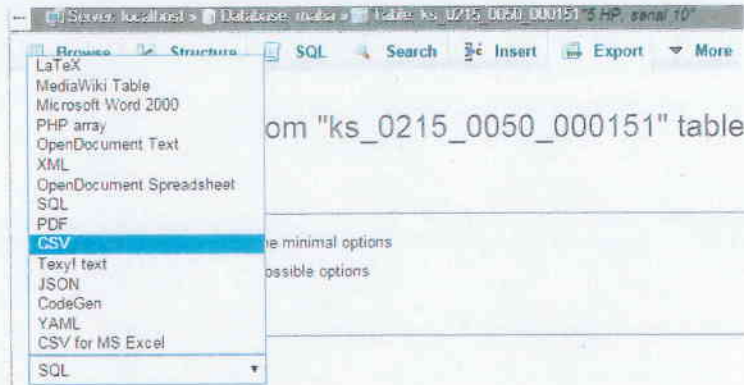
Partner

(6) Other Features of Remote Monitoring of SPCM:

(a) Downloadable data and file format using RM module and server interface:

Various system data is available to download using RM module and its server interface. The data are PV side parameters (Vpv, Ipv, Ppv), machine side parameters (frequency, Vrms, Irms) and pump side parameter (LPM). It also provides time stamping, ON/OFF status, fault indications.

The file is downloadable in text, pdf, csv and MS excel format.



(b) Remote Control using RM module of SPCM:

The remote control feature of SPCM has been tested for its operation and functioning. This remote control feature provides access to user or farmer to control the SPCM from a remote location by way of sending SMS (text message) from his/her mobile phone.

The remote control is managed by way of sending SMS to the SPCM's phone number. The following commands are provided and functions are found as below:

Sr. No.	Action	Command	Remark
1	To turn On SPCM	SMS to <mobile number of spcm>. Message: *off. Press <send>	SPCM turned On after few seconds
2	To turn Off SPCM	SMS to <mobile number of spcm>. Message: *on. Press <send>	SPCM turned Off after few seconds

Tested by *Kamlesh Mishra*
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Inspected & Approved By *[Signature]*



Shuchi
8/1/2016

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[Signature]

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Notes:

1. Kisan Solar SPCM Model No. iACQUA-280/5, Sr. No. ks_0215_0050_000151, has been used for RM testing which is inbuilt part of SPCM.
2. Anson's motor-pump set Model No. EAHOW, Sr. No. 4503 has been used in testing as a load.
3. The SPCM's Remote Monitoring System (RMS) is as per MNRE guidelines. It will help the manufacturer and the state and central governments to monitor large numbers of solar water pumping projects, to improve service to farmers, and to monitor total solar PV energy production in this sector.

For KISAN SOLAR

mshel
Partner

Kamlesh
Nishant
Sidhu
Tested by

[Signature]
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