

Andrews Survey & Engineering, Inc.

Land Surveying - Civil Engineering - Site Planning



SPECIAL PERMIT APPLICATION & SITE PLAN REVIEW

PURSUANT TO FRANKLIN ZONING BYLAWS §185-Attachment 4—Use Regulations, 3.14c §185-3 - Site Plan Review

Proposed Large-Scale Ground Mounted Solar Energy System Off Spring Street Franklin, MA

November 21, 2018

Franklin Assessors Map/Lot: 323/044, 310/002, 309/015

Zoning District: Rural Residential I

Applicant:

Spring Street Renewables, LLC 101 Summer St, 2nd Floor Boston, MA 02110

Representative:

Andrews Survey & Engineering, Inc. 104 Mendon Street Uxbridge, MA 01569

ASE JN: 2018-101







Uxbridge

104 Mendon Street Uxbridge, MA 01569 Tel. 508 278-3897 Fax. 508 278-2289



North Attleboro

500 East Washington Street North Attleboro, MA 02760 Tel. 508 316-0452 Fax. 508 316-0963

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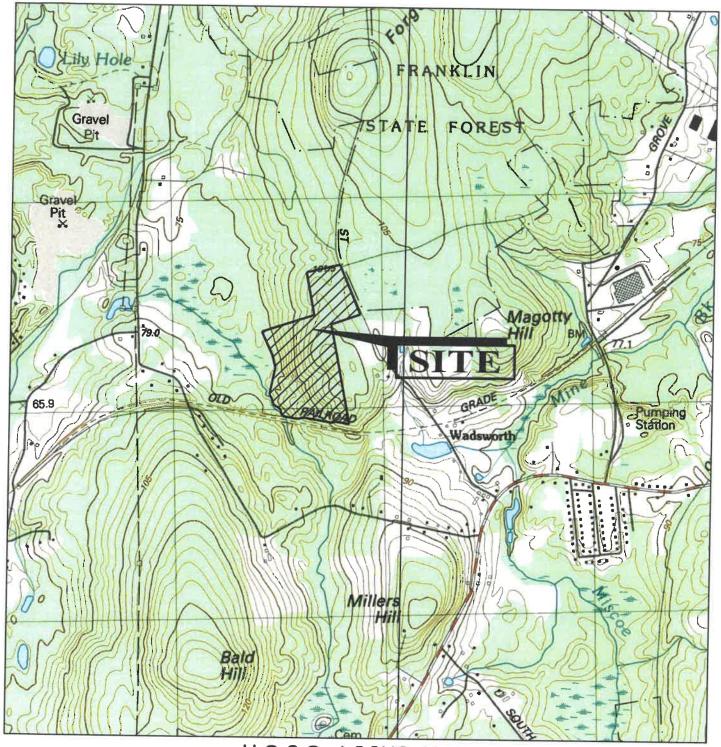
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LARGE CAPACITY GROUND MOUNTED PV SYSTEM SPRING STREET FRANKLIN, MASSACHUSETTS

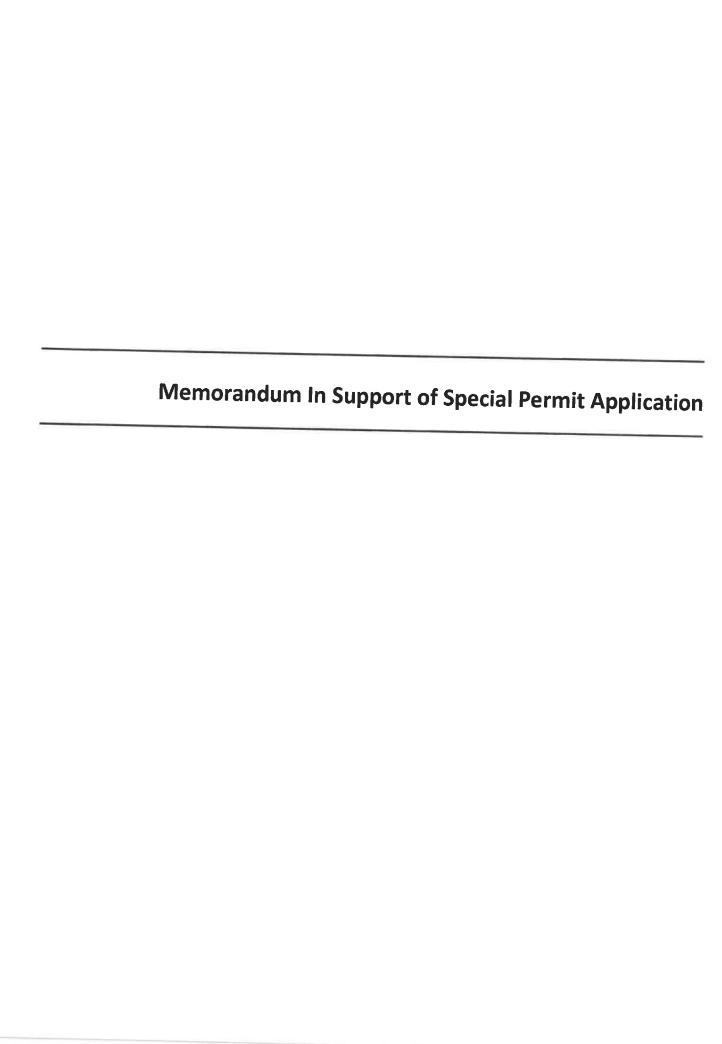


Andrews Survey & Engineering, Inc. Land Surveying - Civil Engineering - Site Planning

> P.O. Box 312, 104 Mendon Street Uxbridge, Massachusetts 01569-0312 P: 508-278-3897 F: 508-278-2289



FIGURE 1.0



COMMONWEALTH OF MASSACHUSETTS TOWN OF FRANKLIN PLANNING BOARD

NORFOLK, ss.

IN RE:

SPECIAL PERMIT TO ALLOW FOR A LARGE SCALE GROUND MOUNTED SOLAR

ENERGY SYSTEM WITHIN THE RURAL RESIDENTIAL I ZONING DISTRICT

LOCUS:

Spring Street, Franklin, Massachusetts 02038

MEMORANDUM IN SUPPORT OF APPLICATION FOR SPECIAL PERMIT TO ALLOW FOR A LARGE SCALE GROUND MOUNTED SOLAR ENERGY SYSTEM WITHIN THE RURAL RESIDENTIAL I ZONING DISTRICT

LOCUS HISTORY

- 1. Relevant District. The Locus is located wholly within the Rural Residential I (RRI) zoning district.
- Location. The Locus consists of a compilation of three parcels of land held in separate ownership, in the aggregate totaling approximately 48.6 acres (Franklin Assessor Map 309-015-000; 310-002-000; 323-044-000), located along the westerly side of Spring Street in Franklin, Massachusetts. According to the records of the Clerk of the Town of Franklin, Spring Street is a public way which proceeds south from West Central Street to Washington Street, accepted by the Town of Franklin prior to 1870 and named by the Town at the Annual March meeting adjourned to April 4, 1870. The Locus is bounded to the north and east by undeveloped land comprising the state forest, and by an undeveloped and wooded portion of Spring Street, to the south by property owned by the Southern N.E. Turnpike Trail, and to the west by undeveloped wooded land. The Locus is undeveloped containing wooded and shrub swamp areas, and a stream running through the southwest quadrant of the Locus (said subject property is collectively referred to herein as the "Locus").
- 3. <u>Current Use/Permitting History</u>. The Locus is currently undeveloped.
- 4. Proposed Use/Construction. The petitioner proposes the construction of a ±6 MW DC ground-mounted solar energy system which includes approximately 25 acres of ground mounted solar modules, a 800 square foot utility structure for battery storage, approximately 4,900 linear feet of security fencing surrounding the perimeter of the developed site, a gravel parking and driveway area to accommodate service and emergency vehicle access and the on site parking of 16 motor vehicles for the public regarding recreational uses in the area.

1

The proposed development also anticipates construction upgrades along 1,150 linear feet of Spring Street (a public way) to establish gravel access for service and emergency vehicles, as well as the installation of six (6) utility poles to provide overhead utility access to the developed site. Also planned for the development would be the introduction of a contemporary storemwater management drainage system serving the Locus designed to attenuate and mitigate peak flows up to and including the 100-year storm event in compliance with the Wetlands Protection Act which would include appropriate treatment of post construction storm water runoff and storm water recharge, along with associated contemporary landscaping all as shown on the site plan entitled, "Site Development Plans" prepared by Andrews Engineering, Inc., (the "Plan") a copy of which has been filed along herewith.

5. Zoning Tabulation CBD District: Rural Residential I - Required/Proposed.

| Required | Proposed |
|-----------------|---|
| 40,000 s.f. | 48.6 acres + |
| 200.00' | 960 ft.+ |
| 25% | <1 % |
| 3 stories/35'** | 12 ft |
| 180.00' | > 2,000 ft |
| 200.00' | > 1,000 ft |
| 40.00' | 470 ft. +/- |
| 40.00'* | 75 ft and 150 ft |
| 40.00'* | 145 ft. |
| 0 | None for solar |
| | 40,000 s.f. 200.00' 25% 3 stories/35'** 180.00' 200.00' 40.00' 40.00'* |

^{*}No accessory ground-mounted solar energy systems on parcels within or adjacent to residential Zoning Districts shall be located in any side or rear yard area nearer to the lot line than 20 feet pursuant to §185-19E2.

PRESENT PETITIONER/APPLICATION

- **Petitioner/Owner.** The present petitioner is NEXAMP, INC., a Massachusetts corporation with a usual place of business at 101 Summer Street, Boston, Massachusetts 02910. The present owners of the various parcels that make up the Locus are as follows:
 - a. Tract I \sim (309-015-000) \sim Michael J. Bucci, an individual with a mailing address of 4 Almond

^{**}No accessory ground-mounted solar energy system shall be more than 15 feet in height, measured from the common grade pursuant to §185-19E3.

- Drive, Johnston, Rhode Island 02919.
- b. Tract II ~ (310-002-000) ~ Richard F. Costello, an individual with a mailing address of P.O. Box 283, Franklin, Massachusetts 02038.
- c. Tract III ~ (323-044-000) ~ <u>Anthony R. Depoto</u>, <u>Edward J. Depoto</u>, <u>Donna A. Brunelli</u> and <u>Richard J. Depoto</u>, with a mailing address of 8 Spring Street, Franklin, Massachusetts 02038.
- 7. Requested Action. The present application before the Board requests approval of the following:
 - a. SPECIAL PERMIT under Attachment 4, Use Regulations Schedule, Part III, 3.14c of §185 of the Code of the Town of Franklin to allow for a Large Scale Ground Mounted Solar Energy System within the Rural Residential I zoning district as shown on the Plan.
- 8. <u>Local Permits and Approvals</u>. In addition to the aforementioned SPECIAL PERMITS, the petitioner has also received, or is contemporaneously seeking the following permits and approvals in connection with the present development proposal of the Locus:
 - a. Notice of Intent filed seeking an Order of Conditions from the Franklin Conservation Commission.

SPECIAL PERMIT APPROVAL

9. Special Permit Approval Requirements under Section 185-45(E)(3). Section 185 45(E)(3) of the Zoning By-Laws, states in part:

Findings. Special permits shall be granted by the special permit granting authority only upon its written determination that the proposed use will not have adverse effects which overbalance its beneficial effects on either the neighborhood or the Town, in view of the particular characteristics of the site and of the proposal in relation to that site. The determination shall be in addition to the following: [Amended 3-25-1987 by Bylaw Amendment 87-91; 3-21-2012 by Bylaw Amendment 12-669]

- (a) Proposed project addresses or is consistent with neighborhood or Town need.
- (b) Vehicle traffic flow, access and parking and pedestrian safety are properly addressed.
- (c) Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded to accommodate development.
- (d) Neighborhood character and social structure will not be negatively impacted.
- (e) Project will not destroy or cause substantial damage to any environmentally significant natural

resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication, or compensatory measures are adequate.

- (f) Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.
- (g) Water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive.

CONDITIONS FOR APPROVAL UNDER SECTION 185-45(E)(3)

10. Satisfaction of Condition for Approval 185-45(E)(3)(a).

(a) Proposed project addresses or is consistent with neighborhood or Town need.

Solar energy harnessed through the use of solar energy panels is a renewable energy source without the ancillary deleterious impacts found with many forms of carbon based energy generation. Local communities that sponsor or participate with such renewable sources of energy such as solar energy generation receive improved electrical infrastructure and potentially will experience savings in electricity bills via the Community Solar program. The associated improvements to Spring Street, including the gravel parking area being proposed for public use, would afford greater public access for active and passive use of the adjacent areas of the state forest located north and east of the Locus.

11. Satisfaction of Condition for Approval 185-45(E)(3)(b).

(b) Vehicle traffic flow, access and parking and pedestrian safety are properly addressed.

The proposed development is to include a gravel access drive providing vehicular access from the developed site to Spring Street and Washington Street, a fully developed arterial roadway within the town of Franklin. Aside from establishing a gravel driveway, sixteen (16) feet in width, providing vehicle access to the northern, southern and eastern quadrants within the developed solar field, a gravel parking area to accommodate 16 motor vehicles is planned, which will include deeded easement rights to the town of Franklin so as to enhance public access and use of the adjacent areas of the state forest located north of the Locus. Once operational, the solar project will only generate 4 to 6 annual vehicle trips, essentially a zero traffic impact to the neighborhood.

12. Satisfaction of Condition for Approval 185-45(E)(3)(c).

(c) Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded

to accommodate development.

The proposed development includes improvement measures to those undeveloped portions of the Spring Street right of way, including the clearing of trees, installation of gravel twenty (20) feet in width, with limited bituminous pavement fourteen (14) feet in width to certain designated areas which are characterized with a steeper grades exceeding 10% so as to avoid 'wash out', thereby providing safe access to the Locus for service and emergency vehicles, as well as access by the general public to the proposed parking easement area. The proposed development would include the installation of new utility poles along the Spring Street right of way, and an upgrade of existing utility poles along Washington Street. The Locus has no plans to access the public water service and sewer service, natural gas, and data services. Included with the proposed the development is a stormwater management system designed in compliance with the Massachusetts Stormwater Management Policy and the Town of Franklin Best Development Practices Guidebook to the maximum extent practicable. The proposed stormwater management system will reduce stormwater runoff peak flow rates and volumes, and improve runoff water quality. The stormwater management measures proposed for the development will have no adverse impacts to resource areas or adjacent properties. Runoff quantity will be reduced and water quality enhanced over existing conditions resulting in an overall benefit to the surrounding area. See Drainage Calculations and Stormwater Management Plan prepared by Andrews Engineering, Inc.

13. Satisfaction of Condition for Approval 185-45(E)(3)(d).

(d) Neighborhood character and social structure will not be negatively impacted.

Vehicle access to the Locus will occur during the construction phase of the project which is anticipated to last approximately five to six months. Once completed, the proposed development of the Locus will not have any detrimental effect to the neighborhood character or social structure, as vehicle traffic generated by the site would be minimal. The rather remote location and natural topography of the Locus will prevent visual appearance of the solar panels by the general public.

14. <u>Satisfaction of Condition for Approval 185-45(E)(3)(e)</u>.

(e) Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication, or compensatory measures are adequate.

The proposed development would result in limited clearing at the southern portion of the Locus. The proposed development will maintain water quality with an entirely vegetated Locus and a "meadow" environment along with the completion of a vegetative swale drainage system with stormwater detention basins and infiltration components to recharge storwater throughout. For areas outside of the fence, all tree stumps will remain to revegetate, initially creating a shrub/small tree environment, ultimately developing into a young forested area (20-30 ft). Also, a pollinator seed mix is proposed along the interior gravel drives surrounding the modules and laydown areas plus adding clover to the solar modules area further enhancing the pollinator environment. Overall, this "meadow" and "pollinator grass" environment will enhance and encourage ecological diversity for birds, invertebrates such as bees and butterflies and small mammals.

The stormwater management system has been designed to meet or exceed the requirements established in the Massachusetts Stormwater Handbook and by the Town of Franklin. According to the Drainage Calculations and Stormwater Management Plan prepared by Andrews Engineering, Inc., the proposed stormwater design will improve the existing conditions and have no adverse impacts to any resource areas. The drainage system is designed to meet the MA DEP stormwater management standards and will provide sufficient treatment of runoff. In addition to seeking approval of a special permit/site plan approval before the Planning Board, the petitioner shall also be contemporaneously seeking an order of conditions from the Franklin Conservation Commission for any construction activities within the delineated buffer zones of the stream located within the southwesterly portion of the Locus.

15. <u>Satisfaction of Condition for Approval 185-45(E)(3)(f).</u>

(f) Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.

The proposed ground mounted solar energy field and associated ancillary building have been located on the Locus meeting, or in many instances exceeding, all minimum site distances, set back and height requirements of the town of Franklin Zoning Bylaw, and as such the proposed development will not result in abutting properties being deprived of light or fresh air circulation. Further, that abutting properties will not be exposed to flooding or subjected to excessive noise, odor, light, vibrations or airborne particulates. The petitioner has incorporated Best Management Practices (BMP's) to meet the Department of Environmental Protection Stormwater Management runoff quality requirements. The proposed drainage serving the proposed development has been designed to attenuate peak flows up to and including the 100-year storm event and

infiltrate after appropriate water quality pre-treatment, and shall handle the post construction storm water runoff

and storm water recharge. Exterior lighting for the Locus is not proposed and will not generate any projection

of light off of the premises.

16. Satisfaction of Condition for Approval 185-45(E)(3)(g).

(g) Water consumption and sewer use, taking into consideration current and projected future local

water supply and demand and wastewater treatment capacity, will not be excessive.

The town of Franklin water system pumps 3-4 million gallons of water each day. The estimated peak

usage for the planned solar development use is zero. According to information and belief, the water demand for

this proposed Locus will not negatively impact the pumping capacity to the Town's water system, and thus will

not adversely affect the Town's water supply.

WHEREFORE, the Petitioner respectfully requests that the Board grant a SPECIAL PERMIT to Allow

for a Large Scale Ground Mounted Solar Energy System within the Rural Residential I zoning district as shown

on the Plan.

Dated: November 20, 2018

Respectfully submitted, NEXAMP, INC.

By its Attorneys,

Richard R. Cornetta, Jr

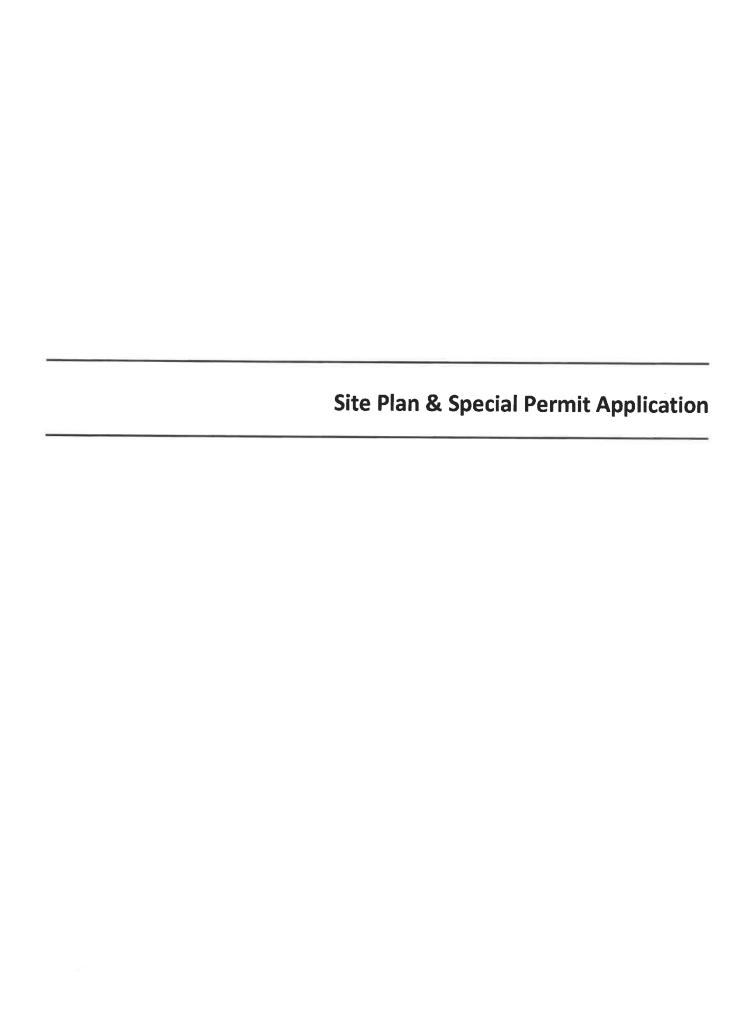
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Richard R. Cornetta, Jr., Esquire Cornetta, Ficco & Simmler, PC Four West Street

Franklin, MA 02038 Tel: (508)528-5300

Fax: (508)528-5555

Email: richard@cornettalaw.com



APPLICATION FOR APPROVAL OF A SITE PLAN AND SPECIAL PERMIT(S)

To the Franklin Planning Board:

| Permi under | The undersigned, herewith, submits the accompanying Site Plan entitled arge Capacity Ground Mounted Solar Energy System "and Special t(s) for Large Capacity Ground Mounted Solar Energy System and requests approval for the provisions of the Zoning By-Laws of the Town of Franklin covering Site Plans and all Permits. |
|----------------|---|
| 1. | Name of Applicant: Spring Street Renewables, LLC, Attn: Alan Clapp |
| | Address of Applicant: 101 Summer St, 2nd Floor, Boston, MA 02110 |
| | Phone No.: 617-431-1440 Email: aclapp@nexamp.com |
| 2. | Name of Owner (if not the Applicant): See Attachment A |
| | Address of Owner: Phone No.: Email: |
| 3. | Stephen J O'Connell Name of Engineer: Andrews Survey & Engineering, Inc. |
| | Address of Engineer: PO Box 312, Uxbridge, MA 01569 |
| | Phone No.: 508-278-3897 Email: soconnell@andrews-engineering.com |
| 1. | Deed of Property recorded with Norfolk Registry of Deeds in Book, Page, (or Certificate of Title No) See Attachment A |
| 2. | Location and Description of Property: 48.584± acres of undeveloped land located off Spring Street |
| | Zoning District: Rural Residential I |
| | Assessor's Map: Lot: _See Attachment A |
| | Square Footage of Building(s): N/A |
| | Impervious Coverage of Existing Upland: <u>0 s.f.</u> |
| 3. | Purpose of Site Plan: Construction of a large scall ground mounted solar energy system and associated utility & access. |
| 4. | Special Permit(s) Requested: Chapter 185, Attachment 4 Use Regulations Schedule 3.14c |

5. Special Permit Criteria: please provide on a separate document, written findings for special permit criteria a-g for each special permit being requested. Criteria are listed below. Applications will not be accepted until findings are submitted.

Chapter 185, Section 45.E

6.

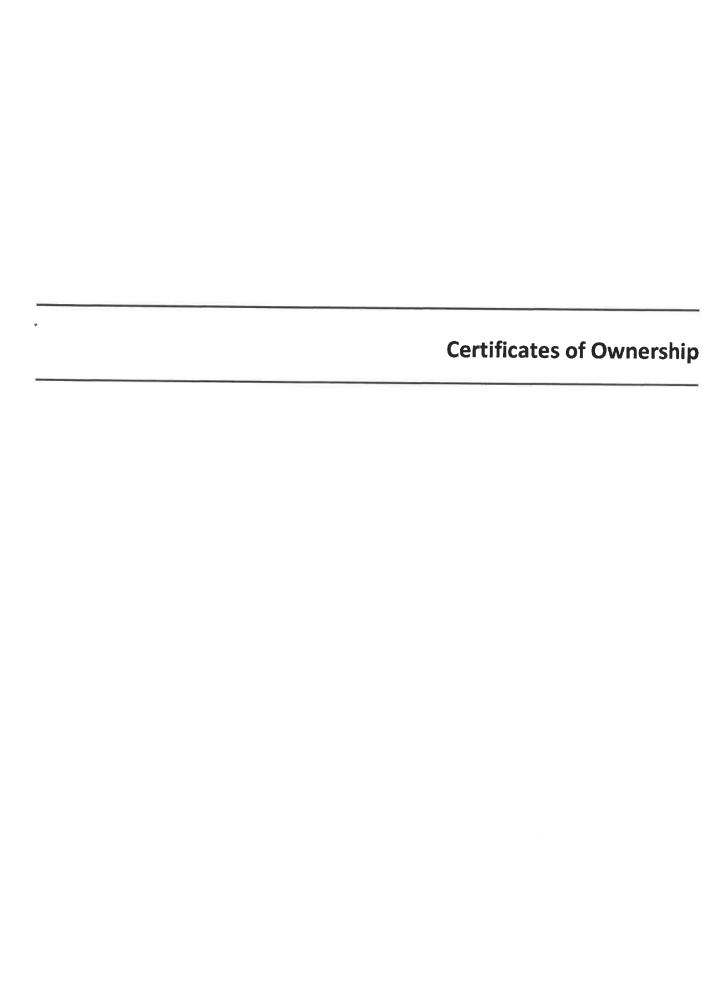
- (3). Findings. Special permits shall be granted by the special permit granting authority only upon its written determination that the proposed use will not have adverse effects which overbalance its beneficial effects on either the neighborhood or the Town, in view of the particular characteristics of the site and of the proposal in relation to that site. This determination shall be in addition to the following specific findings:
- (a) Proposed project addresses or is consistent with neighborhood or Town need.
- (b) Vehicular traffic flow, access and parking and pedestrian safety are properly addressed.
- (c) Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded to accommodate development.
- (d) Neighborhood character and social structure will not be negatively impacted.
- (e) Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication, or compensatory measures are adequate.
- (f) Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.
- (g) Water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive.

| 7. | A certified list (by Office of the submitted with the application. | e Assessors) of abutters within 300 feet of the site is also |
|------------|--|--|
| 8. | Certificate of Ownership. | |
| & Signa | ture of Applicant | Print Name of Applicant |
| See | Attachment A | See Attachment A |
| Signa | ture of Owner | Print Name of Owner |

Other issues requiring Planning Board Consideration:

ATTACHMENT A OWNERS OF RECORD

| Parcel ID: 323-044-000-000: | Norfolk Registry of Deeds |
|-----------------------------|---------------------------|
| Anthony Depoto et als | Book 6132, Page 396 |
| 8 Spring St | - |
| Franklin, MA 02038 | |
| Owner signature: | date: |
| Parcel ID: 310-002-000-000: | Norfolk Registry of Deeds |
| Richard F Costello | Book 2731, Page 108 |
| PO Box 283 | |
| Owner signature: | date: 10[16]7 |
| Parcel ID: 309-015-000-000: | Norfolk Registry of Deeds |
| Michael J Bucci | Book 34238, Page 115 |
| 4 Almond Drive | |
| Johnston, RI 02919-3052 | |
| Owner signature: | date: |



CERTIFICATE OF OWNERSHIP

I the undersigned Applicant, do hereby certify to the Town of Franklin, through its Planning Board, that all parties of interest to the below-listed plan are identified in Section B: below,

SECTION A:

| Type of Plan (circle one) ANR 81-P; Preliminary Subdivision | | | | |
|---|--|--|--|--|
| Definitive Subdivision.; Site Plan; Special Permit | | | | |
| Title of Plan: Large Capacity Ground Mounted Solar Energy System | | | | |
| Date of Plan:11/21/2018Assessor's Information: 309-015-000-000 | | | | |
| Prepared by: Andrews Survey & Engineering, Inc. | | | | |
| Applicant Name & Address: Spring Street Renewables, LLC | | | | |
| 101 Summer St, 2nd Floor, Boston, MA 02110 | | | | |
| SECTION B: | | | | |
| Name of Record Owner(s): Michael J Bucci | | | | |
| Address of Record Owner(s):4 Almond Drive | | | | |
| Johnston, RI 02919-3052 | | | | |
| **Attach Property Deed matching the owner name's listed above. | | | | |
| *If in the name of a Trust, Corporation or Partnership, list the names and addresses of all Trustee(s), Corporate Officer(s) or Partner(s): | | | | |
| *If in the name of a Trust or Corporation, list the Beneficiary(ies) of the Trust or the Shareholder(s) of the Corporation: | | | | |
| *If in the name of a Trust or Corporation, list the date, county, book and page of recording of the Trust Instrument, or the date and State of incorporation: | | | | |

| Executed as a sealed instrument this Class J. Class Signature of Applicant Signature of Owner | ACAN L. CCAPP Print name of Applicant Michael J. Bucci Print name of Owner |
|--|---|
| COMMONWEAL' | TH OF MASSACHUSETTS 20_\lambda{8} |
| public, personally appeared | 2018, before me, the undersigned notary (name of owner), proved ification, which were RT Licence to be seeding document in my presence. |
| | (Official signature and seal of notary) Notary Public: My Commission Expires: 11-2-2033 |

CERTIFICATE OF OWNERSHIP

I the undersigned Applicant, do hereby certify to the Town of Franklin, through its Planning Board, that all parties of interest to the below-listed plan are identified in Section B: below,

| SECTION A: |
|---|
| Type of Plan (circle one) ANR 81-P; Preliminary Subdivision |
| Definitive Subdivision.; Site Plan; Special Permit |
| Title of Plan: Large Capacity Ground Mounted Solar Energy System |
| Date of Plan: 11/21/2018Assessor's Information: 310-002-000-000 |
| Prepared by: Andrews Survey & Engineering, Inc. |
| Applicant Name & Address: Spring Street Renewables, LLC |
| 101 Summer St, 2nd Floor, Boston, MA 02110 |
| SECTION B: |
| Name of Record Owner(s): Richard F Costello |
| Address of Record Owner(s): PO Box 283 |
| Franklin, MA 02038 |
| **Attach Property Deed matching the owner name's listed above. |
| *If in the name of a Trust, Corporation or Partnership, list the names and addresses of all Trustee(s), Corporate Officer(s) or Partner(s): |
| *If in the name of a Trust or Corporation, list the Beneficiary(ies) of the Trust or the Shareholder(s) of the Corporation: |
| *If in the name of a Trust or Corporation, list the date, county, book and page of recording of the Trust Instrument, or the date and State of incorporation: |

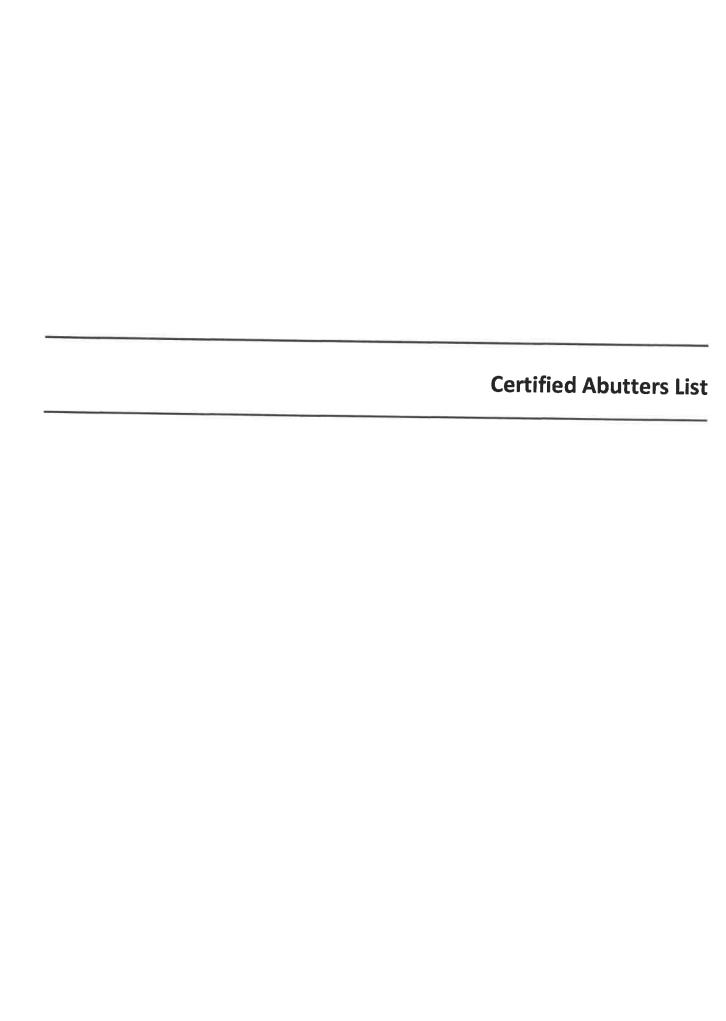
| Executed as a sealed instrument this | day of | 20 |
|--|---------------------------------|--|
| Signature of Applicant | ACAW (. C Print name of Appl | |
| Signature of Owner | Print name of Own | S Costello er |
| | | |
| COMMONWEAL | TH OF MASSACH | JSETTS |
| ss. | | 20_18_ |
| On this 20nd day of October public, personally appeared Pour Cost to me through satisfactory evidence of ident the person whose name is signed on the pred | cification, which were | re me, the undersigned notary (name of owner), provede to be my presence. |
| | (Official signatu | re and seal of notary) |
| | Notary Publ | and the second s |
| | iviy Commis | ssion Expires: 11-2-2023 |

CERTIFICATE OF OWNERSHIP

| I the undersigned Applicant, do hereby certify to the Town of Franklin, through its Planning Board, that all parties of interest to the below-listed plan are identified in Section B: below, |
|---|
| SECTION A: |

| Type of Plan (circle one) | ANR 81-P; | Preliminar | y Subdivision | ı | | |
|--|---|--------------------------------|---------------------------------|----------------------------|--|--|
| | Definitive Su | abdivision.; | Site Plan; | Special Permit | | |
| Title of Plan: Large Capacity Ground Mounted Solar Energy System | | | | | | |
| Date of Plan: 11/21 | Date of Plan: 11/21/2018Assessor's Information: 323-044-000-000 | | | | | |
| Prepared by: Andre | ws Survey & E | ingineering, l | inc. | | | |
| Applicant Name & A | ddress: Spri | ing Street Re | enewables, LL | _C | | |
| | 101 | Summer St, | 2nd Floor, B | oston, MA 02110 | | |
| SECTION B: | | | | | | |
| Name of Record Own | Name of Record Owner(s): Anthony Depoto, etals | | | | | |
| Address of Record O | wner(s):8 Sp | oring St | | | | |
| | Fran | ıklin, MA 020 |)38 | | | |
| **Attach Property Deed | l matching | the owner | name's list | ed above. | | |
| *If in the name of a Trustee(s), Corporate Officer | rust, Corporati (s) or Partner(s | on or Partner | ship, list the | names and addresses of all | | |
| *If in the name of a Tr Shareholder(s) of the Corpora | ust or Corpora tion: | ation, list the | Beneficiary(i | es) of the Trust or the | | |
| *If in the name of a Tr recording of the Trust Instrum | ust or Corpora ent, or the date | ation, list the e and State or | date, county, f incorporatio | book and page of n: | | |

| Executed as a sealed instrument this Signature of Applicant Signature of Owner | Pri | y of Oct ALAW L. nt name of Ap nt name of Ow | Caplicar | _ | poto |
|---|-----------|---|----------|------------------------------|--|
| COMMONW | ÆALTH (| OF MASSACE | HUSE | TTS | |
| Ss. | | | | 20_ | |
| On this day of October public, personally appeared Rice to me through satisfactory evidence of the person whose name is signed on the | ideminica | non, which we | 16 | LICEN | lersigned notary of owner), proved |
| | | (Official signa Notary Pub My Comm | | | 9/24/21 |
| | | | | Not COMMONWEALT My Com | J. LaRosa ary Public H OF MASSACHUSETTS mission Expires |



Town of Franklin - Board of Assessors

355 East Central St Franklin, MA 02038 Tel # 508-520-4920 Fax # 508-520-4923 TOWN OF FRANKLIN

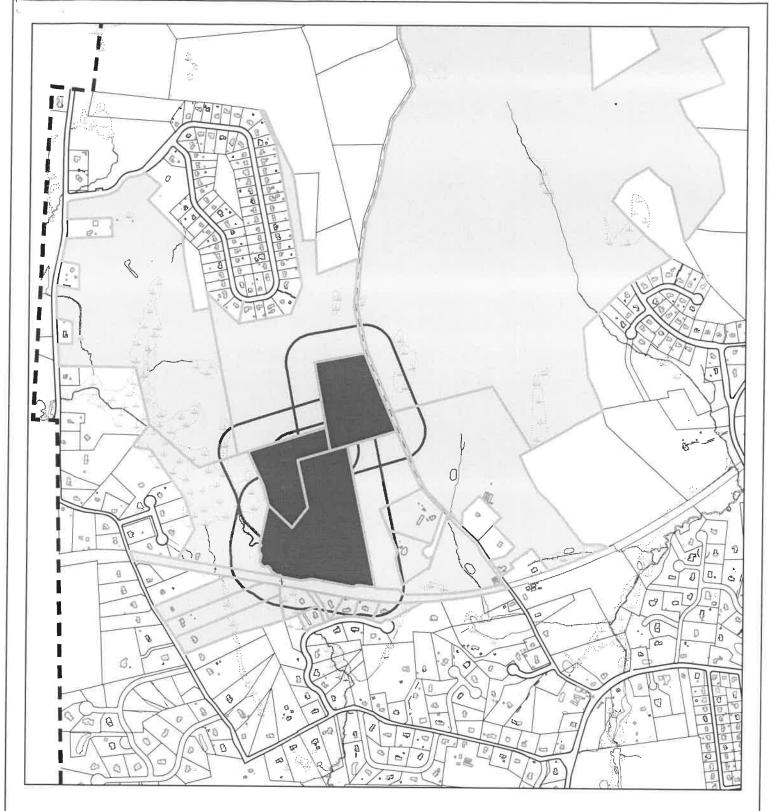
OCT 1 0 2018

BOARD OF ASSESSORS

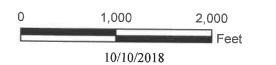
Abutters List Request Form

Please Note: A \$25.00 fee per list is required to process your request. Payment is due at the time of submission of this form. Please allow 10 days from the date of both payment and submission of the form for the Assessors office to complete processing your request. (Revised 1-1-17)

| Date of Request 10 / 9 / 2018 |
|--|
| Assessors Parcel ID # (12 digits) 323 044 000 000 309 - 015 - 000 - 000 310 002 000 000 |
| Property Street Address Spring Street |
| Distance Required From Parcel # listed above (Circle One) 500 300 100 (Note: if a distance is not circled, we cannot process your request) |
| Property Owner Anthony Depoto, Michael J Bucci, Richard F Costello |
| Property Owner's Mailing Address Spring St |
| Town/City Franklin State MA Zip Code 02038 |
| Property Owner's Telephone # |
| Requestor's Name (if different from Owner) Linda Bradley, Andrews Survey & Engineering |
| Requestor's Address104 Mendon St, Uxbridge, MA 01569 |
| Requestor's Telephone # 508 - 278 - 3897 |
| Office Use Only: Date Fee Paid/ Paid in Cash \$ |
| Paid by Check \$ Check # Town Receipt # |



SPRING ST [309-015, 310-002 & 323-044] - 300' ABUTTERS TOWN OF FRANKLIN



300' Abutters List Report

Franklin, MA October 10, 2018

Subject Parcel:

Parcel Number:

309-015-000

CAMA Number:

309-015-000-000

Property Address:

PEPPERMILL LN

Mailing Address: BUCCI MICHAEL J

4 ALMOND DRIVE

JOHNSTON, RI 02919-3052

Subject Parcel:

Parcel Number:

310-002-000

CAMA Number:

310-002-000-000

Property Address: SPRING ST

Mailing Address: COSTELLO RICHARD F

P O BOX 283

FRANKLIN, MA 02038

Subject Parcel:

Parcel Number:

323-044-000

CAMA Number:

323-044-000-000

Property Address: SPRING ST Mailing Address:

Mailing Address:

Mailing Address:

DEPOTO ANTHONY ETALS

8 SPRING ST

FRANKLIN, MA 02038

Abutters:

Parcel Number:

293-001-000

CAMA Number: 293-001-000-000

Property Address: FORGE HILL RD

Parcel Number:

308-024-000

CAMA Number:

Parcel Number:

308-024-000-000

Property Address: OXFORD DR

Mailing Address:

HENO FLOYD 398 PROSPECT ST FRANKLIN, MA 02038

BOSTON, MA 02114

FRANKLIN TOWN OF

FRANKLIN, MA 02038

CAMA Number:

Parcel Number:

CAMA Number:

Property Address: PROSPECT ST

309-015-000

308-076-000-000

308-076-000

Mailing Address:

BUCCI MICHAEL J

4 ALMOND DRIVE

Property Address: PEPPERMILL LN

309-015-000-000

JOHNSTON, RI 02919-3052

Parcel Number:

310-001-000

CAMA Number:

310-001-000-000

Property Address: 30 SPRING ST

Mailing Address:

COCHRAN HARRY G & BARBARA E TR 30 SPRING STREET REALTY TRUST

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF STATE PARKS AND RE

251 CAUSEWAY ST, STE 600

355 EAST CENTRAL STREET

30 SPRING ST

FRANKLIN, MA 02038

Parcel Number: CAMA Number: 310-002-000

Property Address: SPRING ST

Property Address: 2 DEPOTO DR

310-002-000-000

Mailing Address:

COSTELLO RICHARD F

P O BOX 283

FRANKLIN, MA 02038

Parcel Number: CAMA Number: 323-002-000

323-002-000-000

Mailing Address:

MAZUKINA EDWARD MAZUKINA KAREN

2 DEPOTO DR

FRANKLIN, MA 02038

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Data shown on this report is provided for planning and informational purposes only. The municipality and CAI Technologies a:e not responsible for any use for other purposes or misuse or misrepresentation of this report.

300' Abutters List Report

Franklin, MA October 10, 2018

| Parcel Number: | 323-003-000 | Mailing Address: | KERR RONALD E |
|---|--|------------------|--|
| CAMA Number: | 323-003-000-000 | | 19 KENNEY RD |
| Property Address: | DEPOTO DR | | MEDFIELD, MA 02052 |
| Parcel Number: | 323-004-000 | Mailing Address: | LESSARD WILLIAM F LESSARD LISA A |
| CAMA Number: | 323-004-000-000 | | 3 DEPOTO DR |
| Property Address: | 3 DEPOTO DR | | FRANKLIN, MA 02038 |
| Parcel Number: CAMA Number: Property Address: | 323-005-000 323-005-000-000 14 BUBBLING BROOK DR | Mailing Address: | KUYKENDALL GREGORY S & JILL KUYKENDALL GARY & MARGARET GAY 14 BUBBLING BROOK DR FRANKLIN, MA 02038 |
| Parcel Number: CAMA Number: Property Address: | 323-006-000 323-006-000-000 16 BUBBLING BROOK DR | Mailing Address: | VONNEGUT KARL F & HEDWIG L HEDMAN JUDITH V 16 BUBBLING BROOK DR FRANKLIN, MA 02038 |
| Parcel Number: CAMA Number: Property Address: | 323-007-000 323-007-000-000 18 BUBBLING BROOK DR | Mailing Address: | BECKMANN ROBERT M BECKMANN MELISSA B 18 BUBBLING BROOK DR FRANKLIN, MA 02038 |
| Parcel Number: CAMA Number: Property Address: | 323-040-000 323-040-000-000 PROSPECT ST | Mailing Address: | COMMONWEALTH OF MASSACHUSETTS DIVISION OF STATE PARKS AND RE 251 CAUSEWAY STREET - SUITE 60 BOSTON, MA 02114-2104 |
| Parcel Number: CAMA Number: Property Address: | 323-041-000 323-041-000-000 SPRING ST | Mailing Address: | MORSE PATRICIA L TR L/E WADSWORTH FARM REALTY TRUST MO 17 SPRING ST FRANKLIN, MA 02038 |
| Parcel Number: | 323-043-000 | Mailing Address: | POLITO ERIC J POLITO KRISTEN M |
| CAMA Number: | 323-043-000-000 | | 2 COCHRAN WAY |
| Property Address: | 2 COCHRAN WAY | | FRANKLIN, MA 02038 |
| Parcel Number: | 323-044-000 | Mailing Address: | DEPOTO ANTHONY ETALS |
| CAMA Number: | 323-044-000-000 | | 8 SPRING ST |
| Property Address: | SPRING ST | | FRANKLIN, MA 02038 |
| Parcel Number: | 323-046-000 | Mailing Address: | MORSE PATRICIA L |
| CAMA Number: | 323-046-000-000 | | 17 SPRING ST |
| Property Address: | SPRING ST | | FRANKLIN, MA 02038 |
| Parcel Number: | 324-017-000 | Mailing Address: | DAVIS ALAN R JR DAVIS LISA P |
| CAMA Number: | 324-017-000-000 | | 15 PEPPERMILL LN |
| Property Address: | 15 PEPPERMILL LN | | FRANKLIN, MA 02038 |
| Parcel Number: | 324-023-000 | Mailing Address: | MAHER PHILIP L MAHER DONNA |
| CAMA Number: | 324-023-000-000 | | 46 CRESTVIEW TER |
| Property Address: | 250 PROSPECT ST | | STRATHAM, NH 03885 |

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300' Abutters List Report

Franklin, MA October 10, 2018

Parcel Number:

324-024-000

CAMA Number:

324-024-000-000

Property Address: 244 PROSPECT ST

Mailing Address: DONOVAN JAMES C DONOVAN ANN-

MARIE

244 PROSPECT ST FRANKLIN, MA 02038

Parcel Number:

324-025-000

CAMA Number: Property Address: 240 PROSPECT ST

324-025-000-000

Mailing Address: GILLIS SUSAN L GILLIS PATRICK J

240 PROSPECT ST FRANKLIN, MA 02038

Parcel Number: CAMA Number:

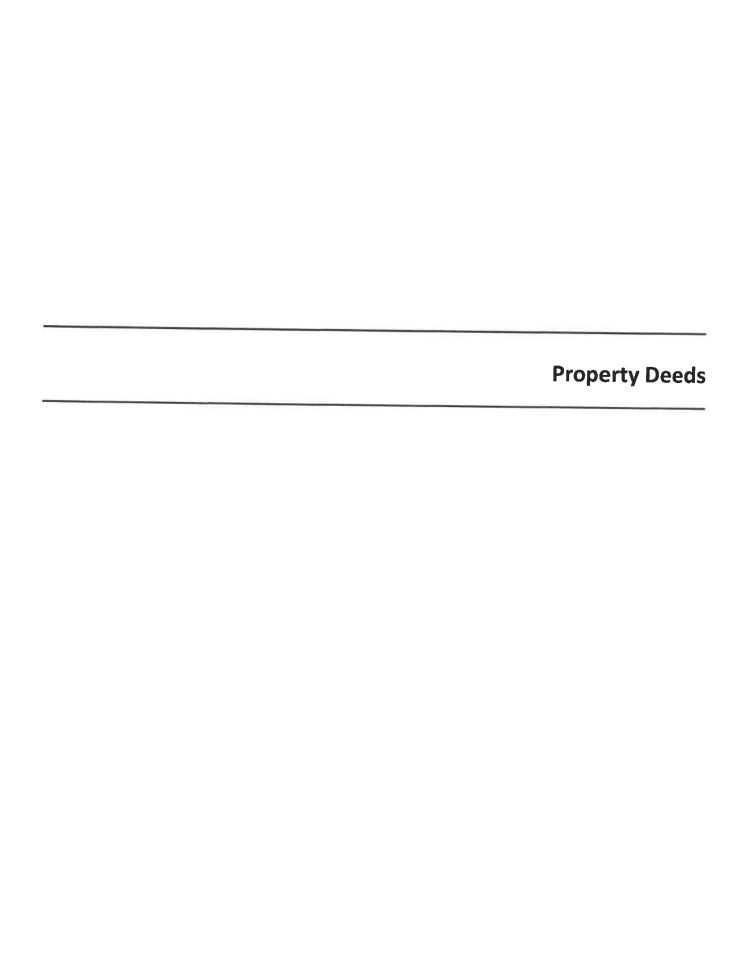
324-031-000

324-031-000-000 Property Address: 4 DEPOTO DR

Mailing Address: KLEIN STUART J

4 DEPOTO DR FRANKLIN, MA 02038

Doyle, 1.0-10-18



| The land hereby granted was inc | loded in | an effet | lands made he | U E Lou | | | | | |
|--|--|--|---|---|--|--|--|--|--|
| The land hereby granted was included in an affidavit made by Henry F. Long, Commissioner of Corporations and recorded recorded on August 8, 1947, in the Norfolk Registry of Deeds, Registry of Deeds, | | | | | | | | | |
| Book 2698 Page 501 Document No. Certificate of Title No. | | | | | | | | | |
| relative to the value of certain parcels of land taken town for non-payment of taxes and to the validity | | | | | | | | | |
| of the tax titles held thereon; and was offered for sale at public auction on | | | | | | | | | |
| in accordance with a notice of sale posted on lioverber 19th, 194.7. | | | | | | | | | |
| | | | | | | | | | |
| in Selection's Office, Franklin, Mass. ; and was sold to the above-named (assents successed as the original time and place appointed for the sale, | | | | | | | | | |
| active transfer to the second | | | | | | | | | |
| not rejected as inadequate. This deed is given with the covenant that the aforesaid sale was in all particulars conducted according to law. | | | | | | | | | |
| I has deen as given with the coveri | unt that i | the atom | esaid sale was - £6 | in all partic | rulars conducted according to law. | | | | |
| Executed as a sealed instrument | this | 1 | 12 23 | day of | December, 1947. | | | | |
| I Illiana R 9 | tu | ly | _; Treasurêr (| of the Kiops | of ranklin | | | | |
| 1 | / | 4 | | _ | * | | | | |
| Norfolk | сомиов | WEALT | TH OF MASS. | ACHUSETTS | e water | | | | |
| | | | | nes elle venes sammanna | December /, 1947 | | | | |
| Then personally appeared the abo | | | | | | | | | |
| and acknowledged the foregoing instrume | | his free | set and deed | as Treasurer | as aforesaid, before me, | | | | |
| My commission suprime formation 30.4.1 | £.Z.a | | 6 | elya (| James Vasellt- | | | | |
| | | | ONTRESIONEN DA C | | | | | | |
| | | | | | | | | | |
| Rec'd & entered for record Dec. 30, 1947 at 12h. 56m. P.K. | | | | | | | | | |
| and of the second of the secon | | | | | | | | | |
| THIS DEED NOT. VALID UNLESS RECORDED | IN THE I | POOPER | O VST210ad | - DEEDE W | | | | | |
| THIS DEED NOT YALID UNLESS RECORDED | in the I | PROPER | REGISTRY O | | | | | | |
| FORM 474 | | | | 1 | THIN 60 DAYS AFTER THE SALE TREASURER'S DEED TO A PERSON LAND OF LOW YALUE | | | | |
| FORM 474 | Онмону | YEALTH | OF MASSAC | 1 | TREASURER'S DEED TO A PERSON | | | | |
| FORM 474 | оммону ур | WEALTH ANKI TO | OF MASSAC | HUSETTS | TREASURER'S DEED TO A PERSON | | | | |
| FORM 474 | оммону ур | WEALTH ANKI TO | i of massac | HUSETTS | TREASURER'S DEED TO A PERSON | | | | |
| FORM 474 THE CA | OMMONY PP SM OFFICE | ANKLIN | OF MASSAC | HUSETTS | TREASURER'S DEED TO A PERSON LAND OF LOW YALUE | | | | |
| FORM 474 THE CO | OHMONY FE OFFICE | ANKI TE | OF MASSAC TY OR TOWN E TREASURE: Treasure | HUSETTS | TREASURER'S DEED TO A PERSON LAND OF LOW YALUE | | | | |
| FORM 474 THE CO I, Villian R. Feeley Pursuant to the provisions of General La | OHMONY PP RA OFFICE WE, Chap | ANKI, IN LANK I, IN LA | FOR TOWN TREASURE TREASURE TREASURE Section 79, in | HUSETTS T of the Town | TREASURER'S DEED TO A PERSON LAND OF LOW YALUE | | | | |
| FORM 474 THE CO I. Villian R. Feeley Pursuant to the provisions of General La | OHMONY PP SA OFFICE Ws, Chag no dol | ANKLING OF THE | FY OR TOWN E TREASURE Treasurer Section 79, is | Trof the Town | TREASURER'S DEED TO A PERSON LAND OF LOW YALUE n of | | | | |
| FORM 474 THE CO L. Fillian R. Feeley pursuant to the provisions of General La Forty (10) Richard F. Costello | OHMONY PP BA OFFICE WE, Chap no dol ofE | ANKITE LICE OF THE OPER 60, pter 60, liars to Orankij | FY OR YOU'R E TREASURE: Treasurer Section 79, in me paid, he | t of the Town | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE n of Franklin on of the percels of land | | | | |
| FORM 474 THE CO I. Villian R. Feeley Pursuant to the provisions of General La | OHMONY PP BA OFFICE WE, Chap no dol ofE | ANKITE LICE OF THE OPER 60, pter 60, liars to Orankij | FY OR YOU'R E TREASURE: Treasurer Section 79, in me paid, he | t of the Town | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE n of Franklin on of the percels of land | | | | |
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| FORM 474 THE CO L. Villian R. Faeley pursuant to the provisions of General La Forty (10) Richard F. Costello described in the instrument of taking or | OHMONY PP SA OFFICE WS, Chap 100 dol cofF tax colle | PEALTH ANKLIE LOS OF THE OPERATE TO EXECUTE OF THE DESTRUCTOR'S d | Treasurer Section 79, in me paid, he in, Vassach | r of the Town n consideration busetts, n reference is | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE n of Franklin on of the parcels of land made in the following schedule: MAMES OF INVERESTED PERSONS SERVED BY RECHTERED MAIL WITH NOTICE OF | | | | |
| PORM 474 THE CO I, William R. Feeley PUIRIANT to the provisions of General La Fighard F. Costello described in the instrument of taking or NAME OF PERSON ASSESSED IN THE YEAR OF THE TAX FOR WHICH THE LAND WAS TAXEN OR SOLD LOCATION OF PARCEL | OHMONY PP EM OFFICE WE, Chap no ioo tax colle | ANKI, THE LOS OF THE L | Treasurer Section 79, in me paid, he in, Vassach leed to which | Tof the Town n consideration to the treference is | the parcels of land made in the following schedule: | | | | |
| PORM 474 THE CO L. William R. Panley pursuant to the provisions of General La Forty (10) Richard P. Costello described in the instrument of taking or NAME OF PERSON ASSESSED IN THE TEAR OF THE TAIL POR WINCH THE LAND WAS TAKEN OF SOLD | OHMONY PP SM OFFICE We, Chap no 100 dol tax colle RECOR Book | ANKLIE LOS OF THE OF THE OF THE DESCRIPTION OF THE PRISE PRISE | Treasurer Section 79, in me paid, he in, Vassach | r of the Town n consideration teleby grant to thuse tits, a reference is | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE n of Franklin the parcels of land made in the following schedule: NAMES OF INTERESTED PERSONS SERVED BY RECHTERED MAIL WITH NOTICE DE SALE UNDER CHAPTER IN SECTION IS A | | | | |
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| PORM 474 THE CO L. William R. Feeley pursuant to the provisions of General La Forty (LQ) Richard F. Costello described in the instrument of taking or NAME OF PERSON ASSESSED IN THE TEAR OF THE TAIL POR WHICH THE LAND WAS TAKEN OF SOLD LOCATION OF PARCEL Nellie A. Batchelor, et al, Land off Spring Street. John Jarvis Koodland off Will Street Edna A. Bright | OHMONY PP SM OFFICE We, Chap no 100 dol of F tax colle RECOR Book 2178 | ANKLIE LOS OF THE OF THE OF THE DESCRIPTION OF THE | Treasurer Section 79, in me paid, he in, Vassach | r of the Town n consideration teleby grant to huse ties a reference is sue Conficus of Tide No. | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE of Franklin on of the Perceis of land the perceis of land made in the following schedule: WARRE OF INTERESTED PERSONS SERVED STERCHERED MAIL WITH NOTICE OF SALE UNDER CHAPTER SECTION IS A Lize Austin John Jarvis, Heirs and Devisees, Catherine Jarvis. | | | | |
| THE COME AND PRESENT AND WEST TAXEN OF PRESENT AND WEST TAXEN OF PRESENT AND WEST TAXEN OF PRESENT OF STREET. Nellie A. Batchelor, et al, Land off Spring Street. John Jarvis Roodland off Will Street Edna A. Bright Bald Sill Lot | OFFICE WE, Chap no dol of F tax colle Book | ANKLIE LOS OF THE OF THE OF THE DESCRIPTION OF THE | Treasurer Section 79, in me paid, he in, Vassach | r of the Town n consideration teleby grant to huse ties a reference is sue Conficus of Tide No. | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE n of Franklin on of the parcels of land the parcels of land made in the following schedule: WARRES OF INTERESTED PERSONS SERVED BY RECURSED MAIL WITH NOTICE OF SALE UNDER CHAPTER M. SECTION BY A Line Austin John Jarvis, Heirs and Devisees, Catherine Jarvis. Edna A. Bright, Robert Wyllie | | | | |
| FORM 474 THE CO L. William R. Feeley pursuant to the provisions of General La Forty (10) Richard F. Costello described in the instrument of taking or NAME OF PERSON ASSESSED IN THE YEAR OF THE TAX FOR WHICH THE LAND WAS TAKEN OF SOLD LOCATION OF PARCEL Nellie A. Eatchelor, et al, Land off Spring Street. John Jarvis Koodland off Will Street Edna A. Bright Eald fill Lot Hollis Minot, et al | OMMONY PP MA OFFICE WS, Chap 100 dol of F tax colle Book 2178 | pter 60, pter 60 | Treasurer Section 79, in me paid, he in, Vassach | r of the Town n consideration teleby grant to huse ties a reference is sue Conficus of Tide No. | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE n of Franklin on of the parcels of land the parcels of land made in the following schedule: WAMES OF INTERESTED PERSONS SERVED BY RECHTERED MAIL WITH NOTICE DE SALE UNDER CHAPTER W. SECTION IS A LESS AUSTIN John Jarvis, Heirs and Devisees, Catherine Jarvis. Edna A. Bright, Robert Wyllie Hollis Minot, Florence Minot. | | | | |
| THE COME AND PRESENT AND WEST TAXEN OF PRESENT AND WEST TAXEN OF PRESENT AND WEST TAXEN OF PRESENT OF STREET. Nellie A. Batchelor, et al, Land off Spring Street. John Jarvis Roodland off Will Street Edna A. Bright Bald Sill Lot | OFFICE We, Chap no dol tax colle RECOR 2178 | pter 60, pte | Treasurer Section 79, in me paid, he in, Vassach leed to which December No. | r of the Town n consideration teleby grant to husetts a n reference is two | TREASURER'S DEED TO A PERSON LAND OF LOW VALUE of Franklin on of the parcels of land made in the following schedule: WAMES OF INTERESTED PERSONS SERVED BY RECHTERED MAIL WITH NOTICE OF SALE UNDER CHAPTER W. SECTION IN A Like Austin John Jarvis, Heirs and Davisees, Catherine Jarvis. cina A. Bright, Robert Wyllie Hollis Minot, Florence Minot, Grace Minot. | | | | |

Property Street Address: Peppermill Lane, Franklin, MA

RECEIVED AND RECORDED NORFOLK COUNTY REGISTLY OF DEEDS DEDHAM, MA

CERTIFY

Trillia PO Parmalle William R O'DUNHELL, REGISTER

QUITCLAIM DEED

I, MICHAEL L. BUCCI, of 4 Almond Drive, Johnston, Rhode Island, in consideration paid in the sum of One Dollar (\$1.00), grant to MICHAEL J. BUCCI, of 4 Almond Drive, Johnston, Rhode Island, as sole owner, with QUITCLAIM COVENANTS:

See Exhibit "A" attached

This conveyance is such that no documentary stamps are required.

For Title, see Quitclaim Deed recorded in Book 29571, Page 490.

The purpose of this deed is to correctly state the owner's middle initial. In the deed of transfer, which is recorded in Book 29571, Page 490, the owner's middle initial is incorrectly stated as "L".

WITNESS my hand this 29 day of June 2016.

MICHAEL L. BUCCI

STATE OF RHODE ISLAND COUNTY OF PROVIDENCE

In Johnston, on the day of ______, 2016, before me personally appeared, MICHAEL L. BUCCI, before me known and known by me to be the party executing the foregoing instrument, and he acknowledged said instrument, by him executed, to be his free act and deed.

Frank Joseph Manni Notary Public,

My Commission Expires:

EXHIBIT "A"

The land in Franklin, Norfolk County, Massachusetts, described as follows:

The remaining parcel of land, standing in the name of Donald S. McStay and Beverly A. McStay, Trustees of TE Realty Trust, of the property which was formerly the homestead farm of Otis Wales, now deceased, which contained eighty-six (86) acres, more or less, and was situated in the southwest part of Franklin, on both sides of Prospect Street, and bounded as follows:

NORTHERLY: by lands now or formerly of James P. and Edgar K. Ray;

EASTERLY: by land now or formerly of John Canney;

SOUTHERLY: by said Canney land and by lands now or formerly of Joseph P. Wadsworth and Adin D. Sargeant; and

WESTERLY: by other land now or formerly of said Sargeant and by land now or formerly of Joel A. and George A. Crooks.

Saving and excepting to the New York and New England Railroad Company all rights of said Company therein.

Subject to grant to American Telephone and Telegraph Company, recorded with Norfolk Registry of Deeds in Book 4519, Page 527.

There is excepted herefrom Lots I, 2, 3, 4 and 5 shown on a Plan of Land entitled "Modification Plan of Peppermill Farms, Franklin, Mass., August 29, 1988, Guerriere & Hanlon, Inc.," filed with Norfolk Deeds as Plan No. 1225 of 1988 in Plan Book 374. Lots 1 and 2, having been subdivided

gall S

into Lots IA and 2A and shown on a plan of land prepared for Donabee Realty Inc. and entitled "Plan of Land in Franklin, Mass. Date June 20, 1989 Scale 40 ft. to an inch" recorded with the Norfolk County Registry of Deeds as Plan No. 873 of 1989 in Plan Book 385, were conveyed along with Lots 4 and 5, by deed dated December 8, 1992 and recorded with said Registry of Deeds in Book 9656, Page 472. Lot 3 was previously conveyed by deed dated October 12, 1990 and recorded with said Registry of Deeds in Book 8764, Page 586.

Also excepting herefrom that certain parcel of land shown as Lot 6 on a plan of land entitled "Peppermill Farms II Definitive Subdivision Plan of Land in Franklin, Mass Scale: 1" = 100' March 14,1997, Rev. June 16, 1997, Rev. June 30, 1997, Rev. July 1, 1997, Salvetti, Surveying & Engineering Assoc." which said Lot was previously conveyed by deed dated September 29, 1999 and recorded with the Norfolk County Registry of deeds in Book 13765, Page 433.

Meaning and intending to convey, and hereby conveying, the land shown as Lot 15 on the Town of Franklin's Assessor's Map 309, containing approximately 9.734 acres of land.

Being a portion of the premises conveyed to these Grantors by deed dated April 13, 1992 and recorded with the Norfolk County Registry of Deeds in Book 9296, Page 292.

grés

I, Dominic A. DePoto, surviving trustee of Dominic A. DePoto Family Trust under a Declaration of Trust dated February 14, 1970, registered of in Norfolk Registry District of the Land Court as Consideration of the contraction Document No. 306774 builty naturation of One Thousand Dollars

grants to Anthony R. DePoto, Stone St., Bellingham, Mass., Edward J. *DePoto, 4 Doten Rd., Plymouth, Mass., Donna A. Brunelli, 8 Spring St., Franklin, Mass. and Richard J. DePoto, 825 Washington St., Franklin, Mass., all as Tenants in Common

MOTERIA PARCEL The land in Franklin off Washington Street and shown on a plan The land in Franklin off Washington Street and Shown on a plan entitled "Plan of Farm xmooth account to the second street and Shown on a plan washer, Michael T. Twomey, Scale 100° = 1" ", dated September 1908 by William E. Mann, Surveyor and filed with Norfolk Registry of Deeds as Plan No. 2557B, Plan Book 54, and shown on this plan as an unnumbered lot but designated as Lot 25 3/4 acres to 2nd dotted line, bounded and described as follows:

EASTERLY: by land of owners unknown, fifteen hundred fifty (1550) feet more or less;

SOUTHERLY: by land of N.Y., N.H. & Hartford Railroad by a fence, nine hundred seventy (970) feet more or less to the brook and a culvert; thence running in a curved line, by the bed of said brook; thence

SOUTHERLY AND WESTERLY: bounded

NORTHWESTERLY: by the dotted line, three hundred ninety (390) feet to end of wall as marked on said plan by land shown

as Ray's Lot; thence bounded NORTHEASTERLY: by said Ray's Lot, three hundred fifty (350) feet;

thence bounded NORTHWESTERLY: by said Ray's Lot, two hundred eighty (280) feet more or less, thence bounded by said Ray's Lot, five hundred eleven (511) feet more or less; thence bounded

WESTERLY:

NORTHERLY: by land of owners unknown, five hundred forty-three (543) feet to point of beginning at marked designation

as stake and stones on said plan.

For my title see Norfolk Registry of Deeds, Book 4657, Page 169.

The land in Pranklin, more particularly described as a certain piece or parcel of land situated on the northeasterly side of Grove Street in said Franklin and shown on a "Plan of Land in Franklin," Mass., June 1, 1960, McIntyre and Johnson, Inc., Registered Civil Engineers and Registered Land Surveyor, which plan is recorded with Norfolk Registry of Deeds as Plan No. 706 of 1960 in Plan Book 209, bounded and described according to said plan as follows:

Beginning at the northwesterly corner of the granted premises on the northeasterly side of Grove Street; thence running NORTH 69 degrees, 34° 10" East by land now or formerly of Mathew A. and Loraine R. Spencer one hundred ninety-seven and 78/100

(197.78) feet to a stake; thence continuing
NORTH 69 degrees, 31° 00" East by land of said Spencer six hundred twenty-one and 94/100 (621.94) feet to an iron pipe at other

land of Dominic A. DePoto; thence
SOUTH 29 degrees, 29 49 East by land of said DePoto one hundred
seventy-one and 38/100 (171.38) feet to a drill hole at a

seventy-one and 38/100 (1/1.36) reet to a drill note at a corner of a stone wall; thence

SOUTH 12 degrees, 12 08 East by land now or formerly of George Greene one hundred seventeen and 38/100 (117.38) feet to a

drill hole on a wall; thence
SCUTH 72 degrees, 38' 20" West by land of said Arthur J. Newell four
hundred fifty and 31/100 (450.31) feet to a bend in the wall;



SOUTH 65 degrees, 37' 50" West by land of said Newell one hundred ten and 90/100 (110.90) feet to a corner of a wall; thence

SOUTH 76 degrees, 24' 55" West five hundred thirty-seven and 537.54) feet to an iron pipe at said Grove Street; thence

NORTH 31 degrees, 50' 10" East by said Grove Street three hundred thirty-three and 90/100 (333.90) feet to a stake and point of beginning.

Containing 5.8 acres more or less or however the same may be bounded and described according to said plan.

For my title see Norfolk Registry of Deeds, Book 4657, Page 168.

Mitterns hand and seal this 12th day of March 1983

The Commonwealth of Massachusetts

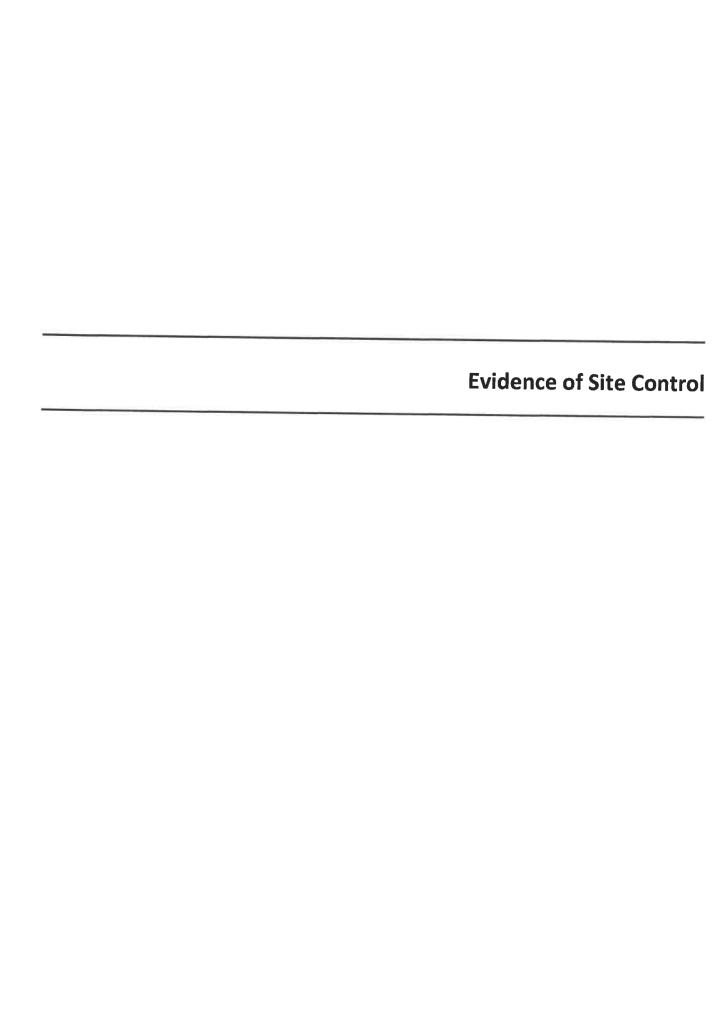
Morfolk

19 83 March 12.

Then personally appeared the above named Dominic A. DePoto, surviving trustee of Dominic A. DePoto Pamily Trust

and acknowledged the foregoing instrument to be his

My Commission Expires January 18



Anthony Marinella, Manager Lewis Street Realty, LLC PO Box 411 Franklin, MA 02038

November 7, 2018

Franklin Planning Board 355 East Central Street Franklin, MA 02038

Dear Chairperson and Members of the Franklin Planning Board:

Per the Franklin Zoning Bylaws and as part of the solar project permitting application, I hereby state the following with respect to documentation of access and control of the project site:

- The project site is comprised of three (3) parcels and a total of 48.6 acres, inclusive of the Depoto parcel shown as AP 323 lot 44, the Costello parcel shown as AP 310 lot 2 and the Bucci parcel shown as AP 309 lot 15.
- I, as Manager for Lewis Street Realty, LLC, did enter into an amended and restated lease
 option agreement, including access easements, with Spring Street Renewables, LLC, dated
 October 26, 2018 for a duration of eighteen (18) months. This lease option agreement
 remains in full force and effect.
- In addition, as Manager for Lewis Street Realty, LLC, I also have entered in to three separate purchase and sale agreements with the respective property owners for the project site, which include the representatives of the estate of Anthony R. and Edward J. Depoto (AP 323/44), the Trustees of the Costello Family Trust (AP 310/2) and Michael Bucci (AP 309/15).
- The full term of the subsequent ground lease agreement with Spring Street Renewables, LLC, including any possible extension(s), is forty (40) years.
- The lease agreement includes terms and conditions that ensure continuation in full force and effect in case of any change of property ownership.

Page 2 of 2 Chairperson and Members of the Franklin Planning Board

Sincerely,

Anthony Marinella, Manager Lewis Street Realty, LLC

COLLATERAL ASSIGNMENT OF REAL ESTATE PURCHASE AND SALE AGREEMENT

(the "Assignment")

October 24, 2018

FOR VALUE RECEIVED, Lewis Street Realty LLC, a Massachusetts limited liability company with an address of PO Box 411, Franklin MA 02038 ("Lewis Street"), hereby assigns to Spring Street Renewables, LLC, a Delaware limited liability company with a principal place of business at 4 Liberty Square, 3rd Floor, Boston, MA 02109, its successors and assigns ("Nexamp"), all of its right, title and interest in the "Real Estate Purchase and Sale Agreements" by and between Lewis Street and Donna A. Brunelli, Richard J. Depoto, Jean M. Bruneault, as Personal Representative of the Estate of Anthony R. Depoto and Lawrence Benedetto and Gerald Tulis, as Co-Executors/Personal Representatives of the Estate of Edward J. Depoto; between Lewis Street and Michael Bucci; and between Lewis Street and Dennis B. Costello and Paul K. Costello, Trustees of the Costello Family Trust u/d/t dated October 12, 1992 and recorded with the Norfolk County Registry of Deeds in Book 9570, Page 301 (the "Sellers"), dated as of August 31, 2018, and as each agreement may be amended from time to time (the "P/S Agreements"), related to the purchase and sale of approximately 48.6 acres of real property located in the Spring Street section of Franklin, Massachusetts, as more particularly described in Appendix A attached hereto (the "Property").

Spring Street and Lewis Street are parties to the "Amended and Restated Lease Option Agreement" dated October 26, 2018 (the "Lease Option"), under which Lewis Street grants to Spring Street an option to lease all or a portion of the Property (as defined in the Lease Option) upon Lewis Street's purchase of the Property pursuant to the P/S Agreement, and other documents and instruments executed and delivered by Lewis Street and others and related to the Lease Option (collectively, the "Lease Documents"). This Assignment is given as collateral to secure Lewis Street's obligations under the Lease Documents (collectively, the "Obligations").

Lewis Street agrees that Spring Street does not assume any of Lewis Street's obligations under the P/S Agreement until Spring Street gives to Seller written notice that it has affirmatively exercised its rights to acquire the Property under the P/S Agreement upon or after a Lewis Street Event of Default under any of the Lease Documents or under the P/S Agreement.

Lewis Street represents and warrants that the P/S Agreement is a valid, enforceable agreement; that neither party is in default under the P/S Agreement and that all conditions and agreements have been performed as required, except those not due to be performed until after the date of this Assignment; and that Lewis Street has obtained the Seller's agreement and consent regarding this Assignment in the form of the "Agreement Regarding Consent to Collateral Assignment of Real Estate Purchase and Sale Agreement" attached hereto as Appendix B. Lewis Street shall not consent to any change in the terms of the P/S Agreement without the written approval of Spring Street and no change in the terms of the P/S Agreement will be valid without

the written approval of Spring Street. Lewis Street agrees not to transfer or encumber in any way its interest in the P/S Agreement so long as this Assignment is in effect.

Lewis Street irrevocably appoints Spring Street as its attorney-in-fact to enforce, on and after the occurrence of an Event of Default under the Lease Documents, in its own name or in the name of Lewis Street, any or all of Lewis Street's rights arising under or in respect of the P/S Agreement in such manner as Spring Street reasonably shall deem necessary or appropriate to protect or preserve Spring Street's interests, including without limitation making payments under the P/S Agreement for and in the name of the Lewis Street or in the name of Spring Street, all with the same authority as Lewis Street could do if this Assignment had not been made.

This Assignment is for security purposes only. Accordingly, Spring Street has no right under this Assignment to enforce the provisions of the P/S Agreement until the occurrence of an Event of Default under any of the Lease Documents. If an Event of Default occurs, Spring Street may, without affecting any of its rights or remedies against Lewis Street under any of the Lease Documents, exercise its rights under this Assignment as Lewis Street's attorney-in-fact or in any other manner permitted by law and Spring Street will have all rights and remedies of a secured party under the law.

Lewis Street agrees to indemnify and hold Spring Street harmless against all claims, liabilities, losses and reasonable expenses (including reasonable attorneys' fees) which Spring Street may incur, in exercising any of its rights under this Assignment.

This Assignment is binding upon and for the benefit of the heirs, legal representatives, assigns, and successors in interest of Lewis Street and Spring Street.

This Collateral Assignment or a memorandum of it may be recorded among the land records of the jurisdiction where the Property is located.

(Signature is on the following page.)

written above. Witness: Lewis Street Realty-LLC Commonwealth of Massachusetts County of Norkolk On this, the 34th day of October 2018, before me, the undersigned officer, personally appeared Anthony Marinella, known to me (or satisfactorily proven to _____to be the person whose name is subscribed to the within instrument, and acknowledged that he executed the same for the purposes therein contained. In witness whereof I hereunto set my hand and official seal. Srenola (Stale Notary Public My Commission Expires: 05 - 37 - 20+ BRENDA C. STEELE NOTARY PUBLIC

IN WITNESS WHEREOF, Lewis Street has executed this Assignment as of the date first

Communwealth of Massachusetts
My Commission Expires May 27, 2022

APPENDIX A

Property Description

[insert P/S Agreements]

STANDARD FORM PURCHASE & SALE AGREEMENT

PARTIES
AND MAILING
ADDRESSES
(fill in)

As of the 31st day of August 2018

Michael Bucci of

4 Almond Drive, Johnston, RI 02919

hereinafter called the SELLER, agrees to SELL and

Lewis Street Realty LLC, a Massachusetts limited liability company with a principal place of business located at 28 Tia Place, P.O. Box ,411, Franklin, MA 02038

2. DESCRIPTION
(fill in and include
title reference)

hereinafter called the BUYER or PURCHASER, agrees to BUY, upon the terms hereinafter set forth, the following described premises: A certain parcel of land known as 0 Peppermill Lane, Franklin, MA 02038, more fully described at the Norfolk County Registry of Deeds in Book 29519, Page 260. SEE ATTACHED ASSESSMENT AND SALES REPORT AND MAP.

3. BUILDINGS, STRUCTURES, IMPROVEMENTS, FIXTURES

(fill in or detete)

Included in the sale as a part of said premises are the buildings, structures, and improvements now thereon, and the fixtures belonging to the SELLER and used in connection therewith including, if any, all wall-to-wall carpeting, drapery rods, automatic garage door openers, venetian blinds, window shades, screens, screen doors, storm windows and doors, awnings, shutters, furnaces, heaters, heating equipment, stoves, ranges, oil and gas burners and fixtures appurtenant thereto, hot water heaters, plumbing and bathroom fixtures, garbage disposers, electric and other lighting fixtures, mantels, outside television antennas, fences, gates, trees, shrubs, plants and, ONLY IF BUILT IN, refrigerators, air conditioning equipment, ventilators, dishwashers, washing machines and dryers,

but excluding:

4. TITLE DEED

Include here by specific reference any restrictions, rasements, rights and obligations in party walls not included in (b), leases, municipal and other liens, other encumbrances, and make provision to protect SELLER agains!

BUYER's breach of SELLER's covenants in leases, where necessary.

Said premises are to be conveyed by a good and sufficient quitclaim deed running to the BUYER, or to the nominee designated by the BUYER by written notice to the SELLER at least seven (7) days before the deed is to be delivered as herein provided, and said deed shall convey a good and clear record and marketable title thereto, free from encumbrances, except

- Provisions of existing building and zoning laws;
- b. Existing rights and obligations in party walls which are not the subject of written agreement;
- c. Such taxes for the then current year as are not due and payable on the date of the delivery of such deed;
- d. Any liens for municipal betterments recorded after the deed to the BUYER;
- e. Easements, restrictions and reservations of record, if any, so long as the same do not prohibit or materially interfere with the current use of said premises;

*f

5. PLANS

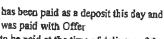
If said deed refers to a plan necessary to be recorded therewith the SELLER shall deliver such plan with the deed in form adequate for recording or registration.

6. REGISTERED TITLE In addition to the foregoing, if the title to said premises is registered, said deed shall be in form sufficient to entitle the BUYER to a Certificate of Title of said premises, and the SELLER shall deliver with said deed all instruments, if any, necessary to enable the BUYER to obtain such Certificate of Title.

7. PURCHASE PRICE (fill in) space ts allowed to spell out the amounts if desired

The agreed purchase price for said premises is





to be paid at the time of delivery of the deed in cash, or by certified, cashler's, check(s) or via wire.



Appendix A - Property Description (Bucci)

- 8 TIME FOR PERFORMANCE DELIVERY OF DEED (fill in)
- Such deed is to be delivered at 10:00 a.m. on the first to occur of: (a) February 28, 2019 or (b) on the day that is set by BUYER in a written notice to SELLER delivered at least ten (10) days prior to the closing date set therein that a solar company has agreed to enter into a ground lease with BUYER. Provided that application has been filed on or before December 1, 2018 with the Town of Franklin seeking approval of the planned solar project and the solar company is making good faith, best efforts to obtain approvals in a prompt manner, Seller will agree to extend the closing to on or before September 1, 2019 and will grant up to two extensions of twelve (12) months and six (6) months, respectively. Said Closing shall take place at time and date set above and anthe day of the sagreed that time is of the essence of this agreement.
- 9. POSSESSION AND CONDITION OF PREMISE (attach a list of exceptions. if any)
- Full possession of said premises free of all tenants and occupants, except as herein provided, is to be delivered at the time of the delivery of the deed, said premises to be then (a) in the same condition as they now are, reasonable use and wear thereof excepted, and (b) not in violation of said building and zoning laws, and (c) in compliance with the provisions of any instrument referred to in clause 4 hereof. The BUYER shall be entitled personally to enter said premises prior to the delivery of the deed in order to determine whether the condition thereof complies with the terms of this clause.
- 10. EXTENSION TO PERFECT TITLE OR MAKE PREMISES CONFORM (Change poriod of time of desired)
- If the SELLER shall be unable to give title or to make conveyance, or to deliver possession of the premises, all as herein stipulated, or if at the time of the delivery of the deed the premises do not conform with the provisions hereof, then any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto, unless the SELLER shall use reasonable efforts to remove any defects in title, or to deliver possession as provided herein, or to make the said premises conform to the provisions hereof, as the case may be, in which event the SELLER shall give written notice thereof to the BUYER at or before the time for performance hereunder, and thereupon the time for performance hereof shall be extended for a period of thirty (30) days.
- 11. FAILURE TO PERFECT TITLE OR MAKE PREMISES CONFORM, etc.
- If at the expiration of the extended time the SELLER shall have failed so to remove any defects in title, deliver possession, or make the premises conform, as the case may be, all as herein agreed, or if at any time during the period of this agreement or any extension thereof, the holder of a mortgage on said premises shall refuse to pennit the insurance proceeds, if any, to be used for such purposes, then any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto.
- 12. BUYER'S ELECTION TO ACCEPT TITLE

The BUYER shall have the election, at either the original or any extended time for performance, to accept such title as the SELLER can deliver to the said premises in their then condition and to pay therefore the purchase price without deduction, in which case the SELLER shall convey such title, except that in the event of such conveyance in accord with the provisions of this clause, if the said premises shall have been damaged by fire or casualty insured against, then, at the BUYER's option, the SELLER shall, unless the SELLER has previously restored the premises to their former condition, either

- a. pay over or assign to the BUYER, on delivery of the deed, all amounts recovered or recoverable on account of such insurance, less any amounts reasonably expended by the SELLER for any partial restoration, or
- b. if a holder of a mortgage on said premises shall not permit the insurance proceeds or a part thereof to be used to restore the said premises to their former condition or to be so paid over or assigned, give to the BUYER a credit against the purchase price, on delivery of the deed, equal to said amounts so recovered or recoverable and retained by the holder of the said mortgage less any amounts reasonably expended by the SELLER for any partial restoration.

13. ACCEPTANCE OF DEED The acceptance and recording of a deed by the BUYER or his nominee, as the case may be, shall be deemed to be a full performance and discharge of every agreement and obligation herein contained or expressed, except such as are, by the terms hereof, to be performed after the delivery of said deed.

14. USE OF MONEY TO CLEAR TITLE To enable the SELLER to make conveyance as herein provided, the SELLER may, at the time of delivery of the deed, use the purchase money or any portion thereof to clear the title of any or all encumbrances or interests, provided that all instruments so procured are recorded simultaneously with the delivery of said deed.

15. INSURANCE
*Insert amount (fist additional types of insurance and amounts as agreed)

Until the delivery of the deed, the SELLER shall maintain insurance on said premises as follows:

Type of Insurance

Amount of Consesses

a. Fire and Extended Coverage

*\$ As Presently Insured

All risk to remain with SELLER until recording of the deed to BUYER.

Appendix A - Property Description (Bucci)

16. ADJUSTMENTS (list operating expenses, if any, or attach schedule)

Collected rents, mortgage interest, water and sewer use charges, operating expenses (if any) according to the schedule attached hereto or set forth below, and taxes for the then current fiscal year, shall be apportioned and fuel value shall be adjusted; as of the day of performance of this agreement and the net amount thereof shall be added to or deducted from, as the case may be, the purchase price payable by the BUYER at the time of delivery of the deed. Uncollected rents for the current rental period shall be apportioned if and when collected by either party.

17. ADJUSTMENT OF UNASSESSED AND ABATED TAXES

If the amount of said taxes is not known at the time of the delivery of the deed, they shall be apportioned on the basis of the taxes assessed for the preceding fiscal year, with a reapportionment as soon as the new tax rate and valuation can be ascertained; and, if the taxes which are to be apportioned shall thereafter be reduced by abatement, the amount of such abatement, less the reasonable cost of obtaining the same, shall be apportioned between the parties, provided that neither party shall be obligated to institute or prosecute proceedings for an abatement unless otherwise herein agreed.

18. BROKER'S FEE (fill in fee with dollar amount or percenuage; also name of Brokerage firm(s))

A Broker's fee for professional services of - is due from the SELLER to

the Broker(s) herein, but if the SELLER pursuant to the terms of clause 21 hereof retains the deposit made hereunder by the BUYER, said Broker(s) shall be entitled to receive from the SELLER an amount equal to one half the amount so retained or an amount equal to the Broker's fee for professional services according to this contract, which over is the lesser:

19. BROKER(S) WARRANTY (fill in name)

The Broker(s) named herein

warrant(s) that the Broker(s) is(are) duly licensed as such by the Commonwealth of Massachusetts.

20. DEPOSIT (fill in name)

All deposits made hereunder shall be held in escrow by Costello Realty

as escrow agent subject to the terms of this agreement and shall be duly accounted for at the time for performance of this agreement. In the event of any disagreement between the parties, the escrow agent shall retain all deposits made under this agreement pending instructions mutually given in writing by the SELLER and the BUYER or pursuant to a final order of a court of competent jurisdiction.

21. BUYER's DEFAULT: DAMAGES

If the BUYER shall fail to fulfill the BUYER'S agreements herein, all deposits made hereunder by the BUYER shall be retained by the SELLER as liquidated damages unless within thirty days offer the time for performance of this agreement or any extension hereof, the SELLER otherwise notifies the BUYER in writing which shall be the Seller's sole remedy in law and in equity.

22. RELEASE BY HUSBAND OR WIFE

The SELLER'S spouse hereby agrees to join in said deed and to release and convey all statutory and other rights and interests in said premises.

23. BROKER AS PARTY

The Broker(s) named herein join(s) in this agreement and become(s) a party hereto, insofar as any provisions of this agreement expressly apply to the Broker(s), and to any amendments or modifications of such provisions to which the Broker(s) agree(s) in writing.

24. LIABILITY OF TRUSTEE. SHAREHOLDER. BENEFICIARY, etc. If the SELLER or BUYER executes this agreement in a representative or fiduciary capacity, only the principal or the estate represented shall be bound, and neither the SELLER or BUYER so executing, nor any shareholder or beneficiary of any trust, shall be personally liable for any obligation, express or implied, hereunder.

25. WARRANTIES AND REPRESENTATIONS (fill in) if none state "none"; if any listed, indicate by whom each warranty or representation was made

The BUYER acknowledges that the BU has not been influenced to enter into this transaction nor has he relied upon any warranties or representations not set forth or incorporated in this agreement or previously made in writing, except for the following additional warranties and representations, if any, made by either the SELLER or the Broker(s): NONE, except as set forth in this agreement.

| Appendix A - F | 'roperty Description (Bucci) |
|---|---|
| 26. MORTGAGE CONTINGENCY CLAUSE footiffuer footidist for in Offerso furchase) | In order to help finance the acquisition of said premises, the BUYER shall apply for a conventional bank or other institutional mortgage loan of at prevailing rates, terms and conditions. If, despite the BUYER'S diligent efforts, a commitment for such loan cannot be obtained on or before thirty (30) days prior to closing the BUYER may terminate this agreement by written notice to the SELLER and/or the Broker(s), as agent(s) for the SELLER, prior to the expiration of such time, whereupon any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto. In no event-will the BUYER be deemed to have used diligent efforts to obtain such commitment unless the BUYER submits a complete mortgage loan application equiforming to the foregoing provisions on or before |
| 27, CONSTRUCTION OF AGREEMENT | This instrument, executed in multiple counterparts, is to be construed as a Massachusetts contract, is to take effect as a sealed instrument, sets forth the entire contract between the parties, is binding upon and inures to the benefit of the parties hereto and their respective heirs, devisees, executors, administrators, successors and assigns, and may be cancelled, modified or amended only by a written instrument executed by both the SELLER and the BUYER. If two or more persons are named herein as BUYER their obligations hereunder shall be joint and several. The captions and marginal notes are used only as a matter of convenience and are not to be considered a part of this agreement or to be used in determining the intent of the parties to it. |
| 28, LEAD PAINT LAW | The parties acknowledge that, under Massachusetts law, whenever a child or children under six years of age resides in any residential premises in which any paint, plaster or other accessible material contains dangerous levels of lead, the owner of said premises must remove or cover said paint, plaster or other material so as to make it inaccessible to children under six years of age. |
| 29. SMOKE & CARBON MONOXIDE DETECTORS | The SELLER shall, at the time of the delivery of the deed, deliver a certificate from the fire department of the city or town in which said premises are located stating that said premises have been equipped with approved smoke and carbon monoxide detectors in conformity with applicable law. |
| 30. ADDITIONAL PROVISIONS | The initialed riders, if any, attached hereto, are incorporated herein by reference. -Subject to Clear Title; -Subject to Buyer obtaining all permits/approvals; -Subject to Buyer being able to operate a 6 Megawatt Solar Farm; and -Subject to Buyer closing on all three parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lane) See attached map. See Rider A attached hereto and incorporated herein. See Rider B, Collateral Assignment, attached hereto and incorporated herein. |
| FOR RESIDENTIAL LEAL | L PROPERTY CONSTRUCTED PRIOR TO 1978, BUYER MUST ALSO HAVE SIGNED PAINT "PROPERTY TRANSFER NOTIFICATION CERTIFICATION" |
| SELLER: Print Name: Michael Bucci Taxpayer ID/Social Security No | BUYER: By: |
| SELLER: Print Name: Taxpayer ID/Social Security No | Print Name: Taxpayer ID/Social Security No. |

BROKER(S)

STANDARD FORM PURCHASE & SALE AGREEMENT

- I PARTIES AND MAILING ADDRESSES (fill in)
- 2. DESCRIPTION
 (fill in and include title reference)
- 3 BUILDINGS, STRUCTURES, IMPROVEMENTS, FIXTURES

(fill in or delete)

- 4. TITLE DEED
- * Include here by specific reference any restrictions, easiements, rights and abligations in party walls not included in (b), leases, municipal and other liens, other uncumbrances, and make provision to protect SELLER against BUYER's breach of SELLER's covenants in leases, where necessary.
- 5. PLANS
- 6. REGISTERED
 TITLE
- 7 PURCHASE PRICE
 (fill in) space is
 allowed to spell
 out the amounts
 if desired

As of the 31st day of August 2018

Dennis B. Costello and Paul K. Costello, Trustees of the Costello Family Trust u/d/t dated October 12, 1992 and recorded with the Norfolk County Registry of Deeds in Book 9570, Page 301, of 11601 Stablewatch Court, Cincinnati, Oh 45249 and 43 Gilmore Road, Wrentham, MA 02093, respectively hereinafter called the SELLER, agrees to SELL and

Lewis Street Realty LLC, a Massachusetts limited liability company with a principal place of business located at 28 Tia Place, P.O. Box ,411, Franklin, MA 02038

hereinafter called the BUYER or PURCHASER, agrees to BUY, upon the terms hereinafter set forth, the following described premises: A certain parcel of land known as 0 Spring St., Franklin, MA 02038, more fully described at the Norfolk County Registry of Deeds in Book 9570, Page 307. SEE ATTACHED ASSESSMENT AND SALES REPORT AND MAP.

Included in the sale as a part of said premises are the buildings, structures, and improvements now thereon, and the fixtures belonging to the SELLER and used in connection therewith including, if any, all wall-to-wall carpeting, drapery rods, automatic garage door openers, venetian blinds, window shades, screens, screen doors, storm windows and doors, awnings, shutters, furnaces, heaters, heating equipment, stoves, ranges, oil and gas burners and fixtures appurtenant thereto, hot water heaters, plumbing and bathroom fixtures, garbage disposers, electric and other lighting fixtures, mantels, outside television antennas, fences, gates, trees, shrubs, plants and, ONLY IF BUILT IN, refrigerators, air conditioning equipment, ventilators, dishwashers, washing machines and dryers,

but excluding:

Said premises are to be conveyed by a good and sufficient quitclaim deed running to the BUYER, or to the nominee designated by the BUYER by written notice to the SELLER at least seven (7) days before the deed is to be delivered as herein provided, and said deed shall convey a good and clear record and marketable title thereto, free from encumbrances, except

a. Provisions of existing building and zoning laws;

- b. Existing rights and obligations in party walls which are not the subject of written agreement;
- c. Such taxes for the then current year as are not due and payable on the date of the delivery of such deed:
- d. Any liens for municipal betterments recorded after the deed to the BUYER;
- Easements, restrictions and reservations of record, if any, so long as the same do not prohibit or materially interfere with the current use of said premises;

*£

If said deed refers to a plan necessary to be recorded therewith the SELLER shall deliver such plan with the deed in form adequate for recording or registration.

In addition to the foregoing, if the title to said premises is registered, said deed shall be in form sufficient to entitle the BUYER to a Certificate of Title of said premises, and the SELLER shall deliver with said deed all instruments, if any, necessary to enable the BUYER to obtain such Certificate of Title.

The agreed purchase price for said premises is Dollars of which



- * TIME FOR PERFORMANCE DELIVERY OF DEED (fill in)
- Such deed is to be delivered at 10:00 a.m. on the first to occur of: (a) February 28, 2019 or (b) on the day that is set by BUYER in a written notice to SELLER delivered at least ten (10) days prior to the closing date set therein that a solar company has agreed to enter into a ground lease with BUYER. Provided that application has been filed on or before December 1, 2018 with the Town of Franklin seeking approval of the planned solar project and the solar company is making good faith, best efforts to obtain approvals in a prompt manner, Seller will agree to extend the closing to on or before September 1, 2019 and will grant up to two extensions of twelve (12) months and six (6) months, respectively Said Closing shall take place at time and date set above at the Norfolk County Registry of Deeds, unless otherwise agreed upon in writing. It is agreement.
- 9. POSSESSION AND CONDITION OF PREMISE (allach a list of exceptions, if any)
- Full possession of said premises free of all tenants and occupants, except as herein provided, is to be delivered at the time of the delivery of the deed, said premises to be then (a) in the same condition as they now are, reasonable use and wear thereof excepted, and (b) not in violation of said building and zoning laws, and (c) in compliance with the provisions of any instrument referred in clause 4 hereof. The BUYER shall be entitled personally to enter said premises prior to the delivery of the deed in order to determine whether the condition thereof complies with the terms of this clause.
- 10. EXTENSION TO PERFECT TITLE OR MAKE PREMISES CONFORM (Change period of time if desired).
- If the SELLER shall be unable to give title or to make to deliver possession of the premises, all as herein stipulated, or if at the time of the delivery of the deed the premises do not conform with the provisions hereof, then any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto, unless the SELLER shall use reasonable efforts to remove any defects in title, or to deliver possession as provided herein, or to make the said premises conform to the provisions hereof, as the case may be, in which event the SELLER shall give written notice thereof to the BUYER at or before the time for performance hereunder, and thereupon the time for performance hereof shall be extended for a period of thirty (30) days.
- 11. FAILURE TO PERFECT TITLE OR MAKE PREMISES CONFORM, etc
- If at the expiration of the extended time the SELLER shall have failed so to remove any defects in title, deliver possession, or make the premises conform, as the case may be, all as herein agreed, or if at any time during the period of this agreement or any extension thereof, the holder of a mortgage on said premises shall refuse to permit the insurance proceeds, if any, to be used for such purposes, then any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto.

12. BUYER'S ELECTION TO ACCEPT TITLE The BUYER shall have the election, at either the original or any extended time for performance, to accept such title as the SELLER can deliver to the said premises in their then condition and to pay therefore the purchase price without deduction, in which case the SELLER shall convey such title, except that in the event of such conveyance in accord with the provisions of this clause, if the said premises shall have been damaged by fire or casualty insured against, then, at the BUYER's option, the SELLER shall, unless the SELLER has previously restored the premises to their former condition, either

- a. pay over or assign to the BUYER, on delivery of the deed, all amounts recovered or recoverable on account of such insurance, less any amounts reasonably expended by the SELLER for any partial restoration, or
- b. if a holder of a mortgage on said premises shall not permit the insurance proceeds or a part thereof to be used to restore the said premises to their former condition or to be so paid over or assigned, give to the BUYER a credit against the purchase price, on delivery of the deed, equal to said amounts so recovered or recoverable and retained by the holder of the said mortgage less any amounts reasonably expended by the SELLER for any partial restoration.

13. ACCEPTANCE OF DEED

The acceptance and recording of a deed by the BUYER or his nominee, as the case may be, shall be deemed to be a full performance and discharge of every agreement and obligation herein contained or expressed, except such as are, by the terms hereof, to be performed after the delivery of said deed.

14. USE OF MONEY TO CLEAR TITLE To enable the SELLER to make conveyance as herein provided, the SELLER may, at the time of delivery of the deed, use the purchase money or any portion thereof to clear the title of any or all encumbrances or interests, provided that all instruments so procured are recorded simultaneously with the delivery of said deed.

15. INSURANCE

*Insert amount (list additional types of insurance and amounts as agreed)

Until the delivery of the deed, the SELLER shall maintain insurance on said premises as follows:

Type of Insurance

Amount of Coverage

a. Fire and Extended Coverage

Ь.

*\$ As Presently Insured

All risk to remain with SELLER until recording of deed to BUYER.

16 ADJUSTMENTS (list operating expenses, if any, or adach schedule)

Collected rents, mortgage interest, water and sower use charges, operating expenses (if any) according to the schedule altached hereto or set forth below, and taxes for the then current fiscal year, shall be apportioned and fuel-value shall be adjusted; as of the day of performance of this agreement and the net amount thereof shall be added to or deducted from, as the case may be, the purchase price payable by the BUYER at the time of delivery of the deed. Uncollected ronts for the autrent restal period shall be apportioned if and when collected by either party.

17. ADJUSTMENT OF UNASSESSED AND ABATED TAXES If the amount of said taxes is not known at the time of the delivery of the deed, they shall be apportioned on the basis of the taxes assessed for the preceding fiscal year, with a reapportionment as soon as the new tax rate and valuation can be ascertained; and, if the taxes which are to be apportioned shall thereafter be reduced by abatement, the amount of such abatement, less the reasonable cost of obtaining the same, shall be apportioned between the parties, provided that neither party shall be obligated to institute or prosecute proceedings for an abatement unless otherwise herein agreed.

18. BROKER'S FEE (fill in fee with dollar amount or percentage; also name of Brokerage (trm(s))

A Broker's fee for professional services of is due from the SELLER to

the Broker(s) heroin, but if the SELLER pursuant to the terms of clause 21 horoof retains the deposit made hercunder by the BUYER, said Broker(s) shall be entitled to receive from the SELLER an amount equal to one half the amount so retained or an amount equal to the Broker's fee for professional services according to this contract, whichever is the lessor:

19. BROKER(S)
WARRANTY
(fill in name)

The Broker(s) named heroin

warrant(s) that the Broker(s) is(are) duly licensed as such by the Commonwealth of Mossachusetts.

20. DEPOSIT
(fill in name)



21. BUYER's DEFAULT; DAMAGES

If the BUYER shall fail to fulfill the BUYER'S agreements herein, all deposits made bereunder by the BUYER shall be retained by the SELLER as liquidated damages unless within thirty days after the time for performance of this agreement or any extension hereof, the SELLER otherwise notifies the BUYER in writing which shall be the Seller's sole remedy in law and in equity.

22. RELEASE BY HUSBAND OR WIFE

The SELLER'S spouse hereby agrees to join in said deed and to release and convey all statutory and other rights and interests in said premises.

23. BROKER AS PARTY The Broker(s) named herein join(s) in this agreement and become(s) a party hereto, insofar as any provisions of this agreement expressly apply to the Broker(s), and to any amendments or modifications of such provisions to which the Broker(s) agree(s) in writing.

24. LIABILITY OF TRUSTEE, SHAREHOLDER, BENEFICIARY, etc. If the SELLER or BUYER executes this agreement in a representative or fiduciary capacity, only the principal or the estate represented shall be bound, and neither the SELLER or BUYER so executing, nor any shareholder or beneficiary of any trust, shall be personally liable for any obligation, express or implied, hereunder.

25. WARRANTIES AND REPRESENTATIONS (fill in) if none state "none": If any listed, indicate by whom each warrany or representation was node

The BUYER acknowledges that the BUYER has not been influenced to enter into this transaction nor has he relied upon any warranties or representations not set forth or incorporated in this agreement or previously made in writing, except for the following additional warranties and representations, if any, made by either the SELLER or the Broker(s): NONE, except as set forth in this agreement.

| Appendix A - P | roperty Description (Costello) |
|--|---|
| 26 MORTGAGE CONTINGENCY CLAUSE foom y no; provided for in Offer to Purchase) | In order to help finance the acquisition of said premises, the BUYER shall apply for a conventional bank or other institutional mortgage loan of at prevailing rates, terms and conditions. If, despite the BUYER'S diagent efforts, a commutation to such loan cannot be obtained on or before thirty (30) days prior to closing the BUYER may terminate this agreement by written notice to the SELLER and/or the Broker(s), as agent(s) for the SELLER, prior to the expiration of such time, whereupon any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto. In no event will the BUYER be deemed to have used diligent efforts to obtain such commitment unless the BUYER submits a complete mortgage loan application conforming to the foregoing provisions on or before |
| 27. CONSTRUCTION OF AGREEMENT | This instrument, executed in multiple counterparts, is to be construed as a Massachusetts contract, is to take effect as a scaled instrument, sets forth the entire contract between the parties, is binding upon and inures to the benefit of the parties hereto and their respective heirs, devisees, executors, administrators, successors and assigns, and may be cancelled, modified or amended only by a written instrument executed by both the SELLER and the BUYER. If two or more persons are named herein as BUYER their obligations hereunder shall be joint and several. The captions and marginal notes are used only as a matter of convenience and are not to be considered a part of this agreement or to be used in determining the intent of the parties to it. |
| 28. LEAD PAINT LAW | The parties acknowledge that, under Massachusetts law, whenever a child or children under six years of age resides in any residential premises in which any paint, plaster or other accessible material contains dangerous levels of lead, the owner of said premises must remove or cover said paint, plaster or other material so as to make it inaccessible to children under six years of age. |
| 29. SMOKE & CARBON MONOXIDE DETECTORS | The SELLER shall, at the time of the delivery of the deed, deliver a certificate from the fire department of the city or town in which said premises are located staying that said premises have been equipped with approved smoke and carbon monoxide detectors in conformity with applicable law. |
| 30. ADDITIONAL PROVISIONS | The initialed riders, if any, attached hereto, are incorporated herein by reference. |
| | ~Subject to Clear Title; ~Subject to Buyer obtaining all permits/approvals; ~Subject to Buyer being able to operate a 6 Megawatt Solar Farm; and ~Subject to Buyer closing on all three parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lane) See attached map. See Rider A attached hereto and incorporated herein. See Rider B, Collateral Assignment, attached hereto and incorporated herein. |
| FOR RESIDENTIAL | L PROPERTY CONSTRUCTED PRIOR TO 1978, BUYER MUST ALSO HAVE SIGNED D PAINT "PROPERTY TRANSFER NOTIFICATION CERTIFICATION" |
| NOTICE: This | is a legal document that creates binding obligations. If not understand the attorney. LEWIS STREET BY LL |
| | |
| Print Name: Dennis B. Costell Taxpayer ID/Social Security No | O. Trustee |
| SELLER: | BUYER: |
| Print Name: Paul K. Costello, Taxpayer ID/Social Security No | Trustee Print Nagic: |
| ranger to rooted security No | Taxpayer 1D/Social Security No. |

| | BR | OKER(S) | |
|--|---|---|--|
| earbridge investigate security No | D | Texpayer ID/Social Security No. | |
| SELLER Print Name: Paul K. Costello, l'axpayer ID/Social Security No | Trustee | BUYER: | |
| Taxpayer (D/Spela) Security No SELLER | b.: | Taxpayer (D/Social Security No.: | |
| Print Name Dennis B. Costel | io, Tra | BUYER: By: Print Name: Anthony Marinella, Manager | |
| SELLER: 1000 | | LEWIS STREET REALTY LLC | |
| NOTICE THIS | is a legal document that creates b | inding obligations. If not understood, consult an attorney. | |
| | | | |
| POR RESIDENTIA LEAI | L PROPERTY CONSTRUCTE D PAINT "PROPERTY TRANS | ED PRIOR TO 1978, BUYER MUST ALSO HAVE SIGNED SFER NOTIFICATION CERTIFICATION" | |
| EOD PROISE. | | ment, attached hereto and incorporated herein. | |
| | See Rider A attached hereto at | nd incorporated hereit. | |
| | | | |
| | -Subject to Buyer being able t | to operate a 6 Megawatt Solar Farm; and ill three parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lanc) See | |
| | ~Subject to Buyer obtaining a | ll permits/approvals; | |
| | ~Subject to Clear Title: | | |
| 0. ADDITIONAL PROVISIONS | The initialed riders, if any, attac | thed hereto, are incorporated herein by reference. | |
| | The second and any on the | Another detectors in contomitty with applicable law. | |
| MONOXIDE DETECTORS | The SELLER shall, at the time of the delivery of the deed, deliver a certificate from the fire department of the city or town in which said premises are located stating that said premises have been equipped with approved smoke and carbon monoxide detectors in conformity with applicable law. | | |
| 9. SMOKE & CARBON | The SELLER shall, at the time | of the delivery of the deed delivery postificate South Co. | |
| LAW | resides in any residential premises in which any paint, plaster or other accessible material contains dangerous levels of lead, the owner of said premises must remove or cover said paint, plaster or other material so as to make it inaccessible to children under six years of age. | | |
| 28. LEAD PAINT LAW | The parties acknowledge that, I | inder Massachusetts lavy sydensyer a child or children and a children | |
| | shall be joint and several. The | two or more persons are named herein as BUYER their obligations hereunder captions and marginal notes are used only as a matter of convenience and are his agreement or to be used in determining the intent of the parties to it. | |
| 27. CONSTRUCTION OF AGREEMENT | the benefit of the parties hereto assigns, and may be cancelled | sultiple counterparts, is to be construed as a Massachusetts contract, is to take ets forth the entire contract between the parties, is binding upon and inures to and their respective heirs, devisees, executors, administrators, successors and i, modified or amended only by a written instrument executed by both the | |
| | refer to | | |
| estense) | hereto shall cease and this agr the BUYER be deemed to have | eement shall be void without recourse to the parties hereto. In no event will ease diligent efforts to obtain such commitment unless the BUYER submits application conforming to the foregoing provisions on or before | |
| provided for ar Offer to Purchaser | | is of the SELLER, prior to the expiration of such time, whereupon any recement shall be forthwith refunded and all other obligations of the parties | |
| CLAUSE family (Inor | | It efforts, a commitment for such loan connot be obtained on or before thirty is BUYER may tenninate this agreement by written notice to the SELLER | |
| 26 MORTGAGE CONTINGENCY | Contract an experience of their places of the state of the | quisition of said premises, the BUYER shall apply for a conventional bank or oan of | |
| 44 | | | |

| | , | ·, |
|--|--|--|
| 26. MORTGAGE CONTINGENCY CLAUSE (omit if not provided for in Offer to Purchase) | If, despite the BUYER'S diligent thirty (30) days prior to closing SELLER and/or the Btoker(s), as whereupon any payments made und of the parties hereto shall cease and no event will the BUYER be deem | at prevailing rates, terms and conditions. at prevailing rates, terms and conditions, a commitment for such loan cannot be obtained on or before the BUYER may terminate this agreement by written notice to the stagent(s) for the SELLER, prior to the expiration of such time, for this agreement shall be forthwith refunded and all other obligations this agreement shall be void without recourse to the parties hereto. In ed to have used diligent efforts to obtain such commitment unless the gage loan application conforming to the foregoing provisions on or |
| 27. CONSTRUCTION OF AGREEMENT | inures to the benefit of the parties successors and assigns, and may be by both the SELLER and the BU obligations hereunder shall be init a | the counterparts, is to be construed as a Massachusetts contract, is to sets forth the entire contract between the parties, is binding upon and hereto and their respective heirs, devisees, executors, administrators, cancelled, modified or amended only by a written instrument executed YER. If two or more persons are named herein as BUYER their and several. The captions and marginal notes are used only as a matter sidered a part of this agreement or to be used in determining the intent |
| 28. LEAD PAINT LAW | | Massachusetts law, whenever a child or children under six years of ses in which any paint, plaster or other accessible material contains of said premises must remove or cover said paint, plaster or other to children under six years of age. |
| 29. SMOKE & CARBON MONOXIDE DETECTORS | | delivery of the deed, deliver a certificate from the fire department of ises are located stating that said premises have been equipped with e detectors in conformity with applicable law. |
| 30. ADDITIONAL PROVISIONS | The initialed riders, if any, attached he | ereto, are incorporated herein by reference. |
| | -Subject to Clear Title; -Subject to Buyer obtaining all pero -Subject to Buyer being able to oper -Subject to Buyer closing on all thre attacked map. See Rider A attacked bereto and inc | nits/approvals; rate a 6 Megawatt Solar Farm; and re parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lane) See |
| FOR RESIDENTIA | L PROPERTY CONSTRUCTED PI | RIOR TO 1978, BUYER MUST ALSO HAVE SIGNED R NOTIFICATION CERTIFICATION" |
| NOTICE: This | is a legal document that creates bindin | g obligations. If not understood, consult an attorney. |
| SELLER: Print Name. Dennis B. Costel Taxpayer ID Social Security N SELLE Print Name: Haul K. Costello, | Trustee | LEWIS STREET REALTY LLC BUYER: By: Print Name: Anthony Marinella, Manager Taxpayer ID/Social Security No.; BUYER: |
| Texpayer ID/, noisi Security No |) | Print Name: Taxpayer ID/Social Security No. |

STANDARD FORM PURCHASE & SALE AGREEMENT

PARTIES AND MAILING ADDRESSES ilill in)

As of the 31st day of August 2018

DONNA A. BRUNELLI of 8 Spring Street, Franklin, MA 02038; RICHARD J. DEPOTO of 825 Washington Street, Franklin, MA 02038; JEAN M. BRUNEAULT, Personal Representative of the Estate of Anthony R. Depoto, of 38 Orchard Street, Blackstone, MA 01504; LAWRENCE BENEDETTO, Co-Executor/Personal Representative of the Estate of Edward J. Depoto, of 211 Chestnut Street, Franklin, MA 02038 and GERALD TULIS, Co-Executor/Personal Representative of the Estate of Edward J. Depoto, of 33 Surrey Drive, Mansfield, MA 02048; hereinafter called the SELLER, agrees to SELL and

Lewis Street Realty LLC, a Massachusetts limited liability company with a principal place of business located at 28 Tia Place, P.O. Box 411, Franklin, MA 02038

2. DESCRIPTION (fill in and include title reference)

hereinafter called the BUYER or PURCHASER, agrees to BUY, upon the terms hereinafter set forth, the following described premises: A certain parcel of land known as 0 Spring St., Franklin, MA 02038, more fully described at the Norfolk Registry District of the Land Court, Certificate of Title No. 117711, Book 589, Page 111.

SEE ATTACHED ASSESSMENT AND SALES REPORT AND MAP.

3. BUILDINGS, STRUCTURES, IMPROVEMENTS. **FIXTURES**

(fill in or delete)

Included in the sale as a part of said premises are the buildings, structures, and improvements now thereon, and the fixtures belonging to the SELLER and used in connection therewith including, if any, all wall-towall carpeting, drapery rods, automatic garage door openers, venetian blinds, window shades, screens, screen doors, storm windows and doors, awnings, shutters, furnaces, heaters, heating equipment, stoves, ranges, oil and gas burners and fixtures appurtenant thereto, hot water heaters, plumbing and bathroom fixtures, garbage disposers, electric and other lighting fixtures, mantels, outside television antennas, fences, gates, trees, shrubs, plants and, ONLY IF BUILT IN, refrigerators, air conditioning equipment, ventilators, dishwashers, washing machines and dryers.

Said premises are to be conveyed by a good and sufficient quitclaim deed running to the BUYER, or to the

nominee designated by the BUYER by written notice to the SELLER at least seven (7) days before the deed

is to be delivered as herein provided, and said deed shall convey a good and clear record and marketable title

but excluding:

4. TITLE DEED (fill in)

BL'YER's breach of

SELLER's covenants in

leases, where necessary.

* Include here by specific reference any restrictions, easements, rights and obligations in party walls not included in (b), leases, municipal and other liens, other encumbrances, and make provision to protect SELLER against

thereto, free from encumbrances, except a. Provisions of existing building and zoning laws;

- b. Existing rights and obligations in party walls which are not the subject of written agreement; c. Such taxes for the then current year as are not due and payable on the date of the delivery of such deed:
- d. Any liens for municipal betterments recorded after the deed to the BUYER;
- e. Easements, restrictions and reservations of record, if any, so long as the same do not prohibit or materially interfere with the current use of said premises;

*f.

5. PLANS

If said deed refers to a plan necessary to be recorded therewith the SELLER shall deliver such plan with the deed in form adequate for recording or registration.

In addition to the foregoing, if the title to said premises is registered, said deed shall be in form sufficient to entitle the BUYER to a Certificate of Title of said premises, and the SELLER shall deliver with said deed all instruments, if any, necessary to enable the BUYER to obtain such Certificate of Title.

7. PURCHASE PRICE

6 REGISTERED TITLE

(fill in) space is allowed to spell out the amounts if desired

| The agreed purchase p | orice for said premise which | es is | |
|-----------------------|---------------------------------|-------|--|
| | | | |
| | 14.4 | | |

Appendix A - Property Description (Depoto/Brunelli)

TIME FOR PERFORMANCE DELIVERY OF DEED gill in) Such deed is to be delivered at 10:00 a.m. on the first to occur of (a) February 28, 2019 or (b) on the day that is set by BUYER, in a written notice to SELLER delivered at least ten (10) days prior to the closing date set therein that a solar company has agreed to enter into a ground lease with BUYER. Provided that application has been filed on or before December 1, 2018 with the I own of Franklin seeking approval of the planned solar project and the solar company is making good faith, best efforts to obtain approvals in a prompt manner, Seller will agree to extend the closing to on or before September 1, 2019 and will grant up to two extensions of twolve (12) months and six (6) months, respectively. Said Closing shall take place at time and date set above at the Norfolk County. Registry of Deeds unless otherwise agreed upon in writing. It is agreed that time is of the essence of this agreement.

9 POSSESSION AND CONDITION OF PREMISE (atlack a list of exceptions, if any) Full possession of said premises free of all tenants and occupants, except as herein provided, is to be delivered at the time of the delivery of the deed, said premises to be then (a) in the same condition as they now are, reasonable use and wear thereof excepted, and (b) not in violation of said building and zoning laws, and (c) in compliance with the provisions of any instrument referred to in clause 4 hereof. The BUYER shall be entitled personally to enter said premises prior to the delivery of the deed in order to determine whether the condition thereof complies with the terms of this clause.

10. EXTENSION TO PERFECT TITLE OR MAKE PREMISES CONFORM (Change period of time if desired). If the SELLER shall be unable to give title or to make conveyance, or to deliver possession of the premises, all as herein stipulated, or if at the time of the delivery of the deed the premises do not conform with the provisions hereof, then any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties herein, unless the SELLER shall use reasonable efforts to remove any defects in title, or to deliver possession as provided herein, or to make the said premises conform to the provisions hereof, as the case may be, in which event the SELLER shall give written notice thereof to the BUYER at or before the time for performance hereunder, and thereupon the time for performance hereof shall be extended for a period of thirty (30) days.

11. FAILURE TO PERFECT TITLE OR MAKE PREMISES CONFORM, etc. If at the expiration of the extended time the SELLER shall have failed so to remove any defects in title, deliver possession, or make the premises conform, as the case may be, all as herein agreed, or if at any time during the period of this agreement or any extension thereof, the holder of a mortgage on said premises shall refuse to permit the insurance proceeds, if any, to be used for such purposes, then any payments made under this agreement shall be forthwith refunded and all other obligations of the parties hereto shall cease and this agreement shall be void without recourse to the parties hereto.

12 BUYER'S ELECTION TO ACCEPT TITLE

The BUYER shall have the election, at either the original or any extended time for performance, to accept such title as the SELLER can deliver to the said premises in their then condition and to pay therefore the purchase price without deduction, in which case the SELLER shall convey such title, except that in the event of such conveyance in accord with the provisions of this clause, if the said premises shall have been damaged by fire or casualty insured against, then, at the BUYER's option, the SELLER shall, unless the SELLER has previously restored the premises to their former condition, either

- a. pay over or assign to the BUYER, on delivery of the deed, all amounts recovered or recoverable on account of such insurance, less any amounts reasonably expended by the SELLER for any partial restoration, or
- b. if a holder of a mortgage on said premises shall not permit the insurance proceeds or a part thereof to be used to restore the said premises to their former condition or to be so paid over or assigned, give to the BUYER a credit against the purchase price, on delivery of the deed, equal to said amounts so recovered or recoverable and retained by the holder of the said mortgage less any amounts reasonably expended by the SELLER for any partial restoration.

ACCEPTANCE OF DEED

The acceptance and recording of a deed by the BUYER or his nominee, as the case may be, shall be deemed to be a full performance and discharge of every agreement and obligation herein contained or expressed, except such as are, by the terms hereof, to be performed after the delivery of said deed.

14. USE OF MONEY TO CLEAR TITLE

To enable the SELLER to make conveyance as herein provided, the SELLER may, at the time of delivery of the deed, use the purchase money or any portion thereof to clear the title of any or all encumbrances or interests, provided that all instruments so procured are recorded simultaneously with the delivery of said deed.

15. INSURANCE

Until the delivery of the deed, the SELLER shall maintain insurance on said premises as follows:

Type of Insurance

Amount of Coverage

"Insert amount (list additional types of insurance and amounts as agreed)

a Fire and Extended Coverage

*S As Presently Insured

b.

All risk to remain with SELLER until recording of deed to BUYER

Appendix A - Property Description (Depoto/Brunelli)

(list operating expeases, if any or attach taliedule) Criticated rents, more age interest, water and sewer use charges, operating expenses (if any) according to the schedule attachment of set forth index, and taxes for the then current fiscal year, shall be apportioned and their shall be a hustide, as of the day of performance of this agreement and the net amount thereof shall be added to or deducted from, as the case may be, the purchase price payable by the BUYER at the time of delivery of the deed. Uncollected tents for the current rental period shall be apportuned if and when collected by either party.

17. ADJUSTMENT OF UNASSESSED AND ABATED TAXES If the amount of said taxes is not known at the time of the delivery of the deed, they shall be apportioned on the basis of the taxes assessed for the preceding fiscal year, with a reapportionment as soon as the new tax rate and valuation can be ascertained; and, if the taxes which are to be apportioned shall thereafter be reduced by abatement, the amount of such abatement, less the reasonable cost of obtaining the same, shall be apportioned between the parties, provided that neither party shall be obligated to institute or prosecute proceedings for an abatement unless otherwise herein agreed.

18. BROKER'S FEE
(fill in fee with
dollar amount or
percentage; also
name of Brokerog.
firm(s))

A Broker's fee for professional services of _____ is due from the SELLER to

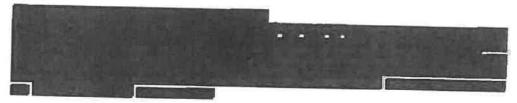
the Broker(s) herein, but if the SELLER pursuant to the terms of clause 21 hereof retains the deposit made hereunder by the BUYER, said Broker(s) shall be entitled to receive from the SELLER an amount equal to one half the amount so retained or an amount equal to the Broker's fee for professional services according to this contract, whichever is the lesser:

19. BROKER(S)
WARRANTY
Gill in name)

The Brokerfel named berein

warrant(s) that the Broker(s) is(are) duly licensed as such by the Commonwealth of Massachusetts.

20. DEPOSIT



21. BUYER's DEFAULT; DAMAGES

If the BUYER shall fail to fulfill the BUYER'S agreements herein, all deposits made hereunder by the BUYER shall be retained by the SELLER as liquidated damages unless within thirty days after the time for performance of this agreement or any extension hereof, the SELLER otherwise notifies the BUYER in writing which shall be the Seller's sole remedy in law and in equity.

22. RELEASE BY HUSBAND OR WIFE

The SELLER'S spouse hereby agrees to join in said deed and to release and convey all statutory and other rights and interests in said premises.

23. BROKER AS PARTY

The Broker(s) named herein join(s) in this agreement and become(s) a party hereto, insofar as any provisions of this agreement expressly apply to the Broker(s), and to any amendments or modifications of such provisions to which the Broker(s) agree(s) in writing.

24. LIABILITY OF TRUSTEE, SHAREHOLDER, BENEFICIARY, etc. If the SELLER or BUYER executes this agreement in a representative or fiduciary capacity, only the principal or the estate represented shall be bound, and neither the SELLER or BUYER so executing, nor any shareholder or beneficiary of any trust, shall be personally liable for any obligation, express or implied, hereunder.

25. WARRANTIES AND REPRESENTATIONS (fill in) if none state "none": if any listed, indicate by whom each warranty or representation was made

The BUYER acknowledges that the BUYER has not been influenced to enter into this transaction nor has he relied upon any warranties or representations not set forth or incorporated in this agreement or previously made in writing, except for the following additional warranties and representations, if any, made by either the SELLER or the Broker(s): NONE, except as set forth in this agreement.

| Appendix A - 26. MORTGAGE CONTINGENCY CLAUSE form if not provided fin in Office in Purchase) | despite the BUYER'S diligent effort (30) days prior to closing the BUY and or the Broker(s), as agent(s) for payments made under this agreementhereto shall cease and this agreementho BUYER be deemed to have used | on of said premises, the BLIVER shall apply for a conventional bank. |
|--|---|---|
| 27. CONSTRUCTION OF AGREEMENT | the benefit of the parties hereto and the assigns, and may be cancelled, modi SELLER and the BUYER. If two or r shall be joint and several. The caption not to be considered a part of this agree | counterparts, is to be construed as a Massachusetts contract, is to take he the entire contract between the parties, is binding upon and inures to eir respective heirs, devisees, executors, administrators, successors and ified or amended only by a written instrument executed by both the more persons are named herein as BUYER their obligations hereunder as and marginal notes are used only as a matter of convenience and are seement or to be used in determining the intent of the parties to it. |
| 28 LEAD PAINT LAW | regress in any residential biglilles ill w | fassachusetts law, whenever a child or children under six years of age which any paint, plaster or other accessible material contains dangerous ses must remove or cover said paint, plaster or other material so as to six years of age. |
| 29. SMOKE & CARBON MONOXIDE DETECTORS | are city of town in which said bremis | delivery of the deed, deliver a certificate from the fire department of ses are located stating that said premises have been equipped with detectors in conformity with applicable law. |
| 30. ADDITIONAL PROVISIONS | ~Subject to Clear Title; ~Subject to Buyer obtaining all perm ~Subject to Buyer being able to opera ~Subject to Buyer closing on all three attached map. See Rider A attached hereto and inco | ate a 6 Megawatt Solar Farm; and e parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lane) See |
| <u></u> | AL PROPERTY CONSTRUCTED PRI AD PAINT "PROPERTY TRANSFER I | OR TO 1978, BUYER MUST ALSO HAVE SIGNED NOTIFICATION CERTIFICATION" |
| NOTICE: Th | is is a legal document that creates binding | obligations. If not understood consult an attorney. |
| SELLER: Print Name: Donna A. Brun | nelli | BUYER: By: Print Name: Anthony Marinella, Manager |
| SELLER Print Name: Richard J. Dep | oto | BUYER: Print Name: |
| ESTATE OF ANTHONY SELLER By: Print Name: Jean M. Prunca | ult, Personal Representative | |
| ESTATE OF EDWARD. SELLER: By: Print Name; Lawrence Bened | Etto, Co-Executor/Personal Representative | |

SELLER: By:
Print Name: Gerald Tulis, Co-Executor/Personal Representative

Appendix A - Property Description (Denote B)

| Appendix A | - Property Description (Depoto/Brunelli) |
|--|--|
| 26 MORTGAGE CONTINGENCY CLAUSE foult (feat product for in Official Posterie) | in order in help finance the acquisition of the set the BUYER shall apply for a conventional bank or other institutions mortgage from it proved the BUYER. It proved the BUYER diligent efforts from the continuous of the set the BUYER diligent efforts from the continuous of the set the set of the s |
| 27. CONSTRUCTION OF AGREEMENT | W The state of the |
| 28 LEAD PAINT LAW | The parties acknowledge that, under Massachusetts law, whenever a child or children under six years of age resides in any residential premises in which any paint, plaster or other accessible material contains dangerous levels of lead, the owner of said premises must remove or cover said paint, plaster or other material so as to make it inaccessible to children under six years of age. |
| 29 SMOKE & CARBO MONOXIDE DETECTORS | The SELLER shall, at the time of the delivery of the deed, deliver a certificate from the fire department of the city or town in which said premises are located stating that said premises have been equipped with approved smoke and carbon monoxide detectors in conformity with applicable law. |
| 30. ADDITIONAL PROVISIONS | The initialed riders, if any, attached hereto, are incorporated herein by reference. -Subject to Clear Title; -Subject to Buyer obtaining all permits/approvals; -Subject to Buyer being able to operate a 6 Megawatt Solar Farm; and -Subject to Buyer closing on all three parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lane) See attached map. See Rider A attached hereto and incorporated herein. See Rider B, Collateral Assignment, attached hereto and incorporated herein. |
| | ITIAL PROPERTY CONSTRUCTED PRIOR TO 1978, BUYER MUST ALSO HAVE SIGNED LEAD PAINT "PROPERTY TRANSFER NOTIFICATION CERTIFICATION" This is a legal document that creates binding obligations. If not understood, consult an attorney. |
| | |
| SELLER: Print Name: Donna A. B | LEWIS STREET REALTY LLC BUYER: By: runnelli Print Name: Anthony Marinella, Mahager |
| SELLER | BUYER |
| Print Name: Richard J. J | Print Name: |
| ESTATE OF ANTHO | NY R. DEPOTO |

SELLER: By:_

Print Name; Jean M. Bruneault, Personal Regresentative

SELLER; By:

Print Name: Lawrence Benedetto, Co-Executor/Personal Representative
SELLER: By:

Print Name: Gerald Tulis, Co-Executor/Personal Representative

ESTATE OF EDWARD J. DEPOTO

Appendix A - Property Description (Depoto/Brunelli)

| | | . (, , | |
|------------------------|--|---|--|
| () (or pro In | MORTGAGE CONTINGENCY CLAUSE milt if not ovilded for Offer to rchase) | despite the BUYER'S different eff (30) days prior to closing the B and/or the Broker(s), as agent(s) payments made under this agreen hereto shall cease and this agreen the BUYER be deemed to have us | at prevailing rates, terms and conditions. If, orts, a commitment for such loan cannot be obtained on or before thirty LYER may terminate this agreement by written notice to the SELLER for the SELLER, prior to the expiration of such time, whereupon any neut shall be forthwith refunded and all other obligations of the parties ent shall be yold without recourse to the parties hereto. In no event will ad diligent efforts to obtain such commitment unless the BLYER submits plication—conforming to the foregoing—provisions—on or before |
| | Onstruction f agreement | the benefit of the parties hereto and assigns, and may be cancelled, muselled, muselled, and the BUYER. If two cantal be joint and several. The cantal be joint and several. | ole counterparts, is to be construed as a Massachusetts contract, is to take orth the entire contract between the parties, is binding upon and inures to their respective heirs, devisees, executors, administrators, successors and odified or amended only by a written instrument executed by both their more persons are named herein as BUYER their obligations hereunder ions and marginal notes are used only as a matter of convenience and are greement or to be used in determining the intent of the parties to it. |
| | AD PAINT W | restues in any residential premises it | r Massachusetts law, whenever a child or children under six years of age n which any paint, plaster or other accessible material contains dangerous mises must remove or cover said paint, plaster or other material so as to er six years of age. |
| MC | IOKE & CARBON DNOXIDE TECTORS | the city of town in which said pre- | ne delivery of the deed, deliver a certificate from the fire department of mises are located stating that said premises have been equipped with ide detectors in conformity with applicable law. |
| | SMOISIVO | -Subject to Clear Title; -Subject to Buyer obtaining all pe -Subject to Buyer being able to op -Subject to Buyer closing on all th attached map, See Rider A attached hereto and in | erate a 6 Megawatt Solar Farm; and ree parcels (0 Spring Street, 0 Spring St., 0 Peppermill Lane) See |
| | FOR RESIDENTIAL | PROPERTY CONSTRUCTED P | RIOR TO 1978, BUYER MUST ALSO HAVE SIGNED R NOTIFICATION CERTIFICATION" |
| | NOTICE: This is | s a legal document that creates bindir | g obligations. If not understood, consult an attorney, |
| Print N | ER: Donn Brunse ER: Bichard J. Depote | 1 Depot | LEWIS STREET REALTY LLC BUYER: By:_ Print Name: Anthony Marinells, Manager BUYER: Print Name: |
| SELL | TE OF ANTHONY RER: Dy: | Personal Representative | |

ESTATE OF EDWARD J. DEPOTO

SELLER: By:_ Print Name: Lawrence Benedetto, Co-Executor/Personal Representative

SELLER: By:
Print Name: Gerald Tulis, Co-Executor/Personal Representative

APPENDIX B

AGREEMENT REGARDING CONSENT TO COLLATERAL ASSIGNMENT OF REAL ESTATE PURCHASE AND SALE AGREEMENT

This Agreement Regarding Consent to Collateral Assignment of Real Estate Purchase and

| Sale Agreement ("Agreement") entered int thisday of, 2018, by and between ("Seller"), Lewis Street Realty, LLC ("Lewis Street") and Spring Street Renewables, LLC ("Spring Street") (each a "Party" and collectively, the "Parties"). |
|--|
| WHEREAS, Seller and Lewis Street entered into that certain Real Estate Purchase and Sale Agreement dated, 201_, attached hereto as Exhibit A (the "P/S Agreement") for the purchase and sale of certain real property owned by Seller, as more fully identified in Exhibit A (the "Property"); and |
| WHEREAS, Lewis Street and Spring Street entered into that certain Amended and Restated Lease Option Agreement dated, 2018 (the "Lease Option"); and |
| WHEREAS, Spring Street wishes to be assured that the Property remains available for development in the event that Lewis Street is unable to obtain ownership of the Property pursuant to the P/S Agreement; and |
| WHEREAS, Spring Street wishes to perform such due diligence and obtain such permits and governmental approvals as are necessary to develop, construct, operate and maintain a solar powered electric generation facility on the Property; |
| NOW THEREFOR, as an inducement to Spring Street to exercise the Lease Option granted by Lewis Street to Spring Street with respect to the Property, and in consideration of One Dollar (\$1.00) paid by Spring Street, the receipt of which is hereby acknowledged, the Parties hereby agree as follows: |
| 1. Seller agrees and consents to the collateral assignment to Spring Street Renewables, LLC ("Spring Street") of the P/S Agreement, and to Spring Street's use of the property which is the subject of the P/S Agreement for permitting and zoning activities as more fully described herein. If an Event of default under any of the Lease Documents occurs, Seller agrees to continue to perform under the P/S Agreement according to its terms if requested by Spring Street or its designee. |
| 2. Spring Street or its designee may enforce the P/S Agreement with the same effect as if enforced by Lewis Street. Spring Street or its designee may perform the obligations of Lewis Street under the P/S Agreement and Seller agrees to accept such performance in satisfaction of Lewis Street's obligations under the P/S Agreement. |
| 3. Seller agrees not to terminate the P/S Agreement on account of any Lewis Street default |

without giving prior written notice to Spring Street and thirty (30) days to cure the default or to declare Lewis Street in default under the Lease Documents and to perform under the P/S Agreement. If Spring Street elects to close on the Property under the P/S Agreement, Seller agrees

not to terminate the P/S Agreement so long as Lewis Street's defaults under the P/S Agreement are cured by Spring Street or its designee within a reasonable time. Seller agrees that Spring Street has no obligation to cure any Lewis Street default under the P/S Agreement.

- 4. Seller agrees that Spring Street does not assume any of Lewis Street's obligations under the P/S Agreement unless and until Spring Street gives to Seller written notice that it has affirmatively exercised its rights to acquire the Property under the P/S Agreement upon or after a Lewis Street Event of default under any of the Lease Documents or under the P/S Agreement. After having been provided any such notice, Seller shall tender its performance of the P/S Agreement to Spring Street or Spring Street's designee.
- 5. Seller represents and warrants to Spring Street that (i) the P/S Agreement is a valid and enforceable agreement binding upon the Seller, (ii) neither Seller nor Lewis Street is in default under the P/S Agreement, and (iii) all P/S Agreement conditions and agreements have been performed as required except those not due to be performed until after the date of this Consent.
- 6. Seller acknowledges that Spring Street intends to develop, construct and operate a solar photovoltaic facility (the "Facility") on all or a portion of the Property. Spring Street shall perform due diligence to evaluate utility interconnection and viability of developing the Facility on the Property. Prior to Lewis Street or Spring Street obtaining ownership of the Property pursuant to the P/S Agreement, Seller shall permit Spring Street or Spring Street's employees, agents and contractors free ingress and egress to the Property to conduct tests and investigations, commence the interconnection process, and perform such similar activities as Spring Street may deem reasonably necessary (collectively, the "Inspections"), at Spring Street's sole cost and expense. The scope, sequence, and timing of the Inspections shall be at Spring Street's reasonable discretion, provided that Spring Street shall make reasonable efforts to coordinate and schedule such Inspections so as not to unreasonably interfere with Seller's or Seller's tenant's use and enjoyment of the Property. Spring Street and its employees, agents and contractors shall have the right to bring the necessary vehicles and equipment onto the Property to conduct the Inspections. Seller shall cooperate with Spring Street during the Inspections and Permitting Activities including providing information about the Property characteristics, taxes, history and encumbrances.
- 7. Spring Street is authorized, in the name of Seller, Spring Street or both, as Spring Street may deem to be necessary or appropriate, to file with such federal, state and local authorities as Spring Street deems appropriate (i) one or more applications to obtain any zoning relief regarding the Property or portions thereof as may be necessary and/or desirable to develop, construct and operate the Facility on the Property; (ii) one or more applications to obtain construction, use or occupancy permits for the Facility or any portion thereof, and (iii) the notice require by Massachusetts General Laws, Chapter 61 to remove the Property from Chapter 61 classification (collectively, the "Permitting Activities"). Seller shall cooperate in good faith with Spring Street and shall execute any such applications, including without limitation applications for a Massachusetts Department of Environmental Protection Order of Conditions and a Franklin Planning Board Special Permit, within fifteen (15) days of Spring Street's request, and shall not oppose or interfere with Spring Street in such regard. Seller is not obligated to incur expense in connection with such efforts.

- 8. Spring Street shall indemnify, defend and hold Seller harmless against any loss or damage for personal injury or physical damage to the Property resulting from the Inspections or the Permitting Activities, except that Spring Street shall not be obligated to indemnify Seller for any loss to the extent such loss is due to the negligence or willful misconduct of Seller; or for a statutory violation by, or punitive damages against, Seller.
- 9. From time to time and at any time at and after the execution of this Agreement, each Party shall execute, acknowledge and deliver such documents, and assurances, reasonably requested by another and shall take any other action consistent with the terms of this Agreement that may be reasonably requested by the other for the purpose of effecting or confirming (but not altering or expanding) any of the transactions contemplated hereby. No Party shall unreasonably withhold, condition or delay its compliance with any reasonable request made pursuant to this Agreement.
- 10. This Agreement may be executed in several counterparts, each of which shall constitute an original and all of which shall constitute the same agreement. Signed email transmissions of this Agreement shall be considered an original of the Agreement and shall have the same effect and force as signed hard-copy originals of the Agreement.

IN WITNESS WHEREOF, the undersigned have entered into this Agreement as of the date first written above.

| SPRING STREET | LEWIS STREET |
|--|--|
| Spring Street Renewables, LLC | Lewis Street Realty LLC |
| By: Nexamp Capital, LLC, its sole member | Ву: |
| rrs sore memoer | Name: Anthony Marinella Title: Manager |
| By: Nexamp, Inc., | Title. Williager |
| its sole member | |
| | SELLER |
| By: | |
| Name: Zaid Ashai/Robert E. Pantano litle: Chief Executive Officer/ Chief Operating Officer | |
| | |
| | |

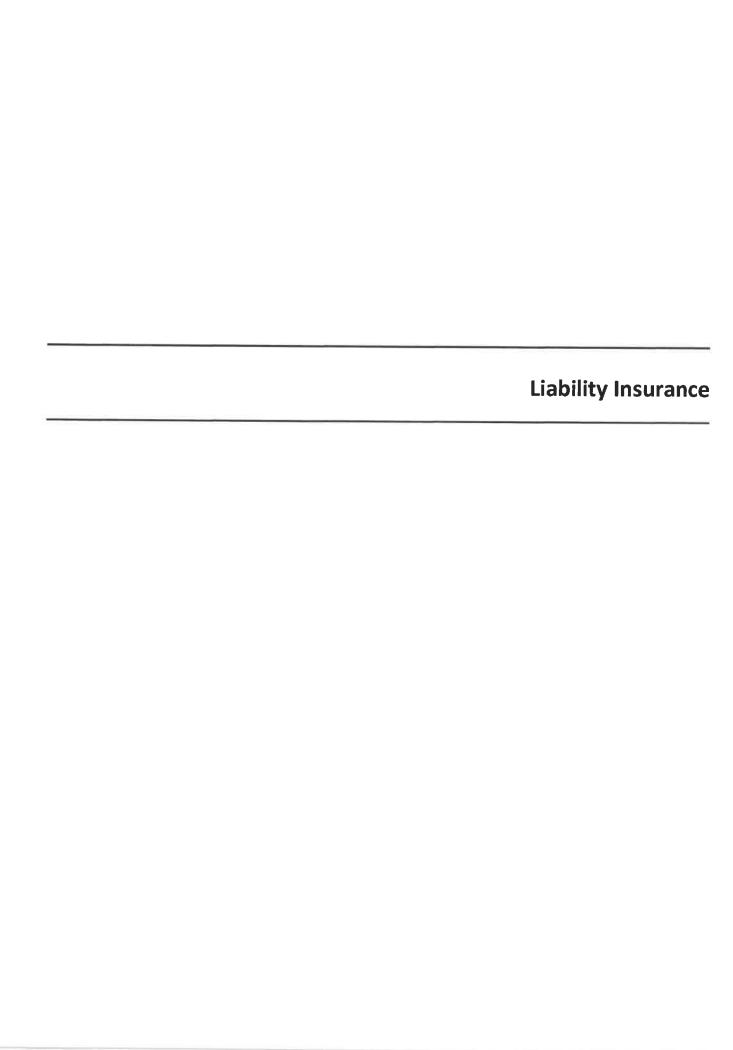
[Acknowledgements to follow]

Acknowledgements to Agreement Regarding Consent to Collateral Assignment of Real Estate Purchase and Sale Agreement

| COMMO | OF | MASSACHUSETTS | 1 |
|--------------------|--------------------------------------|--|---|
| on the prec | day of | , 2018, before m, proved to me through | me, the undersigned notary public, personally appeared gh satisfactory evidence of identification, which was, to be the person whose name is signed ledged to me that he signed it voluntarily as his free ac |
| company. | ns stated purp | ose as authorized represen | ntative of Lewis Street Realty, LLC, a limited liability |
| My commis | ssion expires: | Notary Publ | plic |
| COMMON COUNTY (| | 1ASSACHUSETTS |) |
| on the prece | ding or attached its stated purpo | document, and acknowless | ne, the undersigned notary public, personally appeared h satisfactory evidence of identification, which was, to be the person whose name is signed edged to me that he signed it voluntarily as his free act notative of Spring Street Renewables, LLC, a limited |
| My commiss | ion expires: | Notary Public | ic |
| OMMONV OUNTY O | | ASSACHUSETTS |)) |
| ere tached docu | | proved to me to | before me, the undersigned notary public, personally through satisfactory evidence of identification, which he person whose name is signed on the preceding or the signed it voluntarily for its stated purpose and as |
| | | Notary Public | с |
| | | My Commissi | sion Expires: |

Exhibit A

[see Attached]





CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 12/29/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| 3 | | |
|---|--|----------------------------------|
| PRODUCER | CONTACT NAME: | |
| Willis of Massachusetts, Inc. c/o 26 Century Blvd | | FAX (A/C, No): 1-888-467-2378 |
| P.O. Box 305191 | E-MAIL ADDRESS: certificates@willis.com | |
| Nashville, TN 372305191 USA | INSURER(S) AFFORDING COVERAGE | NAIC# |
| | INSURER A: Axis Specialty Europe SE | C1783 |
| INSURED Nexamp, Inc. | INSURER B: Ohio Security Insurance Compa | ay 24082 |
| 4 LIBERTY SQUARE | INSURERC: Granite State Insurance Company | ny 23809 |
| BOSTON, MA 02109 USA | INSURER D: Zurich American Insurance Comp | pany 16535 |
| | INSURER E : | |
| | INSURER F: | |
| | | |

COVERAGES

CERTIFICATE NUMBER: W5015860

REVISION NUMBER:

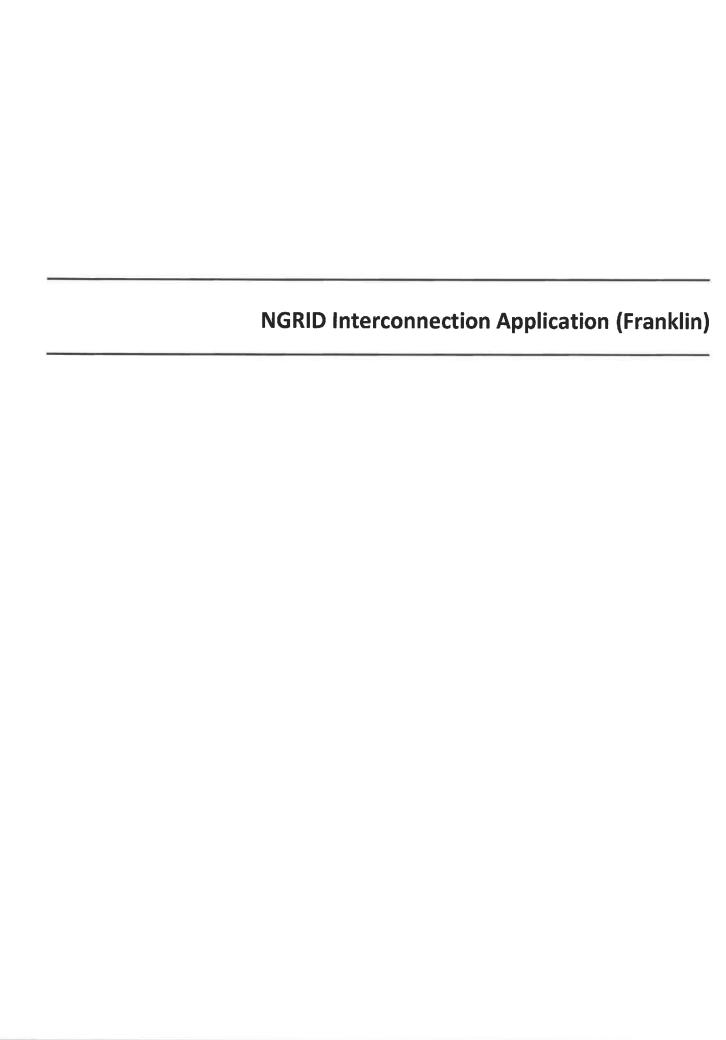
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| NSR LTR | TYPE OF INSURANCE | ADDL SUBR | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMIT | rs |
|------------|---|----------------|--------------------|----------------------------|-----------------------------|---|--------------------------|
| | X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR | | | | | EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) | \$ 1,000,00 \$ 100,00 |
| A | | | 3791010216EN | 791010216EN 12/31/2017 | 12/31/2018 | MED EXP (Any one person) | \$ |
| | | | | | | PERSONAL & ADV INJURY | \$ 2,000,00 |
| | GEN'L AGGREGATE LIMIT APPLIES PER: | | | | | GENERAL AGGREGATE | \$ 2,000,00 |
| | X POLICY X PRO- JECT LOC | | | | | PRODUCTS - COMP/OP AGG | \$ 2,000,00 |
| | OTHER: | | | | | | \$ |
| | AUTOMOBILELIABILITY | | | | | COMBINED SINGLE LIMIT (Ea accident) | \$ 1,000,00 |
| | ANY AUTO | | | | BODILY INJURY (Per person) | \$ | |
| В | OWNED AUTOS ONLY X SCHEDULED AUTOS | | BAS (18) 58489128 | 12/31/2017 | 12/31/2018 | BODILY INJURY (Per accident) | \$ |
| | X HIRED X NON-OWNED AUTOS ONLY | | | | | PROPERTY DAMAGE (Per accident) | \$ |
| | | | | | | | \$ |
| A | X UMBRELLA LIAB X OCCUR | | 3791010316EN | | 12/31/2018 | EACH OCCURRENCE | \$ 5,000,00 |
| | EXCESS LIAB CLAIMS-MADE | | | 12/31/2017 | | AGGREGATE | \$ 5,000,00 |
| | DED X RETENTION \$ 0 | | | | | | \$ |
| С | ORKERS COMPENSATION | | | X PER OTH- STATUTE ER | | | |
| | ANYPROPRIETOR/PARTNER/EXECUTIVE | N/A | /A WC001-60-5334 0 | 00/00/000 | 08/10/2018 | E.L. EACH ACCIDENT | \$ 1,000,00 |
| | OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below | WC001-60-5334 | | 08/10/2017 | | E.L. DISEASE - EA EMPLOYEE | \$ 1,000,00 |
| | | | | | E.L. DISEASE - POLICY LIMIT | \$ 1,000,00 | |
| D | Professional Liability | EOC 0398821-00 | 12/31/2016 | 01/07/2018 | Each Claim | \$2,000,000.00 | |
| | | | | | | Aggregate | \$2,000,000.00 |
| | | | | | | | |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

| CERTIFICATE HOLDER | CANCELLATION | |
|----------------------|--|--|
| | SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. | |
| | AUTHORIZED REPRESENTATIVE | |
| For Information Only | gula m Powers | |
| | | |

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| Contact Information (TYPE or PRINT): | Date Prepared: | | |
|--|--|--|--|
| Legal Name and Address of Interconnecting Customer | • | | |
| Interconnecting Customer: Nexamp Capital, LLC | Contact Person: Alan Clapp | | |
| Mailing Address: 4 Liberty Square, 3rd floor | | | |
| | Zip Code: <u>02109</u> | | |
| | (Evening): | | |
| | E-Mail Address: aclapp@nexamp.com | | |
| | ectric utility): 100% customer | | |
| Site Control: Does the Interconnecting Customer have so Confidentiality Statement: "I agree to allow information be reviewed by the Massachusetts DG Working Group of Group Study Agreement: "I understand and agree if my procontact information and project details with other parties." | | | |
| | Contact Person: | | |
| | Telephone: | | |
| <u>Landowner Name</u> (if neither Interconnecting Customer Landowner email: | nor Customer):Landowner telephone: | | |
| City:State: | Zip Code: | | |
| Alternative Contact Information (e.g., system installation | n contractor or coordinating company, if appropriate): | | |
| Company Name: Nexamp | Contact Person: | | |
| Mailing Address: 4 Liberty Square, 3rd floor | | | |
| | Zip Code: <u>02109</u> | | |
| | (Evening): | | |
| Facsimile Number: | E-Mail Address: interconnections@nexamp.com | | |
| Electrical Contractor Contact Information (if appropriate | e): | | |
| Name: | E-mail Address: | | |
| Mailing Address: | Telephone: | | |
| City: State: | Zip Code: | | |
| Interconnection Seminars: "I have attended one of the ut | ility-hosted Interconnection Seminars." (Recommended) Yes No U 1248 Standards for Interconnection of DG." (Recommended) Yes No | | |
| City: Franklin State: MA | Zip Code: <u>02038</u> | | |
| Single Parcel: Will the Facility be constructed on a single | | | |
| Authorized/Proposed generation capacity already exists (On Current Account On Same Legal Parcel of If any apply, include existing generation capacity on | check all that apply): | | |
| | umber: Meter Number: | | |
| | MTC ID: | | |
| | (kVA) Maximum (kW_{AC}) 5000 (kVA) | | |

 $\label{lem:massachusetts:http://www.nationalgridus.com/masselectric/home/energyeff/distributed generation.asp Nantucket: \\ \\ \underline{\text{http://www.nationalgridus.com/nantucket/home/energyeff/distributed generation.asp}}$

| Prime Mover: Photovoltaic Reciprocating | Engine Fuel | Cell Turbine Other: | | |
|---|---|--|---|--|
| Energy Source: Solar Wind Hydro | Diesel 🗌 Natu | ral Gas 🗌 Fuel Oil 🔲 Other: | | |
| IEEE 1547.1 (UL 1741) Listed? | | | | |
| 1) Generating Unit Type 1 | | | | |
| Manufacturer: SMA | Model Name | and Number: Sunny Central 2500EV-U | JS Quantity: 2 | |
| AC Rating: | | | | |
| Nominal: (kW) (kVA) (AC V Maximum: (kW) (kVA) (AC V | olts) Volts) | Single or Three Phase | | |
| 2) Generating Unit Type 2 (if applicable) | v ons) | | | |
| Manufacturer: | Model Name | and Number: | Quantity | |
| AC Rating: | | | Quantity | |
| Nominal: (kW) (kVA) (AC Volume (kVA) _ | olts) | | | |
| | Volts) | ☐ Single or ☐ Three Phase | | |
| 3) Generating Unit Type 3 (if applicable) | | | | |
| Manufacturer: | Model Name a | and Number: | Quantity: | |
| AC Rating: | • | | | |
| Nominal: (kW) (kVA) (AC Vo | olts) Volts) | Single or Three Phase | | |
| Does this project need an air quality permit from th | | | | |
| If "Yes", have you applied for it? | CDEI: LICS | Yes No | | |
| | Ves D No | Is this a Cogeneration Facility? | □ v □ v- | |
| Anticipated Export Power Purchaser: | | | ☐ Yes ⊠ No | |
| Export Form? Qualifying Facility (QF) Ne | | | | |
| Estimated Install Date: | | | | |
| Agreement Need By: | | nated. In-Service Date: | | |
| If net metering, please refer to Schedule Z of the Standar | | ion of Distributed Community Dis | and the | |
| all off-takers must be a Municipality or other Governmen | us for interconnecti Ital Entity (as defin | ed in 220 C.M.R. 18.02) and therefore be c | that ij under the public cap, ertified by the DPU. | |
| Asset as S | | | | |
| Application Process | | | | |
| Interconnecting Customer Signature: | | | | |
| "I am opting to forego the Expedited Process. Pleas | | | ☐ Yes ☐ No | |
| I hereby certify that, to the best of my knowledge, a | ll of the informat | ion provided in this application is true: | | |
| Simulation | mat at | | | |
| Signature: | | | | |
| Please attach any documentation provided by the in | | | | |
| | | | | |
| All Application Materials Received (For Company | | | | |
| The information provided in this application is com and the application may proceed to the initial/screen | plete, all attachme | ents and supplemental application mate | erials have been received, | |
| and application may proceed to the initial/select | ing icview stage | or the interconnection process: | | |
| Signature: | Title: | | Date: | |
| | | | | |
| Application ID number: | | | | |

 $\label{lem:massachusetts:http://www.nationalgridus.com/masselectric/home/energyeff/distributed generation.asp} \\ \textbf{Nantucket: http://www.nationalgridus.com/nantucket/home/energyeff/distributed generation.asp} \\ \textbf{Nantucket/home/energyeff/distributed generat$

Generating Facility Technical Detail Information on components of the generating facility that are currently Listed Equipment Type Manufacturer Model National Standard 1. 2. 3. 4. 5. 6. Total Number of Generating Units in Facility? Generator Unit Power Factor Rating: Max Adjustable Leading Power Factor? _____ Max Adjustable Lagging Power Factor? Generator Characteristic Data (for all inverter-based machines) Harmonics Characteristics: Start-up power requirements: Generator Characteristic Data (for all rotating machines) Rotating Frequency: (rpm) Neutral Grounding Resistor (If Applicable): Additional Information for Synchronous Generating Units Synchronous Reactance, Xd: (PU) Transient Reactance, X'd: (PU) Subtransient Reactance, X"d: _____(PU) Neg Sequence Reactance, X2: _(PU) Zero Sequence Reactance, Xo: ____(PU) kVA Base: (PU) Field Voltage: (Volts) Field Current: (Amps) Additional information for Induction Generating Units Rotor Resistance, Rr: Stator Resistance, Rs: Rotor Reactance, Xr: Stator Reactance, Xs: Magnetizing Reactance, Xm: __ Short Circuit Reactance, Xd": **Exciting Current:** _____ Temperature Rise: Frame Size:

Per Unit on kVA Base:

(kW) Design Letter:

Massachusetts: http://www.nationalgridus.com/masselectric/home/energyeff/distributed generation.asp

Nantucket: http://www.nationalgridus.com/nantucket/home/energyeff/distributed generation.asp

Additional information for Induction Generating Units that are started by motoring

Total Rotating Inertia, H:

Motoring Power:

Reactive Power Required In Vars (No Load): Reactive Power Required In Vars (Full Load):

| Interconnection Equipm | ent Technical Detail | Date: | | |
|-----------------------------|---|--------------------------------|----------------------------|----------|
| | | and the point of interconnect | ion? | Yes No |
| Will the transformer be pr | | ~ | | Yes No |
| Transformer Data (if appli | icable, for Interconnect | ing Customer-Owned Transfo | rmer): | |
| Nameplate Rating: | (kVA | .) | Single or Three Phas | se |
| Transformer Impedance: | (%) o | n a k | VA Base | |
| If Three Phase: | _ | _ | | |
| Transformer Primary: | (Volts) | Delta Wye Wye-G | rounded 🗌 Other: | |
| Transformer Secondar | y: (Volts) | ☐ Delta ☐ Wye ☐ Wye-G | rounded 🗌 Other: | |
| | | nnecting Customer-Owned Fu | | |
| | | lelt & Total Clearing Time-Cu | | |
| Manufacturer: | Type: _ | Size | Speed: | 3 |
| Interconnecting Circuit Br | | | | |
| Manufacturer: | Type: _ | Load | Rating:(Amps) | |
| Interrupting Rating: | Trip Sp | eed:(Cycl | es) | |
| Interconnection Protective | Relays (if applicable): | | | |
| If microprocessor-controlle | ed, List of Functions an | d Adjustable Setpoints for the | protective equipment or so | oftware: |
| | tpoint Function | Minin | | ximum |
| 1. | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| h | | | | |
| \$ | | | | |
| If discrete components (En | close copy of any prope | osed Time-Overcurrent Coord | ination Curves): | |
| | | Style/Catalog No.: | | σ. |
| | | Style/Catalog No.: | | |
| | | Style/Catalog No.: | | |
| Manufacturer: | Type: | Style/Catalog No.: | Dana and Setting | ś· |
| | | | | |
| | | Style/Catalog No.: | | |
| | | Style/Catalog No.: | Proposed Setting | 3: |
| Current Transformer Data (| · • • • • • • • • • • • • • • • • • • • | | | |
| (Enclose copy of Manufacti | | | | |
| Manufacturer: | Type: | Accuracy Class: | Proposed Ratio Conne | ction: |
| Manufacturer: | Type: | Accuracy Class: | Proposed Ratio Conne | ction: |
| Potential Transformer Data | (if applicable): | | | |
| Manufacturer: | Type: | Accuracy Class: | Proposed Ratio Conne | ction: |
| | | Accuracy Class: | | |
| | | | | |

General Technical Details

Submit all of the customer's Interconnection Application materials and proposed design diagrams using the following process:

| 1. | Email the following materials to National Grid at <u>Distributed.Generation@nationalgrid.com</u> : |
|------------|---|
| | a. P.Estamped One-Line Diagram (and Three-Line Diagram if applicable), including: |
| | i. Schematics for all (internal & redundant) protection and control circuits, relay current circuits, relay potential circuits, and alarm/monitoring circuits (if applicable) |
| | b. |
| | i. Generating Facility |
| | ii. AC Utility Disconnect Switch |
| | iii. All meters (utility- and customer-owned) |
| | iv. Related interconnection equipment |
| | c. Technical Specifications (pdf files only) |
| | d. Exhibit C (this form) – completed and signed (available on the website) |
| | e. Legal Information Document – completed (available on the website) |
| | f. Schedule Z (net metering only) - completed, initialed, and signed (available on the website) |
| | g. Copy of electric bill (if applicable) |
| | h. Copy of any Pre-Application Reports related to this application (if applicable) |
| | i. Copy of Interconnection Application fee check |
| | j. Any other information pertinent to this Interconnection Application (if applicable) |
| 2.] | Mail the Interconnection Application fee check and the I first two pages of the signed copy of this interconnection Application form to: |
| | National Grid |
| | Attn: Distributed Generation 40 Sylvan Rd |
| | Waltham, MA 02451 |
| | |
| Note: Th | e Schedule Z may be updated as needed at any point prior to the Authorization to Interconnect. |
| Refer to 3 | National Grid's Distributed Generation website for more detailed instructions: |
| Massach | usetts: |
| F | Residential: http://www.nationalgridus.com/masselectric/home/energyeff/distributed_generation.asp |
| | Commercial: http://www.nationalgridus.com/masselectric/business/energyeff/distributed_generation.asp |
| Nantucke | |
| R | desidential: http://www.nationalgridus.com/nantucket/home/energyeff/distributed_generation.asp |
| C | Commercial: http://www.nationalgridus.com/nantucket/business/energyeff/distributed_generation.asp |
| | |

Massachusetts Electric Company & Nantucket Electric Company (d/b/a National Grid) M.D.P.U. 1320

Exhibit E -Impact Study Agreement

This Agreement, dated 08/13/2018

is entered into by and between

Nexamp Interconnections

("Interconnecting Customer") and National Grid ("Company"), for the purpose of setting forth the terms, conditions and costs for conducting an Impact Study relative to the Standard Process as defined in Section 1.0 and outlined in Section 3.0

of the Interconnection Tariff. This Impact Study pertains Application Number

00185866 (the Interconnecting

Customer's application ID number). Terms used herein without definition shall have the meanings set forth in Section 1.2 of the Interconnection Tariff which is hereby incorporated by reference.

- The Interconnecting Customer agrees to provide, in a timely and complete manner, all 1) additional information and technical data necessary for the Company to conduct the Impact Study not already provided in the Interconnecting Customer's application.
- All work pertaining to the Impact Study that is the subject of this Agreement will be approved 2) and coordinated only through designated and authorized representatives of the Company and the Interconnecting Customer. Each party shall inform the other in writing of its designated and authorized representative, if different than what is in the application.
- Where there are other potentially Affected Systems, and no single Party is in a position to 3) prepare an Impact Study covering all potentially Affected Systems, the Company will coordinate but not be responsible for the timing of any additional studies required to determine the impact of the interconnection request on other potentially Affected Systems. The Interconnecting Customer will be directly responsible to the potentially Affected System operators for all costs of any additional studies required to evaluate the impact of the interconnection on the potentially Affected Systems. The Company will not proceed with this Impact Study without the Interconnecting Customer's consent to have the other studies conducted. To the extent any studies or System Modifications are required; all associated agreements will be between the Affected System operator and the Interconnecting Customer.
- If the Company determines, in accordance with Good Utility Practice, that the System 4) Modifications to the Company EPS are not substantial, the Impact Study will determine the scope and cost of the modifications. If the Company determines, in accordance with Good Utility Practice, that the System Modifications to the Company EPS are substantial, the Impact Study will produce an estimate for the modification costs (within $\pm 25\%$) and a Detailed Study Agreement and its estimated cost. Interconnecting Customers who elect to execute an Interconnection Service Agreement following the completion of the Impact Study but prior to the commencement of the Detailed Study, pursuant to Section 3.4(g) of the Interconnection Tariff, shall be responsible for any System Modifications costs, ±25%, as identified by the Company in the Impact Study.
- Impact Study, together with any additional studies contemplated in Paragraph 3, shall form the 5) basis for the Interconnecting Customer's proposed use of the Company EPS and shall be furthermore utilized in obtaining necessary third-party approvals of any required facilities and requested distribution services. The Interconnecting Customer understands and acknowledges that any use of study results by the Interconnecting Customer or its agents,

whether in preliminary or final form, prior to NEPOOL 18.4 approval, should such approval be required, is completely at the Interconnecting Customer's risk.

6) The Impact Study fee of 35000.00 (except as noted below) is due in full prior to the execution

of the Impact Study. If the anticipated cost exceeds \$25,000, the Interconnecting Customer is eligible for a payment plan, including a payment and construction schedule with milestones for both parties. At the request of the Interconnecting Customer, the Company will break the costs into phases in which the costs will be collected prior to Company expenditures for each phase of the study. The payment plan will be attached as an exhibit to the Impact Study Agreement.

- The Company will, in writing, advise the Interconnecting Customer in advance of any cost increase for work to be performed up to a total amount of increase of 10% only. All costs that exceed the 10% increase cap will be borne solely by the Company. Any such changes to the Company's costs for the work shall be subject to the Interconnecting Customer's consent. The Interconnecting Customer shall, within thirty (30) days of the Company's notice of increase, authorize such increase and make payment in the amount up to the 10% increase cap, or the Company will suspend the work and the corresponding agreement will terminate.
- 8) Final Accounting. An Interconnecting Customer may request a final accounting report of any difference between (a) Interconnecting Customer's cost responsibility under this Agreement for the actual cost of the Impact Study, and (b) Interconnecting Customer's previous aggregate payments to the Company for the Impact Study within 120 Business days after completion of the construction and installation of the System Modifications described in an attached exhibit to the Interconnection Service Agreement. Upon receipt of such a request from an Interconnecting Customer, the Company shall have 120 Business days to provide the requested final accounting report to the Interconnecting Customer. To the extent that Interconnecting Customer's cost responsibility in this Agreement exceeds Interconnecting Customer's previous aggregate payments, the Company shall invoice Interconnecting Customer and Interconnecting Customer shall make payment to the Company within fortyfive (45) Business Days. To the extent that Interconnecting Customer's previous aggregate payments exceed Interconnecting Customer's cost responsibility under this Agreement, the Company shall refund to Interconnecting Customer an amount equal to the difference within forty-five (45) Business Days of the provision of such final accounting report.
- 9) In the event this Agreement is terminated for any reason, the Company shall refund to the Interconnecting Customer the portion of the above fee or any subsequent payment to the Company by the Interconnecting Customer that the Company did not expend or commit in performing its obligations under this Agreement, Payments for work performed shall not be subject to refunding except in accordance with Paragraph 8 above.
- Nothing in this Agreement shall be interpreted to give the Interconnecting Customer immediate rights to wheel over or interconnect with the Company's EPS.
- Interconnecting Customer shall not voluntarily assign its rights or obligations, in whole or in part, under this Agreement without Company's written consent. Any assignment Interconnecting Customer purports to make without Company's written consent shall not be valid. Company shall not unreasonably withhold or delay its consent to Interconnecting Customer's assignment of this Agreement. Notwithstanding the above, Company's consent will not be required for any assignment made by Interconnecting Customer to an Affiliate or as collateral security in connection with a financing transaction. In all events, the Interconnecting Customer will not be relieved of its obligations under this Agreement unless,

Company of such assumption.

Except as the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth's cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Interconnecting Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death) or property damages to unaffiliated third parties that arise out of, or are in any manner connected with, the performance of this Agreement by that party, except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the party seeking indemnification.

Notwithstanding the foregoing, the Interconnecting Customer hereby waives recourse against the Company and its Affiliates for, and releases the Company and its Affiliates from, any and all liabilities arising from or attributable to incomplete, inaccurate, or otherwise faulty information supplied by the Interconnecting Customer.

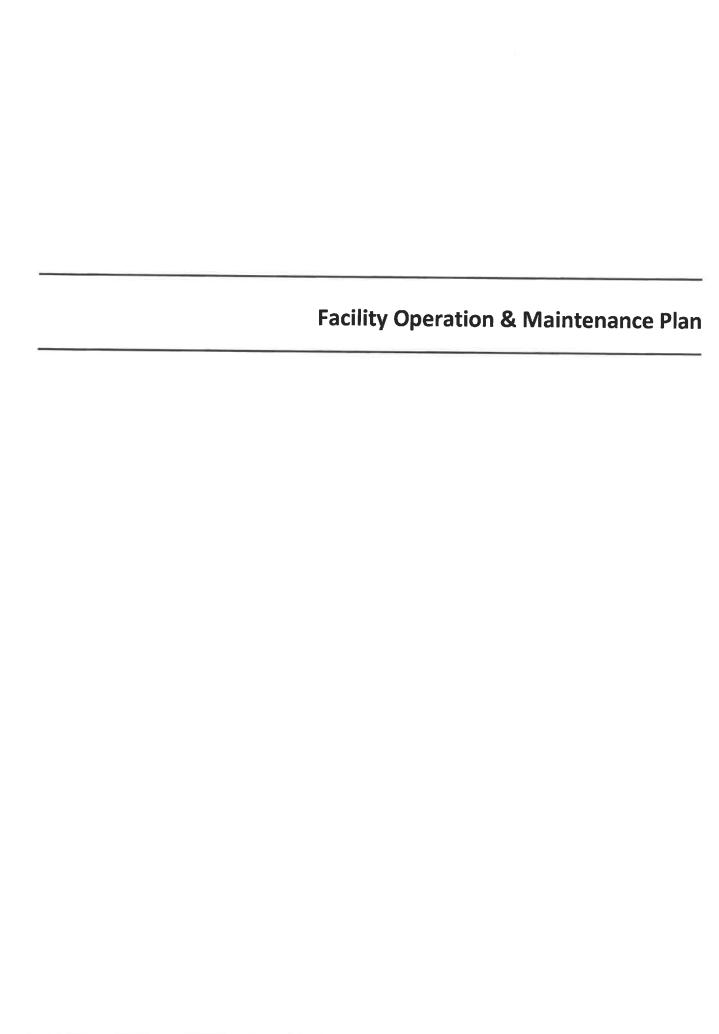
- If either party materially breaches any of its covenants hereunder, the other party may 13) terminate this Agreement by serving notice of same on the other party to this Agreement.
- This agreement shall be construed and governed in accordance with the laws of the 14) Commonwealth of Massachusetts.
- All amendments to this Agreement shall be in written form executed by both Parties. 15)
- The terms and conditions of this Agreement shall be binding on the successors and assigns of 16) either Party.
- This Agreement will remain in effect for a period of up to two years from its effective date. 17)
- This Agreement may be terminated under the following conditions. 18)
 - a) The Parties agree in writing to terminate the Agreement.
- b) The Interconnecting Customer may terminate this agreement at any time by providing written notice to company
- c) The Company may terminate this Agreement if the Interconnecting Customer either: (1) has the fee or, (2) has not responded to requests for further information in accordance not paid with provisions in the Interconnection Tariff, specifically Section 3.6.2.

| Signature: Clapp Signature: Name: ALAN CLAPP Name: | rid |
|---|-----|
| Name: A. | |
| Name: | |
| Title: VP Bus . DEV . Title: | |
| Date: 9/22/18 Date: | |
| (For Application Number 00185866) | |

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Spring Street Renewables, LLC **O&M Services Plan**

October 26, 2018

Spring Street Renewables, LLC, a wholly-owned subsidiary of Nexamp, Inc., as the developer and construction manager of an approximately 6 MW (DC) solar PV array on property that will be owned by Lewis Street Realty, on Spring St. in Franklin MA, is pleased to provide this Operation and Maintenance (O&M) services plan.

Nexamp Asset Management Services, LLC (NAMS) is a full-service photovoltaic Operations and Maintenance company, servicing more than 110 MW as of October 2018. Spring Street Renewables, LLC intends to contract with NAMS in order to provide O&M services for the project for the first ten years of the system operation. At that time, Spring Street Renewables, LLC will revisit that contract and intends to renew the term at ten year intervals for the remaining life of the project.

Attached to this Services Plan is a typical scope of work for an O&M provider for a largescale solar PV array. NAMS has used this scope of work as the basis for its services for infrastructure that it currently maintains. In the following template, "Contractor" represents NAMS and "Owner" represents the project owner, Spring Street Renewables, LLC.

The primary services under the scope of an O&M agreement include:

- Biannual array maintenance inspections, remote monitoring, unscheduled maintenance (fault detection), and scheduled equipment replacement.
- On-site services typically require a single pick-up truck and 2-4 licensed technicians.
- Technicians perform work with hand tools and battery-operated power tools and rarely require generators or any motorized or heavy equipment.
- The array is designed to facilitate major equipment replacement using truck mounted boom lift every 5-10 years.
- Spring Street Renewables, LLC will develop the site with using a pile driven or screw mounting system for the array.

Maintenance Activities include:

- Mowing operations are typically conducted 2 to 4 times per season, depending on the weather conditions and resultant growth. Normally, 2 to 4 personnel using ride-on and self-propelled mowers and weed whackers will perform the mowing operations.
 - The entire Site is inspected for any erosion problems upon each site visit and maintenance activity, a minimum of two times per year. Any erosion to roads, embankments, drainage structures/basins, ground cover, etc. is repaired using



similar methods to the initial install (and as approved by the regulatory agencies), with like equipment and materials. Potentially, additional erosion control blankets, jute netting, etc. will be added to protect the maintenance improvement.

- Depending on the array location and surrounding vegetation, an arborist with boom truck will thin shading tree growth.
- In the event that weed control is required, NAMS uses only non-persistent solutions previously approved for use by DEP and many municipalities for use in regulated and protected areas. The frequency of this activity is typically annually or biannually, if at all. Work is typically performed by licensed applicators using trailer born and backpack spraying apparatus.
- Spring Street Renewables, LLC does not anticipate conducting module washing at this site. In the event that modules are washed, cleaning solution consists of 95% water and 5% non-toxic, non-persistent soap solution. Work is typically performed by 2-4 technicians using backpacks and scrubbing wands.
- Some snow removal may be required to allow site access during winter months, however no snow removal operations will be performed within the array areas.
- Inspection of the storm water management facilities will occur at each site inspection, no less than biannually, and maintenance provided to restore the facilities to their original condition and as approved by the regulatory agencies.

Scope of Work - O&M Services Contract

Nexamp Asset Management Services (the "Contractor") will provide O&M services for the proposed 6 MW (DC) solar photovoltaic system located on property that will be owned by Lewis Street Realty at Spring Street in Franklin, MA (the "Facility"). The services to be provided will include the operation, repair, monitoring and maintenance services listed below.

FACILITY OPERATIONS

The Facility will be operated in conformity to the operating specifications and requirements set forth in the O&M Manual, in compliance with prudent industry practices, in accordance with the terms and conditions of the interconnection agreement between the Owner and the local distribution utility, and in accordance with applicable law. As required to achieve these operational requirements, the O&M Contractor shall be present at the Facility site.

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PERFORMANCE MONITORING AND OPERATIONS REPORTING

During the Service Term, Contractor shall:

- At all times perform basic monitoring of the Facility to make sure Facility is fully functional and record and report all meter data consistent with all Solar Program requirements.
- Provide Owner with web access to basic monitoring data.
- Provide Owner with quarterly reporting of performance against predicted power and historical performance beginning three calendar months after the Commercial Operations Date (as defined as "Substantial Completion" in the EPC Agreement) is achieved, including, summaries of energy measured and reported by the Facility's revenue grade meters, a summary of planned maintenance, and a summary of all forced outages and emergency response measures and the steps that were taken to resolve such forced outages and emergency situations.
- Provide copies of all such information no later than thirty (30) calendar days of making or receiving information pertaining to maintenance and/or repair pertaining to the system and/or any portion thereof or the Interconnection.
- Maintain warranty records with all inverter, module, and mounting suppliers.
- Maintain service agreements with DAS suppliers.

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SCHEDULED INSPECTION AND MAINTENANCE

- Contractor will perform required maintenance of the Facility in accordance with the written manufacturer requirements for operation and maintenance of the equipment that is part of the Facility (such written instructions are included in the O&M Manual).
- Contractor will provide continuous 24/7 active monitoring of Facility performance and provide a single point of contact for Facility maintenance and repair related issues.
- Contractor will implement the preventive maintenance schedule, if any, for each item of equipment that is part of the Facility, as set forth in the relevant portions of the O&M Manual.
- Contractor will maintain maintenance logs, records and reports documenting the provision of O&M Services hereunder in sufficient detail to allow Owner to verify that the Facility is performing in accordance with the Project Warranty and the performance requirements for the Facility. Contractor shall maintain current revisions of the drawings, specifications, lists, clarifications and other materials relating to the Facility.



- Contractor will complete and submit to Owner in a timely manner maintenance log sheets to document Contractor's provision of Services as required hereby in sufficient detail to allow Owner to verify that the Facility is performing in accordance with the Project Warranty and the performance requirements for the Facility.
- Contractor will regularly maintain the Facility, in accordance with the O&M Manual, and provide semi-annual on-site inspections by completing the following:
- Visual inspection of all feeder terminations for corrosion.
- Visual check of all power terminations/connections associated with the system e.g.
 DC combiner boxes, DC and AC disconnects, surge arrestors, inverters and PV modules and re-torque as necessary.
- o Test of ground continuity and correct any unsafe or abnormal issues.
- Check of all fuses in inverters, combiner boxes, and disconnects (AC&DC).
- o Testing and recording of voltage and amperage of the arrays at the string level.
- Inspection of the combiner boxes, disconnects (AC&DC), and inverters with an infrared camera, with the purpose of detecting hotspots, bad connections, etc.
- O Checking of the mechanical and structural integrity of the system.
- Cleaning or replacement of inverter air filters where applicable if necessary.
- o Checking of inverter housing for dust/water ingress.
- o Checking and replacement of any unserviceable system labeling as necessary.
- Visual inspection of weather stations and calibration verification against monitored data.
- o Checking of modules for excessive dirt and debris. Cleaning is excluded.

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 Providing written documentation to include summary report of findings including actions taken and recommendations for additional maintenance or repairs, etc.

FAULT DETECTION AND DISPATCH

- Contractor shall respond to all alarms, alerts and service requests pertaining to the system within 24 hours of such alarm, alert and/or service request, as personnel safety and weather conditions permit.
- Contractor shall monitor and respond to forced outages and performance trends. Contractor and Owner shall notify the other as soon as practically possible, but in no event later than twenty-four (24) hours following their discovery, of "Forced Outage", which is defined as: (a) any material malfunction in the operation of the Facility and/or (b) any interruption in the delivery of energy to the Facility's revenue grade meters. Contractor shall apply safe industry best practices to fully resolve any Forced Outage as quickly as possible. To the extent the correction of the Forced Outage requires either O&M Services or Warranty Services, Contractor shall initiate the O&M Services or Warranty Services needed to return the Facility to service within 24 hours of such notice,



and where applicable, as manufacturer service capabilities permit. Contractor shall provide Owner with an estimate of the time necessary to return the Facility to fully operational service. Contractor agrees to notify the Owner as soon as practicable when the Facility returns to service, but in no event later than twenty-four (24) hours following the Facility's return to service.

• Contractor and Owner agree to notify the other upon the discovery of an Emergency condition pertaining to the Facility. If Contractor is notified of an Emergency condition by Owner or otherwise learns of an Emergency condition, Contractor agrees to promptly dispatch appropriate personnel to address such Emergency as quickly as possible in accordance with industry best practices, and as personnel safety permits. Contractor maintains the right to disconnect the Facility and/or to otherwise isolate the Facility from the electric distribution system servicing Owner's and Owner's property as a result of any Emergency condition pertaining to the Facility as determined at the Contractor's discretion; provided, however, that the Contractor shall be responsible for any adverse consequences caused by such exercise of discretion if the exercise is negligent or represents a breach hereof.

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SPRING STREET RENEWABLES, LLC EMERGENCY RESPONSE AND **COMMUNICATIONS PLAN**

OCTOBER 2018

Overview

This Emergency Response and Communications Plan ("ERCP") outlines the general procedures followed for all emergency situations and incidents that could arise as a result of the operation, maintenance and decommissioning of the solar photovoltaic facility due to weather events, equipment failure, human error or other accident. Shortly after commercial operation, an affiliate of Spring Street Renewables, LLC will meet with the local emergency service personnel (fire, police, and EMS) to review and discuss the operation and decommissioning processes, including unique equipment, the overall process, as well as schedule and phasing. Any hazardous materials that may be present during each phase will be discussed. There are typically no hazardous materials present during operation. Ongoing communication between town officials and police, fire, and emergency services officials, will help assure adequate levels of safety and protection. A site specific health and safety plan (HASP) will also be developed and maintained on site. Based on relevant experience, Spring Street Renewables, LLC believes that the following types of hazards are most likely to have the potential to occur during maintenance and decommissioning activities.

- Personnel injury or medical emergency
- 0 Electrocution
- 0 Slips, trips and falls
- 0 Medical Emergency
- Auto and heavy equipment accidents
- Natural or electrical fire
- Hazardous material spills
- O Gasoline
- Diesel fuel 0
- Hydraulic oil 0
- 0 Lubricating oil and grease
- 0 Cleaning solvents

Spring Street Renewables, LLC is committed to protecting the community, personal property, wildlife and the environment in adherence to all applicable local, state and federal laws and regulations.

Emergency Contact Information

Nexamp personnel, including a specified Emergency Response Coordinator, will be available to arrive on site and may be utilized to assist during emergency situations and/or provide first aid



as needed. For all emergency services including hospital, fire etc. call 9-1-1. During operation of the facility, a phone number where a Nexamp representative can be reached 24 hours a day will be established and shown on a sign as "IN CASE OF EMERGENCY, PLEASE CONTACT NEXAMP AT (617) 431-1440 x8" and will be provided to local emergency personnel along with the location of the nearest hospital.

Internal Reporting

The following procedures will be prescribed for internal reporting of emergencies.

- 1. Once notified by local emergency service personnel, the Emergency Response Coordinator will notify any on-site personnel, including any visitors, of the nature of the emergency either in person or via phone.
- 2. The Emergency Response Coordinator will specify the location for the first responders, if they are not already present onsite. A designated employee or contractor will meet the emergency response personnel at the access road of the emergency.
- 3. The Emergency Response Coordinator will notify local emergency personnel, if not already present, of the emergency using the contact information to be provided.
- 4. The Emergency Response Coordinator will identify any need for access control measures at the facility during the emergency and designate a competent person to implement.
- 5. Personnel will be trained that when any person identifies an emergency situation, or the potential for an emergency situation, and reports it to the Emergency Response Coordinator or his/her designee, the Emergency Response Coordinator will then activate the Plan.

External Reporting

The following procedures will be prescribed for external reporting of emergencies.

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- If immediate emergency response assistance is required, the Emergency Response Coordinator or his designee will call 9-1-1.
- A member of management or the Emergency Response Coordinator or his/her designee are the only persons authorized to speak on Nexamp's behalf to outside agencies (police, fire department, medical services etc.) during an emergency situation.
- In the event of a spill of a hazardous material in excess of reportable limits, the spill must be reported to the Department of Environmental Protection or relevant federal authority.



Emergency Response Procedures

Personnel Injury or Medical Emergency

- Provide First Aid to all injured employees or contractors regardless of severity.
- A First Aid kit will be maintained onsite. First Aid kits are to be inspected regularly and restocked as needed following usage.
- Call 9-1-1 if the injury is serious and needs immediate medical treatment.
- For local emergency response assistance, a designated employee or contractor will meet the emergency responders at the access road of the tower site and direct them to the location of the emergency/injured employee.
- The designated employee or contractor should have a hand-held orange safety flag to use to get the attention of the responding emergency services.
- Regular inspection of fire extinguishers, if required by the local fire department, at all facility locations where they are installed.

Auto and Heavy Equipment Accidents

- Personnel scheduled to work on site will be briefed prior to arrival on facility road conditions, speed limits and hazards
- Ground guides will be used in situations requiring cranes, excavators, lifts and other heavy equipment to operate in the vicinity of plant equipment, personnel and other vehicles.
- Personnel will be briefed not to approach working heavy equipment without first receiving acknowledgement and approval from the vehicle operator.
- Additional care will be exercised by all auto and equipment operators during periods of darkness, rain, snow and icy conditions.
- All collisions or near misses, regardless of severity, will be reported to the Emergency Response Coordinator or his/her representative.
- Accidents requiring medical or firefighting personnel will follow the instructions listed in those sections.

Fire

If a natural, vehicle or equipment related fire exists at the facility, personnel or contractors will follow the following procedures.

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- 1. Provided it is safe to do so, employees can extinguish small fires using the onsite fire extinguisher.
- 2. For all other fires, alert others on site to immediately vacate the area and assemble at a specified location for accountability.



- 3. Shutdown the facility at the point of utility interconnection, provided it is safe to do so.
- 4. Restrict the area.
- 5. Request assistance from firefighting personnel, if needed, in controlling the fire.
- 6. If local emergency response personnel are required, have an employee go to the access road of incident site, to meet emergency personnel and direct them to the fire.
- 7. Employees will use a hand-held orange safety flag, safety vest or other brightly covered material to get the attention of the responding emergency service personnel.

Hazardous Material Spills

Cautionary labeling will be provided for any hazardous chemicals and the associated Material Safety Data Sheets (MSDS) or Globally Harmonized System (GHS) documentation will be provided accordingly.

- 1. The MSDS/GHS for all hazardous materials used at the facility will be provided to the local fire department and emergency service providers upon request.
- 2. Drip pans and associated control measures will be used for all refueling and hydraulic maintenance activities.
- 3. Small spills will be cleaned up immediately using absorbent materials such as hay, sand, socks or pads.
- 4. If the spill is of such magnitude that it cannot be contained, the Emergency Response Coordinator will contact the appropriate authority for assistance.
- 5. Personnel and contractors will be instructed to report all spills, regardless of severity, to the Emergency Response Coordinator.
- 6. Once a spill is identified, the Emergency Response Coordinator or his/her designee will maintain access control measures to safeguard personnel and environmental safety until the spill mitigation is complete.

Site Restoration/Remediation

If any accident or incident at the facility necessitates site restoration or remediation, the restoration/remediation will be conducted according to applicable federal, state and local requirements.

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Incident Reporting

After every accident or incident, the Emergency Response Coordinator or designee will conduct a post incident evaluation to determine the following.

- 1. Suitability of the organization's structure, operations, equipment, communication plans, adequacy of training, alarm systems, security and access control, spill containment and recovery procedures, monitoring and safety programs.
- 2. If any of the above are found to be inadequate, the Emergency Response Coordinator will make necessary changes.

Safety Training

On-site training for local emergency personnel may be given, at their request, by the Emergency Response Coordinator or their designees regarding the content, requirements, and appropriate actions to comply with the provisions of the Plan. The training will occur:

- 1. At the facility;
- 2. When changes are made to the plan;

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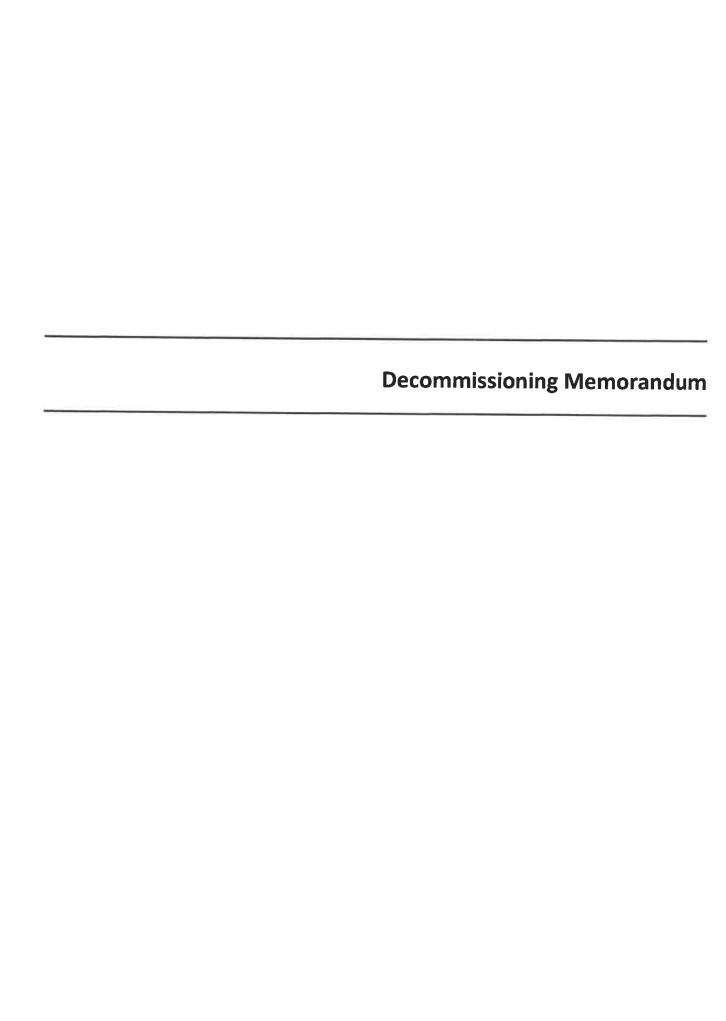
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- At the request of local emergency personnel;
- 4. When Emergency Response Coordinator determines.

Recording of Responder Complaints

- 1. Any and all complaints from responders will be kept in both a log book and an electronic log.
- 2. The name, address, telephone number, date and time of all responders issuing a complaint will be included with the responder's complaint.
- 3. Assurance will be provided to all responders that complaint has been mitigated and will not reoccur.
- 4. In addition to the above, complaints requiring significant plan or operational adjustments will be answered in writing within seven (7) days of the complaint.





To: Respective Planning Board in Franklin, MA

Date: November, 2018

Decommissioning Surety Memorandum

Introduction

Nexamp has prepared this Decommissioning Plan (Plan) for the Spring Street Renewables, LLC Photovoltaic Facility (Facility) off Spring Street, Franklin, Massachusetts. This Plan was prepared to fulfill the requirements of the local bylaws and zoning ordinances and assumes that the Facility will be constructed in accordance with the potential Order of Conditions from each respective Planning Board and Conservation Commission.

Facility Description

The proposed solar system Facility will consist of a new **6.2 Megawatt MW (DC)** capacity solar power-generating operation secured within a chain-link fence surrounding the solar panels and equipment and accessed via a locked CLF gate from Spring Street in Franklin, MA. The Facility will include the following site features:

- An approximately 25-acre array of photovoltaic (PV) modules (panels) and mounting system;
- Screw driven piles supporting the photovoltaic modules;
- Up to two (2) transformers (filled with biodegradable vegetable oil);
- Underground conduit;
- A seven (7)-foot chain-link security fence;
- Underground conduit and wires;
- Up to six (6) aboveground wooden utility poles;
- Overhead wires;
- A gravel access road; and
- A metal security gate at the access road entrance off Spring Street.

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Decommissioning Plan

The Facility will be decommissioned by completing the following major steps: Dismantlement and Demolition, Disposal or Recycle, and Site Stabilization as further described below.

Dismantlement, Demolition, and Disposal or Recycle

A significant amount of the components of the photovoltaic system at the Facility will include recyclable or re-saleable components, including copper, aluminum, galvanized steel, and modules. Due to their re-sale monetary value, these components will be dismantled and disassembled rather than being demolished and disposed of.

Following coordination with National Grid regarding timing and required procedures for disconnecting the Facility from the private utility, all electrical connections to the system will be disconnected and all connections will be tested locally to confirm that no electric current is running through them before proceeding. All electrical connections to the panels will be cut at the panel and then removed from their framework by cutting or dismantling the connections to the supports. Each panel will be individually lifted from its support (likely using a small crane and synthetic rigging straps), wrapped in sheet plastic and taped before being removed. They will then be stacked and cushioned on pallets, plastic wrapped, and transferred to a flat-bed truck for transfer to the purchaser or recycler. The exterior glass of the solar panels is commercial-grade and tempered, designed to significantly reduce a complete fracture. However, in the event of a total fracture, the interior materials are silicon-based and are not considered to be hazardous materials. Disposal of these materials at a landfill will be permissible.

The PV mounting system framework will be dismantled and recycled. The metal screw piles will be removed from their approximated depth of eight feet and recycled for salvage value.

Finally, all associated structures will be demolished and removed from the site for recycling or disposal as required in the bylaws for Franklin. This will include the site fence and gates, which will likely be reclaimed or recycled. Grade slabs will be broken and removed to a depth of one foot below grade, and clean concrete will be crushed and disposed of off-site or recycled (reused either on- or off-site).

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Sanitary facilities will be provided on-site for the workers conducting the decommissioning of the Facility.

Aboveground utility poles owned by Spring Street Renewables, LLC will be completely removed and disposed of off-site in accordance with utility best practices. Overhead wires will be removed from the area of the solar modules and terminated at the utility-owned (National Grid) utility poles located on Spring Street. The access road will remain in place and National Grid will be responsible for dismantling those overhead wires and poles under its ownership. Coordination with National Grid personnel will be conducted to facilitate National Grid's removal of their aboveground poles and overhead wires located on the site.

A final site walkthrough will be conducted to remove debris and/or trash generated within the site during the decommissioning process and will include removal and proper disposal of any debris that may have been wind-blown to areas outside the immediate footprint of the facility being removed.

Site Stabilization

The areas of the Facility that are disturbed (during decommissioning) will be stabilized with the ground treatment approved by the Planning Board during the Special Permit Review process, including application of a drought-tolerant grass seed mix to surfaces disturbed during the decommissioning process. The gravel access road from Spring Street, including the portion within the perimeter fence surrounding the photovoltaic modules, will remain intact and shall be not removed.

Permitting Requirements

Given the size and location of the Facility, several approvals are required prior to initiation of ground-disturbing activity. Table 1 provides a summary of the expected approvals if the decommissioning were to take place in November 2018. Noting, however, that because the decommissioning is expected to occur at a later date, the permitting requirements listed in the table below will be reviewed and updated based on current local, state, and federal regulations at the time.

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Schedule and Cost

The decommissioning process is estimated to take approximately six to eight (6-8) weeks (but no longer than six (6) months) and is intended to occur outside of the winter season.

Nexamp had solicited a specific construction estimate for decommissioning of this project (attached) along with assembling five separate bids regarding the salvage value of the raw materials intended for recycling.

Table 1. Current Permitting Requirements for Decommissioning

| Permit | Agency | Threshold/Trigger |
|--|--|---|
| National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Construction Activity | U.S. Environmental Protection Agency | Ground disturbance of greater than 1 acre with discharge to wetlands or water bodies. Requires preparation of a Stormwater Pollution Prevention Plan, including erosion and sedimentation controls. |
| Special Permit Approval | Town of Franklin Planning Board | Anticipated decommissioning requirements listed in the Special Permit Approval conditions of approval. |
| Building Permit | Town of Franklin Building Departments | A building permit is required to construct the facility. A building permit must also be obtained for any construction, alteration, repair, demolition, or change to the use or occupancy of a building. |

Permitting Requirement Assumptions:

1. The access road will remain in place throughout the Facility.

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2. All ground disturbance, including temporary laydown areas if required within areas subject to the Massachusetts Wetlands Protection Act will obtain the appropriate approval from the Franklin Conservation Commission (Assuming a negative determination from a RDA)



Surety Proposal/ Decommissioning Cost Estimate

Consistent with the approach it has taken in surrounding communities, and pursuant to the Town of Franklin Zoning Ordinance, Nexamp, Inc., the parent company of Spring Street Renewables, LLC, proposes to provide a decommissioning surety bond, to be posted prior to the beginning of operations (COD) and the final Franklin Certificate of Compliance, in the amount of \$78,000.00, for decommissioning in the unlikely event that Nexamp is unable to meet its contractual obligations for solar project removal and restoration.

In developing the decommissioning surety bond, Nexamp utilized a recent decommissioning cost estimates from J & J Construction, one of the region's largest site development contractors, specifically for this site. Nexamp also utilized recent 2018 salvage value estimates from five recycling facilities in New England based on the assumption of recycling the solar modules, racking and associated project components as raw materials. In addition to the decommissioning cost, Nexamp included a 5% contingency and allowance for associated legal costs.

Below is a summary of the analysis:

| Project Size (Megawatts DC) | 6.2 MW (DC) |
|---|-------------------|
| Decommissioning Cost, No Salvage Value | |
| Decommissioning Estimate 6.2MW (\$206,800) | \$33,355 / MW |
| 5% Contingency | \$1,668 /MW |
| 3% Legal Services Estimate | \$1,001 /MW |
| Total Decommissioning Cost, No Salvage Value | \$36,024 /MW |
| Salvage Value | |
| Market Based Salvage Estimate/ MW (Average of 5 Bids-2018) | \$23,476/MW |
| Total Avg. Salvage Value: | \$23,476 /MW |
| - I was a substitution of the substitution of | 323,470 / IVIVV |
| Decomm. Cost Estimate, Net Salvage Value | |
| Decommissioning Estimate | \$36,024 / MW |
| Minus Salvage Value | (\$23,476)/ MW |
| Decommissioning Cost, Net Salvage (\$)/MW: | \$12,548 /MW (DC) |
| Proposed Total Decommissioning Cost | £79 000 00 |
| for the 6.2 MW Solar Project : | \$78,000.00 |

phone: 617.431.1440

www.nexamp.com



The following attachments are included:

- J & J Construction Corporation Decommissioning Cost Estimate for the 6.2 MW
 (DC) Nexamp project at Spring St., Franklin
- Salvage Value Summary, (letters provided upon rerquest)

Sincerely,

Alan L Clapp, P.E.; Spring Street Renewables, LLC, c/o Nexamp, Inc.;

phone: 617.431.1440

www.nexamp.com

Clar L. Claps

VP Business Development



November 12, 2018

Alan L. Clapp, P.E. Spring Street Renewables, LLC

c/o Nexamp, Inc 101 Summer Street Boston, MA 02110

Re: Spring Street, Franklin: Solar Decommissioning Cost Estimate

Dear Mr. Clapp,

J&J Contractors is pleased to provide you with the following decommissioning cost estimate for the 6.2 MW DC project in Franklin.

- Remove all solar infrastructures and return the site to a meadow condition
- . Removal and disposal of non-recycled materials
- Removal and delivery to a recycling facility of the remaining materials (expecting most of the materials can be recycled)
- Dismantle panels, racking system, screw foundations, transformer/inverters, remove all wiring, R&D Nexamp utility poles (3)
- Slight regrading (smoothing of ruts) and reseeding of the area
 - i Removal of concrete pads.
 - i Labor and equipment cost for infrastructure \$29,000.00/mw. For a total cost of \$179,800.
 - i Labor and material cost for slight regrading and seeding \$ 21,000.00.
 - i Labor and material cost for concrete removal \$6,000.00

Total cost for above work \$ 206,800.00

If you have any question, please feel free to call me.

Sincerely,

Kamlesh Patel

CEO

J&J Contractors, Inc. KamP@JJContractor.com

Phone 978.452.9898 Fax 978.452.3796

Metal Green Recycling Industries

Office: 651-580-7570

Fax: 877-249-6117 All price is delivered to kearny NJ

Shipping term

Quantity must be specified before a PO is issued

Deliver \$2.76

**Price are subject to change due to market conditions.

Date:

Circle the Item and quantity, simply email/fax back

| Copper | \$2.76 |
|--|--|
| Copper product | |
| Bare Bright Wire Only #1 copper #2 copper Tin plated copper (wire only) Lead Plated Copper Sheet copper (0% attachement) Lead sheet copper / Irony sheet copper Copper turning clean & dry | CMX -14 \$2.5200 \$2.2800 \$2.3800 \$2.2800 \$2.120 1.90 /Call \$1.92 |

| Date: | 10/8/2018 |
|---|---|
| Lead product | |
| Soft Lead clean Boat keel w steel attachment Wheel weights (ph) Clean Range lead indoor (Depend on quality) Range lead outdoor (Depend on quality) Auto Battery / Steel case Lead shot filtered | \$0.70 \$0.60 \$0.24 \$0.58 call 0.34 / 0.30 \$0.60 |

| suinted wire (base on Copper %) | |
|--|-------------------|
| | \$1.96 |
| #2 MCM 80% | \$1.21 |
| #1 single wire | \$1.79 |
| #1 Single & House | \$1.50 |
| #1 House wire | \$1.40 |
| #2 ICW (min 50%) | \$0.84 |
| #2 ICW 35% low grade | \$0.46 |
| Auto wire (Hamess) - no attachment | \$0.90 |
| Computer wire and plugs | \$0,22 |
| Shredded wire | call |
| Christmas lights | \$0.23 |
| Steel bx (no attachments) | \$0.28 |
| Steel Bx with attachment | \$0.22 |
| Insulated afum wire 65% — | 0.34-0.40 |
| Lead copper wire / URD | call (55-110) |
| Bare / Black / Irony CATV | Not Buying |
| Cu coax open / close / Alum TV coaxial wire | 0.98 / 0.30 / Cal |

| ass product | |
|---|-------------------------------|
| Clean Red brass (0% attachment) | \$1,9850 |
| Water meter / irony water meter | 1.95 /0.75 |
| Red pipe (Base on Sort) | \$2.09 |
| Mixed Brass pipe | \$1,900 |
| Yellow brass ***no shells***** | \$1,7808 |
| Clean shells (no steel/alum/tin/chrom plated, 100% Clean) | \$1.73 |
| Mixed Shells(base on sort) | 1.60 x % |
| Yellow brass turning clean (less Fe& Moisture, no Mn Trg) Mixed brass turning | 1.58 x % |
| Auto radiator / Irony auto Rads only | \$1.52 |
| Irony Truck Rads | 1.57 / 0.80 |
| Clean Heator core(No FE) | \$0.45 |
| Brass valves | \$1.20 |
| Irony brass 50% | call |
| Faucet Brass | not buying \$0.70 - \$0.80 |

| Stainless steel product | |
|---------------------------------|----------|
| Clean 304 SS solid only - baied | \$0.4600 |
| SS 304 Unprepared | \$0.25 |
| 316 SS solid only | \$0.67 |
| 304 Stainless steel turning | \$0.340 |

| Kadiator product | |
|---------------------------|-------------|
| Alum copper rads / irony | 1.14 / 1.01 |
| Aluminum radiator / Dirty | 0.43 / 0.20 |

| lise Product | |
|---|---------------------|
| Electric motor small size / Mixed Motor | 0.20/0.16 |
| Low Grade motor/w power tools | \$0.100 |
| Huge motor / Excessive steel | 0.09-0.13 |
| Seal units / Ballast / electronic Ballast | 0.16 / 0.12 / 0.04 |
| Altenator / Al. Starter / Steel Starter | .34 / .24 / .19 |
| Clean Die cast / Irony 60% min | 0.66 / 0.26 |
| Zinc anodes (w slightly iron) | \$0.52 |
| AC compressor | \$0,21 |
| Whole Air Conditioner | \$0.12 |
| Magnesium clean | \$0,18 |
| Copper transformer Palm size | \$0.29 |
| Copper transformer Mini Size | call |
| Cu/ai transformer Paim size | 50.10 |
| Al transformer Large / Small Palm Size | \$0.04 / not buying |
| Computer Complete | \$0.23 |
| Computer incomplete | |
| ACR ends / alum cutoffs | \$0.14 |
| Mix electronic | 0.55 /No Quotes |
| INIA CIECUONIC | No Quotes |

| 356 wheel / chrom wheel -packaged/ skid | 0.73/ 0.55 |
|---|------------|
| 10/10 Extrusion (100%) Baled | \$0,750 |
| Extrusion with Slightly Fe | \$0.680 |
| Litho clean (light ink) | \$0.70 |
| Bare MLC (100% Clean, boxed or baled) | \$0.610 |
| Painted MLC (100% Clean, boxed or baled) | \$0.59 |
| Painted siding (100% Clean, baled) | \$0.550 |
| Siding with Slightly Fe | \$0.540 |
| UBC (100% Clean Baled only) | ** |
| Cast aluminum 2% max (boxed) | \$0.45 |
| Clean Thermo Break ** No Glass ** | \$0.44 |
| Sheet aluminum 2% max | \$0.43 |
| rony aluminum min. 50% | \$0.44 |
| Sheet alum Off Spec / low grade taint tabor | 0.08-0.12 |
| Fransmission / Engine | \$0.23 |
| 2000/7000 MLC | \$0.11 |
| AANLADA IMPR | \$0.35 |

ice is delivered to kearny NJ

#1 Prepared Steel \$10.00 Per Hondred LB \$224
#1 UnPrepared Steel \$3.50 " " 11

ANESTIS METAL CORP.

TEL: 978-681-6000 FAX: 978-681-6006

48 - 50 MEDFORD STREET

LAWRENCE, MA 01841

| | # 1 Prepared steel (where set inch Thick only belivered - \$240/60005 Ton) Picked up - \$210/60005 Ton |
|---|---|
| | # 1 Un prepared Steel (over SET in Unith) Delivered - # 210 Gross Ton Picked UP - # 180 Gross Ton |
| | Delivered - \$170 6T Picked up - \$100 GT |
| - | Insulated Copper wire Range - #.40-12.20 insulated Aluminum Range - #.20- #.40 |

metal recyclers

SALITSKY ALLOYS, inc. processors of insulated wire by granulation 35 INDUSTRIAL DRIVE, HOLDEN, MASSACHUSETTS 01520-1848 • TEL: (508) 829-7400 FAX: (508) 829-7774

Ms. Ashai,

November 14, 2018

Thank you for allowing us to submit our bid for your scrap metal. Here is our proposal for the pricing range and handling of your scrap materials that we think you will find very attractive.

- 1. #1 Prepared Steel \$160-195/GT
- Bare Aluminum Wire \$0.40-0.50/lb.
- 3. Bare Bright Copper Wire -\$0.80-1.20/lb.

All of these prices are based on the date of proposal and what we believe the actual scrap materials to be. As you stated, this project will be in the future and the markets change every day. Until we see the materials in-person and have agreed upon delivery dates, these ranges are subject to change.

This proposal is for the Aluminum and Copper being dropped at our facility in Holden, MA, and Steel taken to one of our associate facilities in the Central Massachusetts region.

There are no other charges of any type. Payment terms are a standard Net 30 Days.

We are also full service scrap metal dealers. Therefore, we would be able to take and recycle any other metal scrap that you have and can provide you with container service if you would like.

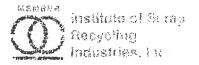
We hope that you find this proposal very appealing. We are very excited at the prospect of working together with you.

If you have any other questions, please feel free to reach out and we will be happy to answer them.

We look forward to hearing from you.

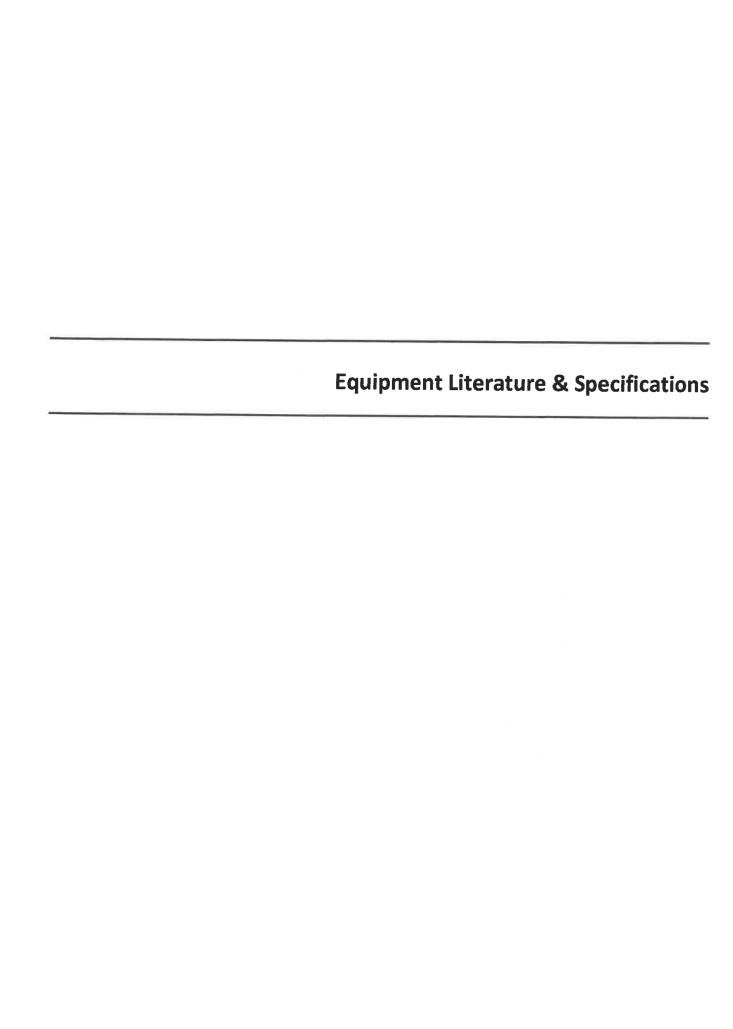
Paul Heiken

Salitsky Alloys, Inc.



Salvage Values for Components of a 2.6 MW DC Solar Project

| Steel Components (Components (Comp | | | | | | | | | | | | |
|---|---------|---------------------|-----------------|---------------|-----------------|-----------------|-----------------|-------------|-------------------|-------------|------------------|-------------|
| CITS Consection - 365.35 SEG WA. 059.722.000* Internal Lateral Bares in Use-2.360 Wa. 059.722.000* Internal Lateral Bares in Use-3.00* Complete HIOS Scattle Leg Assembly -99.00* Refer Bean - 134.700* Complete HIOS Scattle Leg Assembly -99.00* Refer Bean - 134.700* Galvanited Schrift NGC 9.00* Refer Bean - 134.700* Galvanited Schrift NGC 9.00* Galvanited Schrift N | | | SCRAP RATE/Ib | | SCRAP RATE / Ib | | CCDAD DATE / Ib | | CODA P. DA VET IL | | | |
| Forming lateral Bares 104-2, 260 Va.0.59 Y22.000* Internal lateral Bares Tubre 30 Internal lateral Bares Tubre 30 Internal lateral Bares Tubre 32 Internal lateral Bares Tubre 32 Complete HDG South Log Assembly -36.000* Complete HDG South Log Assembly -36.000* Refere Bares Tubre 3000* Refere Bares 1.34.760* Refere Bares Manual Valle Referenal Tooth Lock Washer 1/A Refere Manual Fares 1.38* Refere State Manual Valle Referenal Tooth Lock Washer 1/A Referenal Fares 1.38* Refer 1.35 Fare Valle Yasher Inf. Referenal Fares 1.38* Reference Took Washer Inf. Referende Took Washer Inf. Ref. Tooth Lock Washer | 227,184 | Prepared Steel | \$0.09 | \$21,298.45 | \$0.08 | 618 002 26 | CO 10 | 410 440 44 | SCRAP KATE/ ID | | SCRAP RATE / Ib | |
| Internal lateral later, 10 later, 10 later 10 la | 6,270 | Prepared Steel | 60.05 | \$587.87 | \$0.08 | CADS DE | 30.10 | \$22,718.33 | 20.10 | \$21,805.56 | \$0.09 | \$21,298.45 |
| Infraral lakeral flore, thuse \$41 Infraral lakeral flore, thuse \$41 Infraral lakeral flore, thuse \$42 Complete HDG South Leg Accembly -36.000* Complete HDG South Leg Accembly -36.000* Refere Bean -134.760* Refere Bean -136.760* Refere Bean -1 | 11,438 | Prepared Steel | \$0.09 | ¢1 072 34 | 60.00 | 60.000 | 30.10 | \$627.01 | \$0.10 | \$601.82 | \$0.09 | \$587.82 |
| Inferral lateral fares of the cell lateral l | 11,539 | Prepared Steel | \$0.09 | \$1.081.70 | \$0.00 | 500000 | \$6.10 | 51,143.82 | \$0.10 | \$1,097.87 | \$0.09 | \$1,072.34 |
| Complete HTDG SOUTH lag Assembly - 36,000° Inverter Posts - 96,000° Finetter HTDG SOUTH lag Assembly - 95,000° Finetter HTDG WORTH lag Assembly - 99,000° Finetter Posts - 96,000° Finetter Posts - 96,000° Finetter Benn - 134,700° Finetter Benn - 135,900° Finetter Benn - | 21.762 | Prenared Steel | \$0.09 | 62 040 15 | 90000 | 2914.37 | \$0.10 | \$1,153.91 | \$0.10 | \$1,107.55 | \$0.09 | \$1,081.79 |
| Comilete HDO North lag Akeanbly - 99,000* Refer Benn - 124,700* Refer | Ī | Prepared Steel | \$0.09 | 52,040.10 | 90.00 | \$1,424.42 | \$0.10 | 52,176.17 | \$0.10 | \$2,088.73 | \$0.09 | \$2,040.16 |
| Invector to study 50007 Fabrer Beam - 134-7667 Galvanide G Zevith - 4523 x 16 GAx 201.500* Fabrer Beam - 134-7667 Galvanide G Zevith - 4523 x 16 GAx 201.500* Fabrer Beam - 134-7607 Gross Berter Alexandhy - 213* For Cross Berter Alexandhy - 213* For Server Alexandhy - 213* For Server Berter Server Ser | | Prenamed Steel | 60.09 | 69 020 69 | 30.00 | \$7.70.03 | \$0.10 | \$980.09 | \$0.10 | \$940.71 | \$0.09 | \$918.83 |
| Rafter Bean-134.700° Rafter Bean-134.700° Rafter Bean-134.700° Cross Better Assembly-213° Cross Better Assembly-213° Asset Rev Assembly-213° If A Flaver Assembly-213° If A Flaver Beatter 188° M8-1.55 Flee belt-20mm W/MB Enternal Tooth Lock Washer 1/A Flaver Beatter 188° M8-1.55 Flee Washer 188° M8-1.55 Flee Wult | 596 | Prenared Steel | 60.09 | \$2,270.33 | 20.06 | \$1,919.14 | 50.10 | \$2,421.90 | \$0.10 | \$2,324.59 | \$0.09 | \$2,270.53 |
| Galvanind Zeutin-422 x 16 GA x 201.500* Rate Beam -131.700* Rate Beam -131.700* Cross Brace Assembly - 2013* Gross Brace Assembly - 2013* MS -1.25 Here Boil x 20mm w/ MS External Tooth Lock Washer 1/4 Mid Sill Lock Massage 18.8 MS -1.25 Here Must MS -1.25 Here | | Prenared Steel | 50.00 | 230.40 | 30.08 | 5/6.48 | \$0.10 | \$96.51 | \$0.10 | \$92.63 | \$0.09 | \$90.48 |
| Father Beam-1347GD Cross Brace Meembly - 213° Cross Brace Meembly - 213° Cross Brace Meembly - 213° An Bar - 125° Fate Both - 213° 1/4 Father Meemble - 218 S 1/4 Father Meemble - 218 S Mee - 125° Fate Meemble - 218° Mee - 125° Fate Meemble - 218° | | Draward Chad | 50.00 | 52,545,29 | \$0.08 | \$2,151.38 | \$0.10 | \$2,714.98 | \$0.10 | \$2,605.89 | \$0.09 | \$2,545.29 |
| Foundation KSF 676/2100 3.m.16 Cross Breack Assembly - 2019* Cross Breack Assembly - 2019* M8-1.25 Hote Belt x 20mm w/ M8 External Tooth Lock Washer 1/A Flatvasher 18.88 M8-1.25 Hote Washer 18.84 M8-1.25 Hote Washer 1/A Mid Shit Lockwasher 18.88 M8-1.25 Hote Washer 1/A Ext. Tooth Lock Washer | Ī | Pressured Charl | 50.03 | 54,338.34 | \$0.08 | 53,666.93 | \$0.10 | \$4,627.56 | \$0.10 | \$4,441.63 | \$0.09 | \$4,338.34 |
| Cross Brace Moembly - 213° Cross Brace Moembly - 213° Cross Brace Moembly - 213° Alex Both - 223° I AF Rever Moembly - 233° I AF Reversable 128 & Med 125° Med 125° Here Molt. Med 125° Here Mult. Med 125° Here Mult. Med 126° Here Mult. | Ī | Prepared Steel | \$0.09 | 52,442.45 | \$0.08 | \$2,064.45 | \$0.10 | \$2,605.28 | \$0.10 | \$2,500.60 | \$0.09 | 35 CAD 42 |
| Cross Bracokwamidy, 203* 186 - 154 Set Bello Lts. Zomm w/ M8 External Tooth Lock Washer 114 Relevables 18 ss 114 Mid Salit Lockwamber 18.8 186 - 155 Belle Mid 184 Salit Lockwamber 18.8 186 - 155 Belle Mid 184 Ext. Tooth Lock Washer | | Prepared Steel | 50.09 | \$4,800.00 | 80.08 | \$4,057.14 | \$0.10 | \$5,120.00 | \$0.10 | \$4,914,29 | \$0.09 | SA ROD OD |
| M8 - 1.25 Hox Boll x 20mm w/M8 External Tooth Lock Washer 1/A Flavessher 218 & 1/A Mid Saft Lockwasher 18 & 1/M8 - 1.25 Hox Mut 1/A Ext. Tooth Lock Washer 1/A Ext. Tooth Lock Washer | Ī | Prepared Steel | \$0.09 | \$154.05 | \$0.08 | \$130.21 | \$0.10 | \$164.32 | \$0.10 | \$157.72 | \$0.09 | \$154.05 |
| 1/4 Fatwasher 18.8 s. 1/4 Mid Spift Lockwasher 18.8 M8-1.25 Ren Nut 1/4 Ext. Tonth lock Washer | Ī | Principality Street | \$0.09 | \$6.75 | \$0.08 | \$5.71 | \$0.10 | \$7.20 | \$0.10 | \$6.91 | \$0.09 | \$6.75 |
| 14 Mid Spilt Lockwasher 18.8 M8-1.25 Her Nut 1/4 Ext Tooth Jock Washer | 70,705 | Prepared Steel | \$0.09 | 5722.10 | \$0.08 | \$610.34 | \$0.10 | \$770.24 | \$0.10 | \$739.29 | \$0.09 | \$722.10 |
| ART - more spirit contragation as a few second and a few | | Frepared Steel | \$0.09 | \$5.33 | \$0.08 | \$4.51 | \$0.10 | \$5.69 | \$0.10 | \$5.46 | \$0.09 | CE 33 |
| 1/4 Ext. Tooth lock Washer | Ī | Prepared Steel | \$0.0\$ | \$4.78 | \$0.08 | \$4.04 | \$0.10 | \$5.10 | \$0.10 | \$4 90 | \$0.00 | CA 70 |
| TAKEN MINISTER CONTRACTOR | 4,263 | Prepared Steel | \$0.09 | \$399.68 | \$0.08 | \$337.83 | \$0.10 | \$426,33 | \$0.10 | 000000 | 50.00 | 24.70 |
| MAC Express Track a class to | | Prepared Steel | \$0.09 | \$2.17 | \$0.08 | \$1.83 | \$0,10 | \$2.32 | \$0.10 | 63.33 | 50.00 | 9333.00 |
| MASS 20 LANGE LIGHT LOCK WAS NET | | Prepared Steel | \$0.09 | \$5.79 | \$0.08 | \$4.90 | \$0.10 | \$6.18 | \$0.10 | 27:75 | 5000 | 22.17 |
| MLD-2.U X 4U SOCKET Set Screw Cone Pt HDG | | Prepared Steel | \$0.09 | \$41.74 | \$0.0\$ | \$35.28 | \$0.10 | 544 53 | \$0.10 | 20.00 | 50.05 | 55.79 |
| MID-COURSE Jam Nut Gr. 2 HIDG | | Prepared Steel | \$0.09 | \$18.57 | \$0.08 | \$15.70 | \$0.10 | \$19.81 | \$0.10 | 610.01 | 50.03 | 54T./4 |
| 2/0-10 X3 Hex Bolt | | Prepared Steel | \$0.09 | \$13.84 | \$0.08 | \$11.70 | \$0.10 | \$14.76 | \$0.10 | 20.000 | 50.05 | 518.57 |
| 3/8-16 x 1-1/2 Brace Clamp Carriage Bolt | | Prepared Steel | \$0.09 | \$26.08 | \$0.08 | \$22.04 | \$0.10 | 63765 | 00.00 | /T.P16 | 50.09 | \$13.84 |
| 3/8-16 Serrated Flange Nut | | Pripared Steel | \$0.09 | \$9.47 | \$0.08 | 58.01 | \$0.10 | 610 11 | 20.10 | 07.976 | 50.09 | \$26.08 |
| 1/2 - 13 x 1-1/2 Serrated Hange Hex Bolt | 916 | Prepared Steel | \$0.09 | \$85.86 | \$0.08 | 572.57 | \$0.10 | 270.11 | 20.10 | \$9.70 | \$0.09 | \$9.47 |
| 1/2 - 13 x 3-1/2 Serrated Flange Hex Bolt | | Prepared Steel | \$0.09 | \$36.27 | \$0.08 | Can 65 | 60.10 | 03069 | 20.10 | 06.784 | \$0.09 | \$85.86 |
| 1/2 - 13 Serrated Flange Nut | | Prepared Steel | \$0.09 | \$19.54 | 80.08 | \$16.52 | 01.05 | 20000 | 20.10 | 537.13 | \$0.09 | \$36.27 |
| Interlocking Brace Clamp - HDG | | Prepared Steel | \$0.09 | \$477.40 | \$0.08 | SAM3 52 | 01.00 | 220.04 | 20.10 | \$40.03 | \$0.09 | \$19.54 |
| L 5x5x1/2 Finished L-Bracket | | Prepared Steel | \$0.09 | \$950.36 | \$0.08 | \$803.28 | 01.05 | \$309.23 | 20.10 | \$488.77 | 80.09 | \$477.40 |
| | 495,640 | | | \$66,466,28 | | C16 375 G7 | 07:04 | 31,013.72 | 20.10 | 5972.99 | \$0.09 | \$950.36 |
| | | | | | | and the same of | | 74 ,030.3s | | 19°66'05' | | 545,515.97 |
| Wire, insulated | | | SCRAP RATE / Ib | | SCRAP RATE / Ib | TOTAL | SCRAP RATE / IS | | CRAP BATE / IL | | CCBAB BATTE I IL | |
| #10 PV RATED WIRE CU per circuit (1000VDC) | 6,035 | Copper | \$1.30 | \$7,845.50 | \$1,00 | \$6.035.00 | \$0.84 | \$5 DEQ 40 | 62.26 | 1000000 | SCHAFFIGUE III | |
| ZSUMCM AL RHW-2 (1000VDC) | | Aluminium | \$0.30 | \$3,863,10 | \$0.45 | 55.794.65 | \$0.37 | CA 764 AD | 46.33 | C7.701/416 | 32.40 | \$14,484.DO |
| #1 AL EGC RHW-2 (1000VDC) | 924 | Aluminium | \$0.30 | \$277.20 | \$0.45 | 4415 BD | 60.37 | 54,704.40 | 50.33 | 54,506.95 | 20.50 | \$7,726.20 |
| 400 KCMIL AL. | | Aluminium | \$0.30 | \$145.40 | \$0.45 | C340 6D | 16.00 | 3341.88 | 50.35 | 5323.40 | 20.60 | \$554.40 |
| 350 KCMIL AL. | | Aluminium | 5030 | C130 E0 | CO AE | 00.5136 | \$0.37 | \$180.56 | 50,35 | \$170.80 | \$0.50 | \$292.80 |
| 1/0 AWG AL. 15kV | 332 | Aliminium | 00.00 | 000000 | 50.45 | 3195.75 | 50.37 | \$160.95 | \$0.35 | \$152.25 | \$0.60 | \$261.00 |
| Total Value of Aluminum and Copper | | | 2000 | 00,555 969 90 | 30.43 | >149.40 | \$0.37 | \$122.84 | \$0.35 | \$116.20 | \$0.60 | \$199.20 |
| Total Value per 2.6MW DC | | | | CON BOR PR | | 512,819,20 | | \$10,640.12 | | 519,451,85 | | \$23,527,60 |
| Total Salvage Value per MW DC | | | | 200,000,000 | | 552,085.27 | | \$59,196.43 | | \$66,051.48 | | \$60,033.52 |
| | | | | 344,548,50 | | \$20,032.80 | | \$22,765.55 | | \$25,404,41 | | \$26.551.35 |



HYUNDAI SOLAR MODULE



Mono-Crystalline Type

HIS-S330KI HIS-S335KI HIS-S340KI HIS-S345KI HIS-S350KI HIS-S355KI HIS-S360KI

72

Cells



For Utility-Scale Applications



UL 1,500V Saves BOS Cost



More Power Generation In Low Light



Hyundai Cell





PERL Technology

PERL technology provides ultra-high efficiency with better performance in low irradiation. Maximizes installation capacity in limited space.



Anti-LID / PID

Both LID(Light Induced Degradation) and PID(Potential Induced Degradation) are strictly eliminated to ensure higher actual yield during lifetime.



Mechanical Strength

Tempered glass and reinforced frame design withstand rigorous weather conditions such as heavy snow and strong wind.



Reliable Warranty

Global brand with powerful financial strength provide reliable 30-year warranty.



Corrosion Resistant

Various tests under harsh environmental conditions such as ammonia and salt-mist passed.



UL / VDE Test Labs

Hyundai's R&D center is an accredited test laboratory of both UL and VDE.

Hyundai's Warranty Provisions



- 12-Year Product Warranty
- \cdot On materials and workmanship



- · 30-Year Performance Warranty
- · Initial year: 97.6%
- Linear warranty after second year: with 0.6%p annual degradation,
 80.2% is guaranteed up to 30 years

About Hyundai Solar

Established in 1972, Hyundai Heavy Industries (HHI) is one of the most trusted names in the heavy industries sector with 48,000 employees and more than 40 Billion USD in annual sales (2015). As a global leader and innovator, Hyundai Heavy Industries is committed to building a future growth engine by developing and investing heavily in the field of renewable energy.

Started as a core business division of HHI, Hyundai Solar (Hyundai Heavy Industries Green Energy) now stands as an independent company and an affiliate of HHI as from December 2016. We have strong pride in providing high-quality solar PV products to more than 3,000 customers worldwide.

Certification











www.hhigreen.com Printed Date: 07/2018

Electrical Characteristics Mono-Crystalline Type(HiS-S) +#148) 概 ME 160 Nominal Output Propor 330 335 340 345 350 355 360 Open Circuit Voltage (Voc) 46.5 46.3 46.7 47.1 46.9 47.3 47.4 Short Circuit Current 9.3 9.4 9.5 9.6 9.6 9.7 9.8 Voltage at Pmax (Vmpp) 38.2 38.4 38.0 38.6 38.7 38.9 39.1 8.7 9.0 8.8 8.9 9.0 9.1 9.2 Module Efficiency 16.9 17.1 17.4 17.6 17.9 18.1 18.4 Cell Type 6", mono-crystalline silicon Maximum System Voltage 1,500 Temperature Coefficient of Pmax Layly -0.42 Temperature Coefficient of Voc ******** -0.30 Temperature Coefficient of Isc Most. 0.047

Mechanical Characteristics

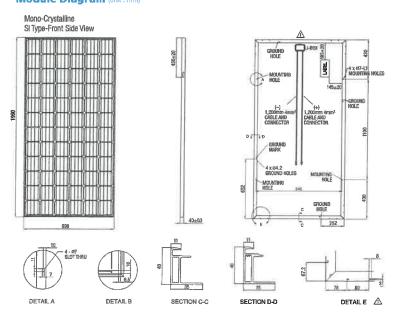
| Dimensions | 998 mm (39.29")(W) × 1,960 mm (77.17")(L) × 40 mm (1.57")(H) | |
|---------------|---|--|
| Weight | Approx. 22.9 kg (50.5 lbs) | |
| Solar Cells | 72 cells in series (6 × 12 matrix) (Hyundai cell, Made in Korea) | |
| Output Cables | 4 mm² (12AWG) cables with polarized weatherproof connectors, IEC certified (UL listed and UL 4703 certified), Length 1.2 m (47.2") | |
| Junction Box | IP67, weatherproof, IEC certified (UL listed) | |
| Bypass Diodes | 3 bypass diodes to prevent power decrease by partial shade | |
| Construction | Front : Anti-reflection coated glass, 3.2 mm (0.126") Encapsulant : EVA Back Sheet : Weatherproof film | |
| Frame | Clear anodized aluminum alloy type 6063 | |

Installation Safety Guide

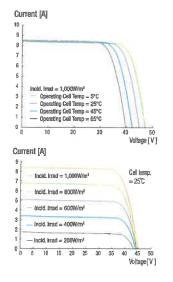
- Only qualified personnel should install or perform maintenance.
- Be aware of dangerous high DC voltage.
- Do not damage or scratch the rear surface of the module.
- Do not handle or install modules when they are wet.

| Cell Temperature | 46°C ± 2 |
|-------------------------|--------------------------------------|
| Operating Temperature | -40 - 85°C |
| Maximum System Voltage | DC 1,500 V (UL) |
| Maximum Reverse Current | 15A (Up to 350W) 20A (Above 355W) |

Module Diagram (unit:mm)



I-V Curves







^{*}All data at STC (Standard Test Conditions). Above data may be changed without prior notice.





NEC Energy Solution's Distributed Storage Solution (DSS®) enables advanced energy management and resiliency services for commercial & industrial customers and the utilities that serve them.

The relationship between utilities and commercial & industrial customers is being transformed as enterprises produce as well as consume electricity and actively manage the amount and timing of their energy use. The fully integrated DSS® platform enables next-generation energy storage-based services on both sides of the electricity meter: reducing energy costs and increasing resiliency for commercial & industrial enterprises, while improving efficiency, predictability, and distributed resource dispatchability for utilities.

The DSS® platform integrates energy storage, power conversion and system controls into a range of flexible outdoor-rated configurations that are simpler, smarter, and safer than other point products. DSS® systems may operate autonomously, within an enterprise energy management system, under utility or local SCADA control, as part of an aggregator's virtual power plant, or any combination of these.



EXAMPLE APPLICATIONS

The DSS® platform allows integrators and service providers to deliver advanced energy management services to enterprises and/or utilities.

For commercial & industrial enterprises, DSS® systems support emerging 'behind-the-meter' services including:

- Demand charge management
- Demand response
- Power quality and resiliency
- Distributed/renewable generation integration
- Time-of-use management

For utilities, DSS® systems deliver distribution grid 'front-of-the-meter' services including:

- Dispatchable load and demand management
- T&D congestion relief and upgrade deferral
- Voltage support
- Renewable capacity firming / ramp management
- Distributed ancillary services

KEY FEATURES



NOTES

- The 710kW option requires separate MV transformer (not included).
- In addition to PCS options shown above, DSS® systems are offered without a PCS enabling custom configurations. The AC interconnect is replaced by a 720V (nominal) DC bus.

Proven Battery Technology

The DSS® platform uses proven industry-leading lithium-ion battery storage technologies, leveraging years of operational experience of NEC Energy Solution's leading GSS® product lines. In the DSS® system, NEC Energy Solutions offers the optimal technology for typical demand charge management and similar peak shaving applications.

Flexible Power Conversion

Pre-integrated, 4 quadrant, bi-directional inverters are available within the DSS® systems. Choose from remote-mounted 100kW, 280kW, or 710W component PCS options, all provided as fully integrated, ready-to-install systems.

Powerful AEROS® Controls

NEC Energy Solution's AEROS® Controls, with C&I optimized Demand Charge Reduction, Peak Shaving, and Load Limiting applications, is provided with every DSS system. The complete AEROS® application suite, including functions for grid ancillary services, volt/VAR control, ramp rate management, and other applications is also available.

Pre-Engineered Environmental Control

Mechanical system optimization and serviceability is key to maximizing overall system life and availability. DSS pre-engineered systems leverage NEC Energy's years of experience developing systems used in harsh environments around the world.

Robust Safety

System safety can never be compromised, and DSS® systems use the same multi-level safety approach — at the cell, module, rack, and system level — for which NEC Energy Solutions is known. Integrated fire suppression is also available as an option.

Installation Simplicity

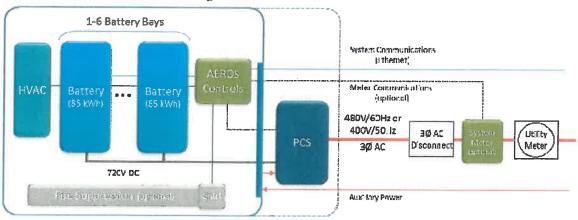
DSS® systems are designed for fast, straightforward installation by typical commercial electrical contractors. Power and communications connections are conventional and common to standard industrial grade facility products.

| Sy | stem Characteristics |
|---|--|
| Energy Options | 85, 170, 255, 340, 425 and 510 kWh |
| Power Conversion Options | 100, 280, and 710 kW ¹ |
| DC Voltage | 720 V |
| Controls | AEROS® Applications Suite |
| AC Interfaces | 480V / 60Hz or 400VAC / 50Hz 3Ø, 4 wire |
| Communications | Ethernet/IP HTTP/HTTPS Modbus (TCP/IP) Options for DNP3.0, IEC61850 |
| Enclosures | NEMA 4 / IP65, in 2, 4 and 6 bay configurations Separate PCS cabinets rated IP54 |
| Operating Temp | -25°C to 50°C |
| Standards and Compliance (partial list) | UL 9540, 1973, 1642 IEC 61508, 62040-1; UN 38.3, CE, NFPA 70 FCC CPR Part 15, Class A IEC 61000-6-2,4,5 & -7 PCS: UL 1741(SA), G59/3, IEEE 1547 |

 ^{100, 280} and 710 kW PCS options provided in separate, pre-integrated, remotely mounted cabinets.

EXAMPLE INSTALLATION

DSS® - Distributed Storage Solution



NEC Energy Solutions, Inc. makes no warranty explicit or implied with this data sheet. Not for construction. Contents subject to change without notice.



NEC Energy Solutions, Inc.

Phone: +1.508.497.7319
Web: www.neces.com

HEC-US_{V1500}

UTILITY SCALE SOLAR INVERTER



















HEC-US V1500

The new Power Electronics HEC-US V1500 outdoor inverters are powerful and reliable 1500Vdc utility scale PV units for the US market. The HEC-US V1500 inverter family has 25 different UL-1741 certified models ranging from 1MW to 3MW with no derating at 50°C and a 98.5% CEC rated efficiency.

Power Electronics designs and manufactures 1700Vdc power converters for market leading customers in the mining, oil & gas and water industries and for the most demanding environments. With up to 7 425KW power modules connected in parallel, the HEC-US V1500 is a multilevel 1500Vdc system built on the Power Electronics expertise in >1,000Vdc systems and the proven Freesun HEC modular topology. The HEC-US V1500 has a standard stainless steel enclosure and best-in-class cooling at 50°C without derating to ensure reliable performance in the most demanding conditions.

Power Electronics offers customized NEC2014 compliant FSDK15 external DC Recombiner cabinets. The FSDK15 includes user specified overcurrent protection up to 400 Amps with 16 or 32 inputs to support higher ratio DC:AC PV designs. FSDK15 cabinets include current monitoring.

Power Electronics continues to evolve with the solar industry and the HEC-US V1500 is designed specifically to meet the new demand for 1500Vdc PV systems.

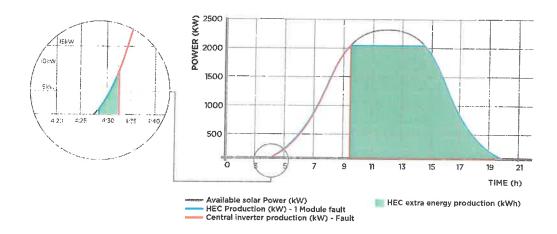
THE MOST POWERFUL AND RELIABLE 1500Vpc UL-1741 CERTIFIED UTILITY-SCALE PV INVERTER IN THE MARKET



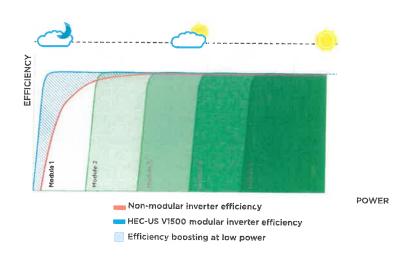
AUTOMATIC REDUNDANT POWER MODULE SYSTEM (ARPMS)

The HEC-US V1500 topology combines the advantages of a central inverter with the availability of string inverters. HEC-US V1500 is a modular central inverter based on an Automatic Redundant Power Module (350kVA to 500kVA per stage).

If there is a fault in one power module, it is taken off-line and its output power is distributed evenly among the remaining functioning modules. All power modules work in parallel controlled by a dual redundant main control. As the main governor of the system it is responsible for the MPPt tracking, synchronization sequence and overall protection. The automatic redundant capability based on our industrial systems is able to shift the main control in the event of a fault, restoring the backup control and restarting the station to guarantee high availability. (patent pending)



A modular inverter is more efficient than a standard central inverter. During low radiation conditions, a modular architecture uses the correct number of power modules to provide power, while a central inverter must consume power internally to support the entire system. With lower losses, a modular inverter can provide power earlier in the morning and stop later at the end of the day. As a result, throughout the entire service life of the PV plant, the HEC-US V1500 inverter generates higher yields than a standard central inverter with a higher reliability than string inverters.





REVOLUTIONARY COOLING SYSTEM

The Power Electronics HEC-US V1500 series includes the innovative and sophisticated iCOOL V performance that allows HEC-US V1500 to work up to $140^{\circ}F$ ($60^{\circ}C$) at nominal power. The cooling system iCOOL V smartly cools the inverter, regulating the cooling system capacity depending on data from the temperature sensors.

HEC-US V1500 modules are divided into two main areas: clean area (electronics) and hot area (heat sink). The electronics are totally sealed in a NEMA4 area and use a temperature control low flow cooling system that reduces filters clogging and maintenance intervals. The hot area integrates a speed controlled fan for each module, simplifying the cooling system and reducing the maintenance tasks.

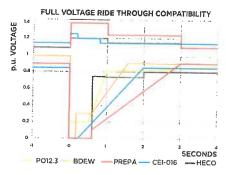
Furthermore, due to the modular topology, the iCOOL V reduces the Stand-by consumption at low capacity to the maximum, boosting the cooling capacity for photovoltaic installations situated up to 4000 meters above sea level. (patent pending)



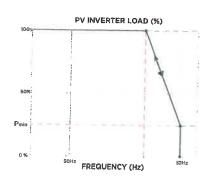


DYNAMIC GRID SUPPORT

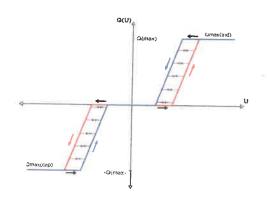
HEC-US V1500 firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Antiislanding, active and reactive power curtailment...), and is compatible with all the specific requirements of the utilities.

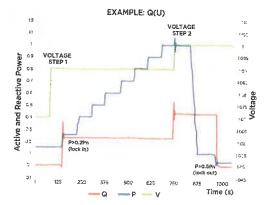


▲ LVRT or ZVRT (Low Voltage Ride Through). Inverters can withstand any voltage dip or profile required by the local utility. The inverter can immediately feed the fault with full reactive power, as long as the protection limits are not exceeded.

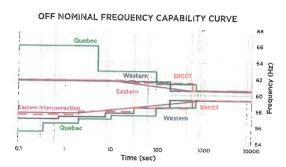


▲ FRS (Frequency Regulation System).
Frequency droop algorithm curtails the active power along a preset characteristic curve supporting grid stabilization.

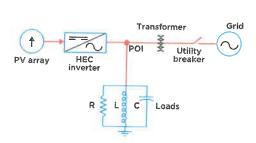




▲ Q(V) curve: It is a dynamic voltage control function which provides reactive power in order to maintain the voltage as close as possible to its nominal value.



▲ FRT (Frequency Ride Through): Freesun solar inverters have flexible frequency protection settings, and can be easily adjusted to comply with future requirements.



ISLANDING CONDITION

▲ Anti-islanding: This protection combines passive and active methods that eliminates nuisance tripping and reduces grid distortion according to IEC 62116 and IEEE1547.



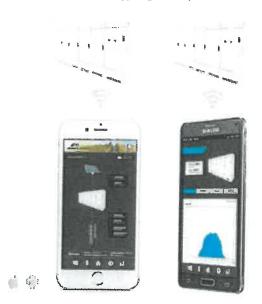
VAR AT NIGHT

At night, the HEC-US V1500 inverter can shift to reactive power compensation mode. The inverter can respond to an external dynamic signal, a Power Plant Controller command or pre-set reactive power level (kVAr).



EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wifi, allowing remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors. The app user friendly interface allows quick and easy access to critical information (energy registers, production and events).





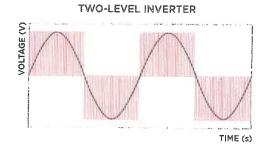
ACTIVE HEATING

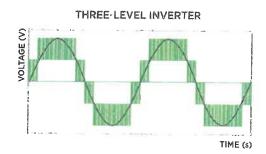
At night, when the unit is not actively exporting power, the inverter can import a small amount of power to keep the inverter internal ambient temperature above -20°C, without using external resistors. This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing the maintenance. (patented)



MULTILEVEL TOPOLOGY

The multilevel IGBT topology makes the difference in the 1500Vdc technology, being the most efficient way to manage high DC link voltages. Based in our long IGBT experience components used in the HEC PLUS series, the HEC-US V1500 takes profit of the three level IGBT topology reducing the power stage losses, increasing the efficiency and offering a very low total harmonic distortion.







| | | SE SERVICE PROPERTY. | 690VAC | - MPPt Window S | 76V-1310V | |
|-----------------------------|---|----------------------|------------------------------------|---|------------------------|--------------------|
| | | FRAME 3 | FRAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
| NUM | BER OF MODULES | 3 | 4 | 5 | 6 | 7 |
| REF | ERENCE | FS1275CU15 | FS1700CU15 | FS2125CU15 | FS2550CU15 | FS3000CU15 |
| | AC Output Power(kVA/kW) @50°C | 1275 | 1700 | 2125 | 2550 | 3000 |
| | AC Output Power(kVA/kW) @25°C [1] | 1530 | 2040 | 2550 | 3060 | 3500 |
| | AC Output Power(kW) @50°C; PF=0.9 | 1150 | 1530 | 1910 | 2250 | 2700 |
| 5 | Max. AC Output Current (A) @25°C | 1285 | 1710 | 2140 | 2570 | 3000 |
| DUTPUT | Operating Grid Voltage (VAC) | | | 690V ±10% | 23/0 | 3000 |
| 5 | Operating Grid Frequency (Hz) | | | 60Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% per IEEE519 | | |
| | Power Factor (cosine phi) (2) | | 0.0 leading 0.0 la | gging / Reactive Pov | ver injection at night | |
| | Power Curtailment (kVA) | | | 0100% / 0.1% Steps | | |
| | MPPt @full power (VDC) [1] | | | 976V - 1310V | | |
| 5 | Maximum DC voltage | | | 1500V | | |
| HNPUT | Minimum Start Voltage Max. DC continuous current (A) | 1000 | | 00V - User configural | ble | |
| | Max. DC short circuit current (A) | 1600 2320 | 2140 3100 | 2675 | 3210 | 3745 |
| 95 ≻ | Efficiency (Max) (n) | 98.5% | 98.7% | 3880 | 4650 | 5450 |
| 주 년 | CEC (n) | , | | 98.7% | 98.7% | 98.7% |
| SE | | 98.0% | 98.5% | 98.5% | 98.5% | 98.5% |
| EFFICIENCY & AUX. SUPPLY | Max. Standby Consumption (Pnight) | | < ap | oprox. 50W/per mod | lule | |
| ਜ਼ਕ | Control Power Supply | 120V / 20 | 08VAC-6kVA power | supply available for e | external equipment (| optional) |
| | Dimensions [WxDxH] [inches] | 119.6"x37.2"x86.5" | 147.6"x37.2"x86.5" | 175.7"x37.2"x86.5" | 203.8"x37.2"x86.5" | 231.9"x37.2"x86.5" |
| 듑 | Dimensions [WxDxH] [mm] Weight (kg) | 3038x945x2198 | 3751x945x2198 | 4464x945x2198 | 5177x945x2198 | 5890x945x2198 |
| CABINET | Weight (lbs) | 2635 | 3290 | 3945 | 4600 | 5255 |
| 2 | Air Flow | 5809 | 7253 | 8697 | 10141 | 11585 |
| | Type of ventilation | | Bottom | intake. Exhaust top r Forced air cooling | ear vent. | |
| | Degree of protection | | | NEMA 3R | | |
| ENVIRON- | Permissible Ambient Temperature | -31°F | to +140°F, -35°C ^[3] to | +60°C / Active Pov | ver derating >50°C/1 | 22°F |
| A K | Relative Humidity | | 0% t | o 100% non condens | ing | |
| ũ | Max. Altitude (above sea level) Noise level [4] | | 2000m/>200 | Om power derating (| Max. 4000m) | |
| | Interface | | Graphic Dienlay (in | < 79 dBA | | |
| _ W | Communication protocol | | Graphic Display (in | side cabinet) / Option | onal Freesun App | |
| % ₹ 7 | Power Plant Controller | | | Optional | | |
| CONTROL | Keyed ON/OFF switch | | | Standard | | |
| OZ | Digital I/O | | | User configurable | | |
| | Analog I/O | | | User configurable | | |
| | Convert St. II S | | Floating PV arr | ray: Isolation Monitor | ing per MPP | |
| un un | Ground Fault Protection | Onti | NEC2014 Grou | inded PV Array: GFD | I protection | |
| Š. | Humidity control | Opti | onal PV Array transfe | er KIC: GFDI and Isola: Active Heating | tion monitoring devi | ce |
| PROTECTIONS | General AC Protection & Disconn. | | | Circuit Breaker | | |
| Ď | General DC Protection & Disconn. | | External (| Disconnecting Unit C | abinet | |
| 2 | Module AC Protection & Disconn. | | A | C contactor & fuses | | |
| | Module DC Protection Overvoltage Protection | | . ~ | DC fuses | | |
| 7 2 12 | Safety | | | DC protection (type | | |
| IS SER | - | | | 41; CSA 22.2 No.107.1- | | |
| U | Utility interconnect | | IEEE 1547 with U | tility Interactive Con | trol functions | |

NOTES [1] Values at 1.00 ·Vac nom and $\cos \Phi = 1$. Consult Power Electronics for derating curves. [2] Consult P-Q charts available: $Q(kVAr) = \sqrt{(S(kVA)^2 - P(kW)^2)}$ [3] Heating kit option required below -20 °C, [4] Sound pressure level at a distance of 1m from the rear part.



| | | | 645VAC | - MPPt Window 9 | 913V-1310V | Yes MATE |
|-----------------------------|---|-------------------------------------|-----------------------|-----------------------------------|------------------------|--------------------|
| | | FRAME 3 | FRAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
| | BER OF MODULES | 3 | 4 | 5 | 6 | 7 |
| REFE | RENCE | FS1200CU15 | FS1600CU15 | FS2000CU15 | F\$2400CU15 | FS2800CU15 |
| | AC Output Power(kVA/kW) @50°C □ | 1200 | 1600 | 2000 | 2400 | 2800 |
| | AC Output Power(kVA/kW) @25°C [1] | 1430 | 1910 | 2390 | 2860 | 3345 |
| | AC Output Power(kW) @50°C; PF=0.9 | 1080 | 1440 | 1800 | 2160 | 2520 |
| 5 | Max. AC Output Current (A) @25°C | 1285 | 1710 | 2140 | 2570 | 3000 |
| TUMTUO | Operating Grid Voltage (VAC) | | | 645V ±10% | 2070 | 3000 |
| ō | Operating Grid Frequency (Hz) | | | 60Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% per IEEE519 | | |
| | Power Factor (cosine phi) [2] | | 0.0 leading 0.0 la | agging / Reactive Pov | ver injection at night | |
| | Power Curtailment (kVA) | | | O100% / 0.1% Steps | | • |
| | MPPt @full power (VDC) ^m | | | 913V - 1310V | • | |
| 5 | Maximum DC voltage | | | 1500V | | |
| INPUT | Minimum Start Voltage | | 10 | 75V - User configura | ble | |
| | Max. DC continuous current (A) | 1600 | 2140 | 2675 | 3210 | 3745 |
| est . | Max. DC short circuit current (A) Efficiency (Max) (n) | 2320 | 3100 | 3880 | 4650 | 5450 |
| EFFICIENCY & AUX. SUPPLY | CEC (n) | 98.4% | 98.5% | 98.6% | 98.6% | 98.6% |
| E S | Max. Standby Consumption (Pnight) | 98.0% | 98.0% | 98.5% | 98.5% | 98.5% |
| FE S | Control Power Supply | 4001440 | | pprox. 50W/per moo | | |
| | | | | supply available for e | | optional) |
| | Dimensions [WxDxH] [inches] Dimensions [WxDxH] [mm] | 119.6"x37.2"x86.5" 3038x945x2198 | 147.6"x37.2"x86.5" | 175.7"x37.2"x86.5" | 203.8"x37.2"x86.5" | 231.9"x37.2"x86.5" |
| Ä | Weight (kg) | 2635 | 3751x945x2198 3290 | 4464x945x2198 3945 | 5177x945x2198 | 5890x945x2198 |
| CABINET | Weight (lbs) | 5809 | 7253 | 8697 | 4600 10141 | 5255 |
| U | Air Flow | | | intake. Exhaust top r | | 11585 |
| | Type of ventilation | | | Forced air cooling | cai verit. | |
| ÷ | Degree of protection | | | NEMA 3R | | |
| Z Z | Permissible Ambient Temperature Relative Humidity | -31°F | | o +60°C / Active Pov | | 122°F |
| ENVIRON- MENT | Max. Altitude (above sea level) | | | to 100% non condens | | |
| и | Noise level [4] | | 2000m / >200 | 00m power derating (< 79 dBA | (Max. 4000m) | |
| | Interface | G | ranhic Display (incid | e cabinet) / Optional | Evansum Ann dieule | |
| ₌ K | Communication protocol | · · | opine Display (ilisia | Modbus TCP | Preesun App display | y |
| FA | Power Plant Controller | | | Optional | | |
| INTERFACE | Keyed ON/OFF switch | | | Standard | | |
| Z | Digital I/O | | | User configurable | | |
| | Analog I/O | | | User configurable | | |
| | 0 1 - 1 - 1 - 1 | | Floating PV a | ray: Isolation Monitor | ring per MPP | |
| so. | Ground Fault Protection | | NEC2014 Gro | unded PV Array: GFD | I protection | |
| PROTECTIONS | Humidity control | Opt | onal PV Array transi | fer kit: GFDI and Isola | tion monitoring devi | ce |
| E . | General AC Protection & Disconn. | | | Active Heating Circuit Breaker | | |
| | General DC Protection & Disconn. | | External | Disconnecting Unit C | ahinet | |
| Z. | Module AC Protection & Disconn. | | | C contactor & fuses | -uonset | |
| | Module DC Protection | | | DC fuses | | |
| | Overvoltage Protection | | AC an | d DC protection (type | e 2) | |
| SNS | Safety | | UL 17 | 741; CSA 22.2 No.107.1- | -01 | |
| - 2 | Utility interconnect | | IEEE 15 47 . W | Jtility Interactive Con | | |

- NOTES [1] Values at 1.00 Vac nom and cos Φ = 1. Consult Power Electronics for derating curves. [2] Consult P-Q charts available: Q(kVAr) = √(S(kVA)²-P(kW)²) [3] Heating kit option required below -20°C. [4] Sound pressure level at a distance of 1m from the rear part.



| | | ALLES REVENUE | 630VAC | - MPPt Window 8 | 391V-1310V | 100 Test 100 Test |
|-----------------------------|------------------------------------|--------------------|-----------------------|--|------------------------|--------------------|
| | | FRAME 3 | FRAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
| NUMI | BER OF MODULES | 3 | 4 | 5 | 6 | 7 |
| REFE | RENCE | FS1270CU15 | FS1695CU15 | F\$2120CU15 | FS2540CU15 | FS3001CU15 |
| | AC Output Power(kVA/kW) @50°C [1] | 1180 | 1570 | 1965 | 2360 | 2750 |
| | AC Output Power(kVA/kW) @40°C | 1270 | 1695 | 2120 | 2540 | 3000 |
| | AC Output Power(kVA/kW) @25°C [1] | 1400 | 1870 | 2340 | 2800 | 3275 |
| | Max. AC Output Current (A) @50°C | 1080 | 1440 | 1800 | 2160 | 2520 |
| 5 | Max. AC Output Current (A) @40°C | 1165 | 1550 | 1940 | 2330 | 2715 |
| OUTPUT | Max. AC Output Current (A) @25°C | 1285 | 1710 | 2140 | 2570 | 3000 |
| 0 | Operating Grid Voltage (VAC) | | | 630V ±10% | | |
| | Operating Grid Frequency (Hz) | | | 60Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% per IEEE519 | | |
| | Power Factor (cosine phi) [2] | | 0.0 leading 0.0 la | igging / Reactive Pov | ver injection at night | |
| | Power Curtailment (kVA) | | | 0100% / 0.1% Steps | | |
| | MPPt @full power (VDC) | | @50°C 891V-1310V | / @40°C 891V-1285V | | |
| E | Maximum DC voltage | | G00 0 0017 1010 7 | 1500V | / @25°C 651V-1250V | |
| TUPNI | Minimum Start Voltage | | 10 | 50V - User configura | ble | |
| = | Max. DC continuous current (A) | 1600 | 2140 | 2675 | 3210 | 3745 |
| | Max. DC short circuit current (A) | 2320 | 3100 | 3880 | 4650 | 5450 |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (η) Preliminary | | | 98.5% | | |
| SUP | CEC (n) Preliminary | | | 98.5% | | |
| EX. | Max. Standby Consumption (Pnight) | | < a | pprox. 50W/per mod | ule | |
| ਜ਼∢ | Control Power Supply | 120V / 2 | 08VAC-6kVA power | supply available for e | external equipment (c | optional) |
| | Dimensions [WxDxH] [inches] | 119.6"x37.2"x86.5" | 147.6"x37.2"x86.5" | 175.7"x37.2"x86.5" | 203.8"x37.2"x86.5" | 231.9"x37.2"x86.5" |
| 5 | Dimensions [WxDxH] [mm] | 3038x945x2198 | 3751x945x2198 | 4464x945x2198 | 5177×945×2198 | 5890x945x2198 |
| CABINET | Weight (kg) | 2635 | 3290 | 3945 | 4600 | 5255 |
| 5 | Weight (lbs) Air Flow | 5809 | 7253 | 8697 | 10141 | 11585 |
| | Type of ventilation | | Bottom | intake. Exhaust top r | ear vent. | |
| | Degree of protection | | | Forced air cooling | | |
| ż. | Permissible Ambient Temperature | -7 | 1°E to +140°E -35°C | NEMA 3R (3) to +60°C / Power (| dovoting > 4000/10/40 | - |
| ENVIRON- MENT | Relative Humidity | J | 0%1 | to 100% non condens | ina | - |
| ž | Max. Altitude (above sea level) | | | Om power derating (| | |
| | Noise level [4] | | | < 79 dBA | | |
| | Interface | | Graphic Display (ir | nside cabinet) / Optio | onal Freesun App | |
| CONTROL | Communication protocol | | | Modbus TCP | | |
| R F | Power Plant Controller | | Compatible | with third party SCAE | DA controls | |
| | Keyed ON/OFF switch | | | Standard | | |
| = | Digital I/O | | | User configurable | | |
| | Analog I/O | | | User configurable | | |
| | Ground Fault Protection | | Floating PV ar | ray: Isolation Monitor | ing per MPP | |
| 52 | Ground Fault Protection | Ont | NEC2014 Gro | unded PV Array: GFD | l protection | |
| ē | Humidity control | Орг | ional PV Array (ransi | er kit: GFDI and Isola Active Heating | tion monitoring device | ce |
| PROTECTIONS | General AC Protection & Disconn. | | | Circuit Breaker | | |
| 6 | General DC Protection & Disconn. | | External | Disconnecting Unit C | abinet | |
| 쫎 | Module AC Protection & Disconn. | | | C contactor & fuses | | |
| | Module DC Protection | | | DC fuses | | |
| ** | Overvoltage Protection | | AC an | d DC protection (type | e 2) | |
| SNS SNS | Safety | | UL 1741; C | SA 22.2 No.107.1-01 (p | ending) | |
| # × | Utility interconnect | | IEEE 1547 with I | Utility Interactive Con | tral functions | |

- NOTES [1] Values at 1.00+Vac nom and cos Φ= 1. Consult Power Electronics for derating curves. [2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)²-P(kW)²) [3] Heating kit option required below -20°C [4] Sound pressure level at a distance of 1m from the rear part.



| | | | 600VAC | - MPPt Window 8 | 49V-1310V | SECTION STATE |
|-----------------------------|--|--------------------|------------------------------------|---|------------------------|--------------------|
| | | FRAME 3 | FRAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
| NUME | BER OF MODULES | 3 | 4 | 5 | 6 | 7 |
| REFE | RENCE | FS1100CU15 | F\$1475CU15 | FS1850CU15 | FS2225CU15 | FS2600CU15 |
| | AC Output Power(kVA/kW) @50°C [1] | 1100 | 1475 | 1850 | 2225 | 2600 |
| | AC Output Power(kVA/kW) @25°C [1] | 1335 | 1780 | 2225 | 2660 | 3110 |
| | AC Output Power(kW) @50°C; PF=0.9 | 990 | 1325 | 1665 | 2000 | 2340 |
| 5 | Max. AC Output Current (A) @25°C | 1285 | 1710 | 2140 | 2570 | 3000 |
| DUTPUT | Operating Grid Voltage (VAC) | | | 600V ±10% | | |
| ŏ | Operating Grid Frequency (Hz) | | | 60Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% per IEEE519 | | |
| | Power Factor (cosine phi) [2] | | 0.0 leading 0.0 la | gging / Reactive Pov | ver injection at night | |
| | Power Curtailment (kVA) | | | O100% / O.1% Steps | | |
| | MPPt @full power (VDC) [1] | | | 849V - 1310V | | |
| 5 | Maximum DC voltage | | | 1500V | | |
| NPUT | Minimum Start Voltage | | | 50V - User configura | | |
| | Max. DC continuous current (A) Max. DC short circuit current (A) | 1600 2320 | 2140 3100 | 2675 | 3210 | 3745 |
| ĕ ≥ | Efficiency (Max) (η) | 98.4% | 98.5% | 3880 98.6% | 4650 98.6% | 5450 98.6% |
| EFFICIENCY & AUX. SUPPLY | CEC (n) | 98,0% | 98.0% | 98.5% | 98.5% | 98.5% |
| . S S | Max. Standby Consumption (Pnight) | 00.070 | | oprox, 50W/per mod | | 36.376 |
| ES. | Control Power Supply | 120V / 20 | 08VAC-6kVA power | | | ontional) |
| | Dimensions [WxDxH] [inches] | 119.6"x37,2"x86.5" | 147.6"x37.2"x86.5" | 175.7"x37.2"x86.5" | 203.8"x37.2"x86.5" | 231.9"x37.2"x86.5" |
| - | Dimensions [WxDxH] [mm] | 3038x945x2198 | 3751x945x2198 | 4464x945x2198 | 5177x945x2198 | 5890x945x2198 |
| CABINET | Weight (kg) | 2635 | 3290 | 3945 | 4600 | 5255 |
| CAE | Weight (lbs) | 5809 | 7253 | 8697 | 10141 | 11585 |
| | Air Flow Type of ventilation | | Bottom | intake. Exhaust top r | ear vent. | |
| | Degree of protection | | | Forced air cooling NEMA 3R | | |
| ENVIRON- MENT | Permissible Ambient Temperature | -31°F | to +140°F, -35°C ^[3] to | | ver derating >50°C/1 | 22°F |
| EN S | Relative Humidity | | | to 100% non condens | | decides 1 |
| E - | Max. Altitude (above sea level) | | 2000m/>200 | Om power derating (| (Max. 4000m) | |
| | Noise level [4] | | | < 79 dBA | | |
| | Interface | | Graphic Display (in | side cabinet) / Opti | onal Freesun App | |
| INTERFACE | Communication protocol Power Plant Controller | | | Modbus TCP | | |
| E E | Keyed ON/OFF switch | | | Optional | | |
| 3 2 | Digital I/O | | | Standard User configurable | | |
| | Analog I/O | | | User configurable | | |
| | , 110.03 , 0 | | Floating PV ar | ray: Isolation Monitor | ring per MDD | |
| | Ground Fault Protection | | | unded PV Array: GFL | | |
| NS NS | | Opt | ional PV Array transf | | tion monitoring devi | ce |
| Ĕ | Humidity control General AC Protection & Disconn. | | | Active Heating | | |
| Ĭ | General DC Protection & Disconn. | | Extornal | Circuit Breaker Disconnecting Unit (| `ahinat | |
| PROTECTIONS | Module AC Protection & Disconn. | | | .C contactor & fuses | Labinet | |
| - | Module DC Protection | | / | DC fuses | | |
| | Overvoltage Protection | | AC an | d DC protection (typ | e 2) | |
| FICA- | Safety | | UL 17 | '41; CSA 22.2 No.107.1 | -01 | |
| | | | | | | |

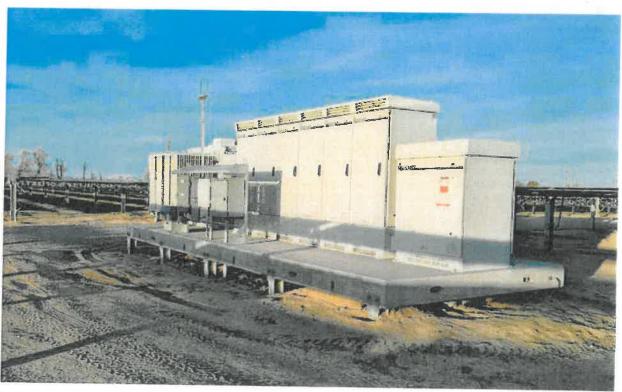
- NOTES [1] Values at 1.00 Vac nom and cos Φ= 1. Consult Power Electronics for derating curves. [2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)²-P(kW)²) [3] Heating kit option required below -20°C. [4] Sound pressure level at a distance of 1m from the rear part.



| | | GALIFORNIA (SE | | - MPPt Window 8 | 00V-1310V | ALS THE PARTY |
|-----------------------------|---|--------------------|------------------------|--|-------------------------------------|----------------------|
| | | FRAME 3 | FRAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
| | IBER OF MODULES | 3 | 4 | 5 | 6 | 7 |
| REF | ERENCE | FS1050CU15 | FS1400CU15 | FS1750CU15 | FS2100CU15 | FS2450CU15 |
| | AC Output Power(kVA/kW) @50°C | 1050 | 1400 | 1750 | 2100 | 2450 |
| | AC Output Power(kVA/kW) @25°C [1] | 1250 | 1675 | 2090 | 2510 | 2930 |
| | AC Output Power(kW) @50°C; PF=0.9 | 945 | 1260 | 1575 | 1890 | 2205 |
| 5 | Max. AC Output Current (A) @25°C | 1285 | 1710 | 2140 | 2570 | 3000 |
| OUTPUT | Operating Grid Voltage (VAC) | | | 565V ±10% | 2570 | 3000 |
| ٥ | Operating Grid Frequency (Hz) | | | 60Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% per IEEE519 | | |
| | Power Factor (cosine phi) [2] | | 0.0 leading 0.0 la | gging / Reactive Pov | ver injection at night | |
| | Power Curtailment (kVA) | | | O100% / O.1% Steps | | |
| | MPPt @full power (VDC) [1] | | | 800V - 1310V | | |
| TUMN | Maximum DC voltage | | | 1500V | | |
| Z | Minimum Start Voltage Max. DC continuous current (A) | | | 50V - User configural | ble | |
| | Max. DC short circuit current (A) | 1600 2320 | 2140 | 2675 | 3210 | 3745 |
| «» | Efficiency (Max) (n) | 98,2% | 3100 | 3880 | 4650 | 5450 |
| EFFICIENCY & AUX. SUPPLY | CEC (ŋ) | 98.0% | 98.4% 98.0% | 98.5% 98.0% | 98.5% | 98.5% |
| X.S. | Max. Standby Consumption (Pnight) | | | pprox. 50W/per mod | 98.5% | 98.5% |
| A S | Control Power Supply | 1201/ / 20 | | | | |
| | Dimensions [WxDxH] [inches] | 119.6"x37.2"x86,5" | 147.6"x37.2"x86,5" | supply available for e 175.7"x37.2"x86.5" | | |
| la. | Dimensions [WxDxH] [mm] | 3038x945x2198 | 3751x945x2198 | 4464x945x2198 | 203.8"x37.2"x86.5" 5177x945x2198 | 231.9"x37.2"x86,5 |
| N. | Weight (kg) | 2635 | 3290 | 3945 | 4600 | 5890x945x219 5255 |
| CABINET | Weight (lbs) | 5809 | 7253 | 8697 | 10141 | 11585 |
| | Air Flow | | Bottom | intake. Exhaust top re | ear vent. | 71000 |
| | Type of ventilation Degree of protection | | | Forced air cooling | | |
| ż. | Permissible Ambient Temperature | .710⊏ | to ±140°E 7E°C[3] to | NEMA 3R | | |
| ₩ ₩ ₩ | Relative Humidity | -51 F | 10 +140 F, -35-Cisi (c | +60°C / Active Pow o 100% non condensi | rer derating >50°C/1 | 22°F |
| ENVIRON- MENT | Max Altitude (above sea level) | | | Om power derating (I | | |
| | Noise level [4] | | | < 79 dBA | Taxi (000iii) | |
| | Interface | | Graphic Display (in | side cabinet) / Optio | nal Freesun App | |
| N N | Communication protocol | | | Modbus TCP | | |
| Z E | Power Plant Controller Keyed ON/OFF switch | | | Optional | | |
| INTERFACE | Digital I/O | | | Standard | | |
| | Analog I/O | | | User configurable | | |
| | . malog i, o | | | User configurable | | |
| | Ground Fault Protection | | NEC2014 Grou | ray: Isolation Monitori Inded PV Array: GFD | ng per MPP | |
| SS | | Opti | onal PV Array transfe | er kit: GFDI and Isolat | ion monitorina devi | ne ne |
| Ĕ | Humidity control | | | Active Heating | | |
| Ĕ | General AC Protection & Disconn. General DC Protection & Disconn. | | | Circuit Breaker | | |
| PROTECTIONS | Module AC Protection & Disconn, | | | Disconnecting Unit Ca | abinet | |
| _ | Module DC Protection | | AG | C contactor & fuses | | |
| | Overvoltage Protection | | AC and | DC fuses IDC protection (type | . 2) | |
| FICA- | Safety | | | 41; CSA 22.2 No.107.1-(| | |
| | | | QE 17- | , 140.10/. -(| √1 | |

NOTES [i] Values at 1.00 • Vac nom and cos Φ= 1. Consult Power Electronics for derating curves. [2] Consult P-Q charts available: Q(kVA/p=√(S(kVA)²-P(kW)²) [3] Heating kit option required below -20°C. [4] Sound pressure level at a distance of 1m from the rear part.







PURE ENERGY

ENERGY STORAGE POWER QUALITY



PURE ENERGY

Pure Energy is our morivation for leading the renewable energy generation, it is the search for product and service perfection, it is our vision of a world, clean and sustainable for our children and future generations.



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| POWER ELECTRONICS | |
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starters for low and medium voltage AC motor applications. This experience has allowed Power Electronics to position designs, fastest global delivery times and unbeatable 24/7been producing high power variable speed drives and soft inverters thanks to our unique product features, patented manufactures its Freemaq converters in Valencia, Spain Power on Support. Power Electronics fully designs and and is proud to have some of the most advanced R&D itself as the leading manufacturer of utility scale solar Since 1987 Power Electronics Industrial division has laboratories and factories in the industry.



30 YEARS OF PRODUCT EXCELLENCE



() INTERNATIONAL PRESENCE







INDEPENDENT REPORTS AND CERTIFICATIONS



SUSTAINABLE GROWTH

Engineering & Consulting

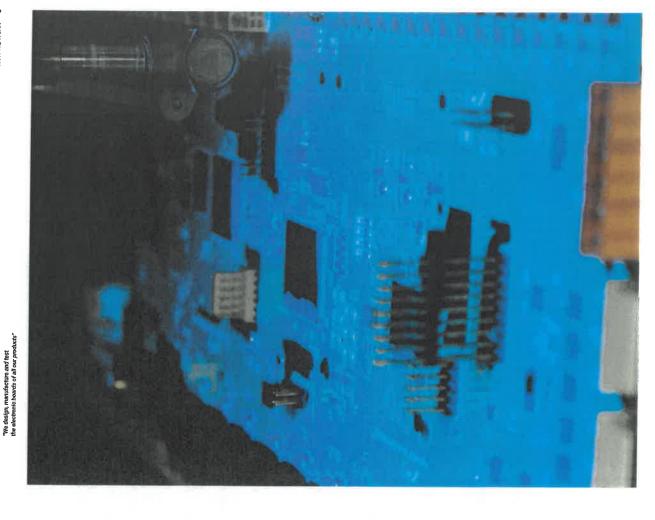
Energy projects often require customer specific solutions, for this reason our clients also have our Engineering and Consulting department at their disposal, which comprise a wide number of highly skilled and experienced engineers that are available to modify our standard product to suit customer demands and ensure our clients get the product they need.

TECHNICAL ADVICE
ENGINEERING
CUSTOMIZED SOLUTIONS
PROJECT MANAGEMENT
COMMISSIONING
2477 SERVICE

VERTICAL INTEGRATION

Flexibility and specialization play a key role in the manufacture of standard products, but even more so in personalized products. We design and manufacture integrally the mechanics of our equipment. Vertical Integration gives us the flexibility to adapt to customer requirements and still provide very short delivery times.

(NNOVATION & DESIGN FLEXIBILITY HIGH QUALITY COMPONENTS RELABLE ENGINEERING FACTORY TESTED VALUE CHAIN SUPERVISION IMMEDIATE DELIVERY





AVAILABILITY

G

CUSTOMER SUPPORT

ONSITE ASSISTANCE (

@

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POWER ON SUPPORT

strategy implemented by Power Electronics since its origins more than 30 years ago with 24/7 after sales service available for all our customers and end users without the need of Power on Support is the concept of a customer oriented signing an O&M contract.

Customer Oriented Strategy.

WORLDWIDE PRESENCE

have been key elements for the development of the company.

Thanks to the global expansion in the five continents, today we have presence and provide technical service throughout the world. From the beginning, customer service and internationalization



KINODOM MEXICO .

. JAPAN

● DUBAI

ZEALAND

+12GW

SALES COUNTRIES

+100

DELEGATIONS

INVERTERS INSTALLED

+126W
ANNUAL CAPACITY PRODUCTION

ROBUST DESIGN



Polymeric Painting



Closed-Cell Insulation



Galvanized Steel | Stainless Steel (Optional)

Freemaq series has been designed to last for more than 30 years of operation in harsh environments and extreme weather conditions. Freemaq units are tested and ready to withstand conditions from the frozen siberian tundra to the californian Death Valley, featuring:

Totally sealed electronics cabinet protects electronics against dust and moisture.

Conformal coating on electronic boards shields PCBs from harsh atmospheres.

Temperature and humidity controlled active heating prevents internal water condensation.

Galvanized Steel construction with 2mm thickness for maximum enclosure longevity. (Stainless Steel Optional)

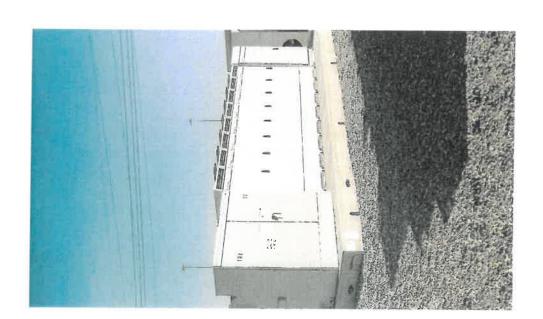
Closed-Cell insulation panel isolates the cabinet from solar heat gains.

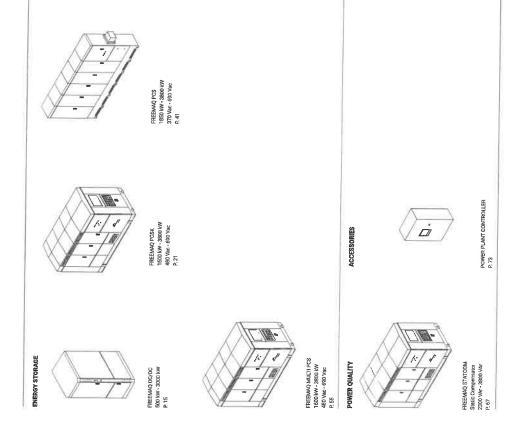
Roof cover designed to dissipate solar radiation, reduce heat build-up and avoid water leakages. The solid structure avoids the need of additional external structures.

Random units selected to pass a Factory Water Tightness Test ensuring product quality.

C4 degree of protection according to ISO 12944. Up to C5-M optional.

PRODUCT RANGE





FREEMAQ DC/DC

POWER ELECTRONICS

BI-DIRECTIONAL DC/DC CONVERTER



MODULAR DESIGN



OUTDOOR DURABILITY



CLIPPING RECOVERY CAPABILITY



FOR NEW AND EXISTING PLANTS

(m)

COMPETITIVE SOLUTION FOR SOLAR + STORAGE THE MOST COST INSTALLATIONS

tional DC converter designed to maximize the benefits of the large-scale solar plants with a solar-plus-storage approach, The new Power Electronics Freemaq DC/DC is a bi-direcreduce the CAPEX of PV installations coupled with energy storage systems, avoiding the installation of an additional offering a cuttingedge technology product that is able to station with a dedicated MV transformer.

DC/DC is a modular outdoor solution available from 500kW to cost-competitive solution for battery storage systems paired 3000kW, fully compatible with different battery technologies and manufacturers, with a voltage range up to 1500Vdc and Following the Power Electronics philosophy, the Freemag the highest efficiency in the market. This product has been designed to be easily integrated with a Freesun inverter in new or already installed PV power plants, being the most with PV installations.

functions such as: energy shifting, ramp control rate, frequency response, and most importantly, clipping energy recovery, that will boost customer revenues. By coupling the Power Electronics Freemaq DC/DC converter with a Freesun solar inverter, it is possible to perform



LOAD LEVELING

ENERGY STORAGE APPLICATIONS

this energy when there is a higher demand. This has the beneperiods. It also allows grid operators to supply electricity with a higher renewable origin. Since PV generation may not be at periods of low demand from the grid, in order to later supply fit of selling the energy at a higher market price during peak the same time as peak demand, this facilitates the flexibility Freemaq DC/DC series are able to store energy during and integration of renewable generation into the grid.



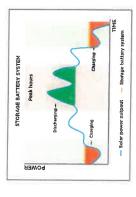
RENEWABLE INTEGRATION

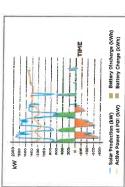
transient conditions experienced by the PV array. The system monitors the PV inverter output to inject or consume power nature of renewable energy sources, to provide a smoother power output. The Freemaq DC/DC controls the ramp rate accordingly to ensure the output remains within the ramp at which power is injected into the grid, and thus reduces The Freemag DC/DC series attenuates the intermittent the impact of rapid power fluctuations due to sudden or requirements.



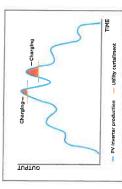
(AA) UTILITY CURTAILMENT RECOVERY

stored in the Battery Energy Storage System (BESS) and then the grid during certain periods. With this AC-coupled energy storage system, the excess energy from the PV field can be grid operator, due to the high energy sources penetration in Utility scale inverter production can be curtailed by the delivered when needed.









<

CLIPPING RECOVERY

FREEMAQ DC/DC 17

The Power Electronics Freemaq DC/DC gets the maximum energy can be exported to the utility grid when the price per storage system when the PV inverter is clipping the output revenues from the PV generator, by charging the battery power, due to the high DC/AC power ratios. This stored (Wh is high.

b(kM)



FREQUENCY REGULATION SYSTEM

Freemaq DC/DC provides ability to regulate grid frequency (generation>demand) inverter power output is curtailed and (generation<demand) inverter power output is increased by this energy is stored. When there is a grid under-frequency discharging the batteries and injecting more power to the in both directions. When there is a grid overfrequency

(ZH)J 5





PEAK POWER SHAVING

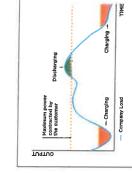
- Grid foad

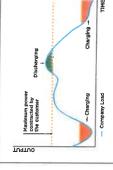
Discharging

Charging

By delivering stored energy to the grid during periods of high demand, it reduces the burden on the distribution network and increases significantly its efficiency.

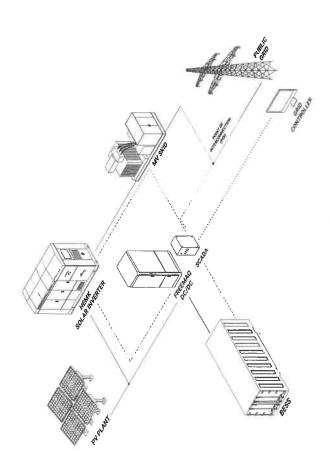
the load on the grid. During peak periods this stored energy is the grid can avoid switching on more expensive and polluting Energy is stored during periods of low demand increasing then injected into the grid reducing the demand at this time. The result is a more flattened demand curve which means





FREEMAQ DC/DC 19

CONFIGURATION



Power connections

MODULAR DESIGN

design your project, choosing the amount of storage power to be dispatched, according to the specific grid requirements. Its unique modular design provides the flexibility needed to

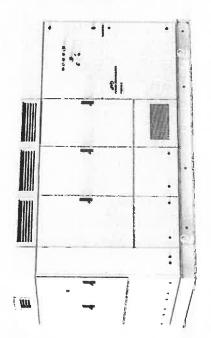
From 500 kW to 3MW.

| - | 7 | |
|---|---|---|
| | | 9 |
| | | |
| * | 7 | |
| | | - |
| 7 | 7 | |

TECHNICAL CHARACTERISTICS

| REFERENCE | | FD0500 |
|-------------------|--|---|
| DC INPUT & OUTPUT | DC Rated Power (kW) @50°C | 200 |
| | DC PV Voltage Range (Vdc) | 800 to 1310 |
| | DC ESS Voltage Range (Vdc) | 700 to 1310 |
| | Maximun DC PV Input Voltage (Vdc) | 1500 |
| | DC Voltage Ripple | %6> |
| | Battery Technology | Compatible with all battery technologies |
| EFFICIENCY | Efficiency (Max) | 98.5% (target) |
| | Max. Standby Consumption | < approx. 50W |
| CABINET | Dimensions(mm) | 1000x1200x1800 |
| | Cooling | Forced air |
| | Enclosure Rating | NEMA 3R / IPS4 |
| CONNECTIONS | Number of connections | 3 positive / 3 negative |
| | Terminals | Lugs Rated 90°C |
| | Max. positive and negative input wire size | 750 kcmil / 380mm² |
| ENVIRONMENT | Operating Temperature range | -35°C to 50°C |
| | Relative Humidity | 4% to 95% non condensing |
| | Max. Althude | 4000m; >2000m power derating |
| | Audible Noise level | ×79 dBA |
| CONTROL | Interfaces | Graphic display (Freesun cabinet) |
| MENTAGE | | Emergency pushbutton and indicator lights |
| | | USB, RJ45 and RS 485 |
| | | Freesun App |
| | Communications Protocol | Modbus TCP, Modbus RTU |
| PROTECTIONS | Ground Fault Detection | Insulation monitoring device |
| | DC disconnection & protection (PV) | Built-in |
| | DC disconnection | Optional |
| | Battery overvoltage protection | Optional |
| CERTIFICATIONS | Safety Certification | UL-1741 (pending) |
| | | , n |

[1] For other range consult Power Electronics. [2] Heating resistors kit option below -20°C.



FREEMAQ PCSK

UTILITY SCALE BATTERY INVERTER



POWER CONVERSION SYSTEM



FIELD REPLACEABLE UNITS



MODULAR DESIGN



4 QUADRANT



3 LEVEL TOPOLOGY

=



P65 AVAILABLE

PROVEN HARDWARE AND ROBUST OUTDOOR DESIGN FEATURED WITH THE LATEST CONTROL The Freemaq PCSK is a modular solution from 1600kW to 3800kW with configurable DC and AC voltages making it compatible with all battery technology and manufacturers. Power Electronics is a proven partner in the solar and energy storage market. The Power Electronics Freemaq PCSK offers proven hardware to meet storage and grid support challenges. The energy production industry is embracing renewable energy sources. However, high penetration creates power transmission instability challenges, thus Grid Operators require stringent dynamic and static grid support features for solar inverters and Power Conversion Systems (PCS).

The Freemag Posts Conveyable bysettls (PCDs).
The Freemag PCSK can perform grid support functions such as: Peak Shawing, Ramp Rate Control, Frequency Regulation, Load Leveling and Voltage Regulation, controlled by a Power Plant Controller or SCADA. The Freemag PCSK stations are turn-key solutions ready for connection to the battery container and MV power distribution wiring. Units are designed for concrete pads or piers, open skids or integrated into full container solutions.

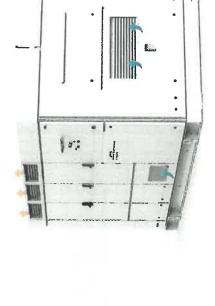
FREEMAQ PCSK 23

COMPACT DESIGN - EASY TO SERVICE

achieving a lower OPEX). The total access allows a fast swap of the FRUs without the need of qualified technical personnel. simplifies the maintenance tasks, reducing the MTTR (and By providing full front access the Freemaq PCSK series

compact solution, achieving 3.8MW in just 12ft long, reducing

With the Freemaq PCSK, Power Electronics offers its most installation costs and labor time.



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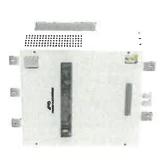
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STRING CONCEPT POWER STAGES

AUXILIARY PANEL

units), being able to work with up to 6 independent DC inputs. inverter with the modularity of the string inverters. Its power The Freemaq PCSK combines the advantages of a central system. Following the modular philosophy of the Freemaq without the need of advanced technical service personnel, stages are designed to be easily replaceable on the field series, the unit is composed of 6 FRUs (field replaceable providing a safe, reliable and fast Plug&Play assembly



INNOVATIVE COOLING SYSTEM

the FRUs, being the most effective way of reaching up to IP65 converter. iCOOL3 delivers a constant stream of clean air to Based on more than 3 years of experience with our MV system allowing IP65 degree of protection in an outdoor Variable Speed Drive, the iCOOL3 is the first air-cooling

avoiding the commonly known inconveniences of it (complex maintenance, risk of leaks, higher number of components...), degree of protection, without having to maintain cumbersome dust filters or having to use liquid-cooling systems, therefore resulting in an OPEX cost reduction.

ACTIVE HEATING

When the unit is not actively exporting power, the inverter internal ambient temperature above -20°C, without using can import a small amount of power to keep the inverter external resistors.

This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing the maintenance. PATENTED

MULTILEVEL TOPOLOGY

The multilevel IGBT topology is the most efficient approach to manage high DC link voltages and makes the difference in the 1,500 Vdc design. Power Electronics has many years of power design in both inverters and MV drives and the

Freemaq PCSK design is the result of our experience with 3 level topologies. The 3 level IOBT topology reduces stage losses, increases inverter efficiency and minimizes total harmonic distortion.

TWO-LEVEL INVERTER THER INVERTER THRE IO

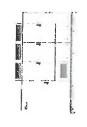
(V) BOATLOV

THREF-LEVEL INVERTER VOLTAGE (V) POWER ELECTRONICS SOLUTION TIME (s)

EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wift, allowing remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors.

The app user friendly interface allows quick and easy access to critical information (energy registers, production and events).





| AVAILABLE INFORMATION | Grid and PV field data. Inverter and Power module data (Vol- lages, currents, power, temperatures, I/O status., J. Wester confidions. Westers and warlings events. Finely registers. |
|-----------------------|--|
| FEATURES | Easy Wireless connection. Comprehensive interface. Real time data. Save and copy settings. |
| LANGUAGE | English, Spanish. |
| SYSTEM REQUIREMENTS | iOS or Android devices. |

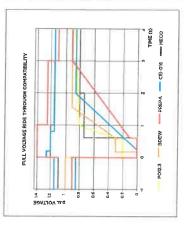
Yes

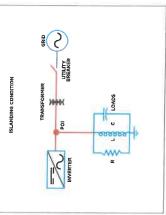
SETTINGS CONTROL

| 4 | H | tel | | 正 |
|----|---|-----|---|---|
| | | 7 | _ | 4 |
| 13 | | 40 | 3 | |

DYNAMIC GRID SUPPORT

Freemaq PCSK firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-Islanding, active and reactive power curtailment...), and is compatible with all the specific requirements of the utilities.





LVRT or ZVRT (Low Voltage Ride Through)

Inverters can withstand any voltage dip or profile required by the local utility. The inverter can immediately feed the fault with full reactive power, as long as the protection limits are not exceeded.

Anti-islanding

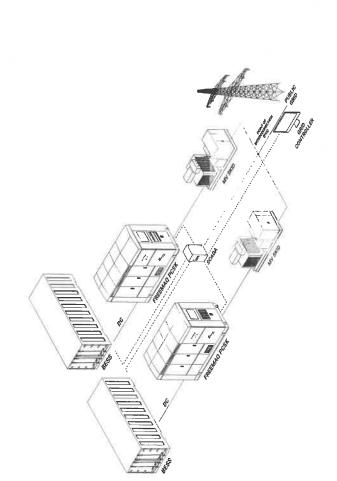
This protection combines passive and active methods that eliminates nuisance tripping and reduces grid distortion according to IEC 62116 and IEEE1547.

FREEMAQ PCSK 27

BATTERY ENERGY STORAGE SYSTEM

A BESS comprises a battery container connected to a Freemaq PCSK (Power Conversion System) that follows the instruction of the main governor of the plant, the PPC (Power Plant Controller) or SCADA.

EXAMPLE 1



EXAMPLE 2

Power connections

Plant communication

ENERGY STORAGE APPLICATIONS



Freemaq PCSK series are able to store energy during periods periods. It also allows grid operators to supply electricity with a higher renewable origin. Since PV generation may not be at the same time as peak demand, this facilitates the flexibility energy when there is a higher demand. This has the benefit of selling the energy at a higher market price during peak of low demand from the grid, in order to later supply this and integration of renewable generation into the grid.



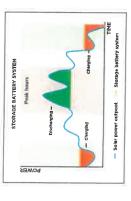
RENEWABLE INTEGRATION

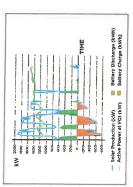
The Freemag PCSK series attenuates the intermittent nature rapid power fluctuations due to sudden or transient conditions power is injected into the grid, and thus reduces the impact of of renewable energy sources, to provide a smoother power output. The Freemag PCSK controls the ramp rate at which experienced by the PV array. The system monitors the PV inverter output to inject or consume power accordingly to ensure the output remains within the ramp requirements.

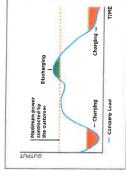


PEAK POWER SHAVING

demand, it reduces the burden on the distribution network and increases significantly its efficiency. Energy is stored instead of reduces the demand at this time. The result is a more flattened By delivering stored energy to the grid during periods of high periods this stored energy is then injected into the grid, which injected into the grid during periods of low demand, which as a result increases the load on the grid. However, during peak demand curve which means the grid can avoid switching on more expensive and polluting generators.









GRID SUPPORT

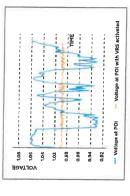
FREEMAQ PCSK 29

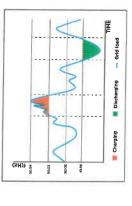
sources, by helping to maintain grid stability and power quality. It can help support the grid voltage by generating capacitive or inductive current. Other features include Voltage Control, Freemaq PCSK series helps the integration of renewable Reactive Power Control and Fault Ride Through Support.



FREQUENCY REGULATION SYSTEM

discharging the batteries and injecting more power to the grid. (generation>demand) inverter power output is curtailed and (generation<demand) inverter power output is increased by Freemaq PCSK provides ability to regulate grid frequency this energy is stored. When there is a grid under-frequency in both directions. When there is a grid overfrequency





TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 690V

| an interest to date | | FKAME 1 | FRAME 2 |
|--------------------------|---|---|-------------------------------|
| NUMBER OF MODULES | | 4 | 4 |
| REFERENCES | | FP2300K | FP3450K |
| AC | AC Output Power (kVA/kW) @50"C ^(r) | 2300 | 3450 |
| | AC Output Power (KVA/KW) (@25°Ctil | 2530 | 3800 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) (@25°C | 2117 | 3175 |
| | Overload capacity 12 | 710% (depending on preload conditions) | reload conditions) |
| | Operating Grid Voltage (VAC) | ₩ 10% ¥10% | 7% kt |
| | Operating Grid Frequency (Hz) | 50/60 Hz | Z. |
| | Current Harmonic Distortion (THDi) | < 3% per IEEE519 | EE519 |
| | Power Factor (cosine phi)(3) | 0.5 leading0.5 lagging | .5 lagging |
| | Reactive power compensation | Four quadrant operation | operation |
| DC | DC Voltage Range (full power) | 976V-1310V | V01 |
| | Maximum DC voltage | 15000 | |
| | DC Voltage Ripple | 8,68 | |
| | Max. DC continuous current (A) | 2646 | 3969 |
| | Battery Technology | All type of batteries (BMS required) | ш |
| | Battery Connections | Up to 18 positive and 18 negative connections | negative connections |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (η) | %8.86 | |
| | Max. Standby Consumption | < approx. 50W/ner module | ner module |
| CABINET | Dimensions [WxDxH] (ft) | 7×7×6 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 27×22×22 | 3.7 x 2.2 x 2.2 |
| | Weight (lbs) | 10802,65 | 15432.36 |
| | Weight (kg) | 4900 | 7000 |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / IP54 / (IP65 Optional) | P65 Optional) |
| | Permissible Ambient Temperature | -35°C(4) to +60°C, >50°C / Active Power derating (>50°C) | e Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | ndensina |
| | Max. Attitude (above sea level) | 2000m / >2000m pawer derating (Max. 4000m) | erating (Max. 4000m) |
| | Noise fevel ^[5] | 479 d8A | A, |
| CONTROL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | Optional Freesun App display |
| | Communication protocol | Modbus TCP | TCP |
| | Power Plant Controller | Optional. Third party SCADA systems supported | A systems supported |
| | Keyed ON/OFF switch | Standard | rd ud |
| | Digital I/O | Maleuotioo | E. |
| | Analog I/O | Pilenoito | E |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | oring device |
| | Humidity control | Active Heating | ating |
| | General AC Protection & Disconn, | Circuit Breaker | aaker |
| | General DC Protection & Disconn. | Fuses + Contactors | itactors |
| | Overvoltage Protection | AC and DC protection (type 2) | tion (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22.2 No.107,1-01, UL62109-1, IEC62109-1, IEC62109-2 | 109-1, IEC62109-1, IEC62109-2 |
| | Utility interconnect | T CA154 / 156515A | GE1EA24 |

[1] Values at 1.00-Vac norm and cos the 1.
Constalt Power Electronics for deraining curves.
[2] Constut P-Q charts available: Q(RVxt)=-(StRvx)=PqktvP?).

[3] Consult Power Electronics for other configurations.
[4] Heating resistors kit option below -20°C.
[5] Readings taken 1 meter from the back of the unit.

FREEMAQ PCSK 31

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 660V

| WEEK OF MODULES FRENCES | | , | |
|----------------------------|---|---|--------------------------------|
| | | * | ٥ |
| | | FP2200K | FP3300K |
| | AC Output Power (kVA/kW) @50°C ¹¹ | 2200 | 3300 |
| | AC Output Power (kVA/kW) @25°C ⁽ⁱ⁾ | 2420 | 3630 |
| 2101010 | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity ¹² | 110% (depending on preload conditions) | preload conditions) |
| | Operating Grid Voltage (VAC) | 660V±10% ⊠ | 10% st |
| | Operating Grid Frequency (Hz) | 50/60 Hz | Hz |
| | Current Harmonic Distortion (THDI) | < 3% per (EEE519 | EEE519 |
| -1 | Power Factor (cosine phi) ^[2] | 0.5 leading0.5 lagging | 3.5 lagging |
| | Reactive power compensation | Four quadrant operation | toperation |
| DC | DC Voltage Range (full power) | V0151-V456 | 310V |
| - | Maximum DC voltage | 1500V | NO. |
| 9 | DC Voltage Ripple | %e > | 200 |
| ~ | Max. DC continuous current (A) | 2646 | 3969 |
| a | Battery Technology | All type of batteries (BMS required) | |
| | Battery Connections | Up to 18 positive and 18 negative connections | negative connections |
| EFFICIENCY & AUX, SUPPLY E | Efficiency (Max) (n) | 98.8% | * |
| | Max. Standby Consumption | < approx. 50W/per module | /per module |
| CABINET | Dimensions [WxDxH] (ft) | 9×7×7 | 12×7×7 |
| -1 | Dimensions [WxDxH] (m) | 2.7×2.2×2.2 | 3.7 x 2.2 x 2.2 |
| > | Weight (fbs) | 10802,65 | 15432,36 |
| > | Weight (kg) | 4900 | 7000 |
| | Type of ventilation | Forced air cooling | cooling |
| ENVIRONENT | Degree of protection | NEMA 3R / IP54 / (IP65 Optional) | (IP65 Optional) |
| 4 | Permissible Ambient Temperature | -35°CM to +60°C, >50°C / Active Power derating (>50°C) | ve Power derating (>50°C) |
| œ. j | Relative Humidity | 4% to 100% Condensing | ondensing |
| ~ | Max. Altitude (above sea level) | 2000m / >2000m power derating (Max. 4000m) | derating (Max. 4000m) |
| | Noise levei ^[5] | < 79 dBA | BA |
| CUNIKOL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | Optional Freesun App display |
| oj | Communication protocol | Modbus TCP | TCP |
| <u>- </u> | Power Plant Controller | Optional. Third party SCADA systems supported | DA systems supported |
| × | Keyed ON/OFF switch | Standard | ard |
| ۵ | Digital I/O | Optional® | (a)(a) |
| | Analog I/0 | Optional | alpi |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | toring device |
| 1 | Humidity control | Active Heating | ating |
| 9 | General AC Protection & Disconn. | Circuit Breaker | eaker |
| 9 | General DC Protection & Disconn. | Fuses + Contactors | nfactors |
| | Overvoltage Protection | AC and DC protection (type 2) | ction (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 2109-1, IEC62109-1, IEC62109-2 |
| 2 | Utility interconnect | UL1741SA / IEFE1547 1 | FF1547 1 |

[3] Consult Power Electronics for other configurations.
[4] Heating resistors Mi option below -20°C.
[5] Readings taken 1 meter from the back of the unit.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 645V

| NUMBER OF MODULES REFERENCES | | | |
|------------------------------|---|--|--|
| REFERENCES | | 4 | 100 |
| | | FP2150K | FD3225K |
| AC | AC Output Power (kVA/kW) @50°CP | 2150 | 3225 |
| | AC Output Power (KVA/KM) @25°C ^向 | 2365 | 3550 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity 12 | 110% (depending on preload conditions) | reload conditions) |
| | Operating Grid Voltage (VAC) | 645V ±10% P | P. P |
| | Operating Grid Frequency (Hz) | 50/60 Hz | ZH ZH |
| | Current Harmonic Distortion (THDI) | < 3% per IEEE519 | EE519 |
| | Power Factor (cosine phi)[1] | 0.5 leading0.5 lagging | .5 lagging |
| | Reactive power compensation | Four quadrant exeration | operation |
| DC | DC Voltage Range (full power) | V015V-1310V | 100 |
| | Maximum DC vo(tage | 1500V | |
| | DC Voltage Ripple | <3% | |
| | Max, DC continuous current (A) | 2646 | 6968 |
| | Battery Technology | All type of batteries (BMS required) | |
| | Battery Connections | Up to 18 positive and 18 negative connections | regative connections |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (ŋ) | 98.8% | 20 |
| | Max. Standby Consumption | < approx. 50W/per module | per module |
| CABINET | Dimensions [WxDxH] (ft) | 7×7×9 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 2.7 × 2.2 × 2.2 | 3.7×2.2×2.2 |
| | Weight (lbs) | 10802,65 | 15432.36 |
| | Weight (kg) | 4900 | 7000 |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / IP54 / (IP65 Optional) | (P65 Optional) |
| | Permissible Ambient Temperature | -35°C ^H to +60°C, >50°C / Active Power derating (>50°C) | re Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | ondensing |
| | Max. Altitude (above sea level) | 2000m / >2000m power derating (Max. 4000m) | lerating (Max, 4000m) |
| | Noise fevel ^[5] | < 79 dBA | BA |
| CONTROL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | Optional Freesun App display |
| | Communication protocol | Modbus TCP | TCP |
| | Power Plant Controller | Optional: Third party SCADA systems supported | A systems supported |
| | Keyed ON/OFF switch | Standard | La la |
| | Digital I/O | Optional | 349 |
| | Analog I/O | Optionaliti | II) |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | oring device |
| | Humidity control | Active Heating | ating |
| | General AC Protection & Disconn. | Circuit Breaker | eaker |
| | General DC Protection & Disconn. | Fuses + Contactors | ntactors |
| | Overvoltage Protection | AC and DC protection (type 2) | ction (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 2109-1, IEC62109-1, IEC62109-2 |
| | Utility interconnect | UL1741SA / IEEE1547.1 | EE1547.1 |

[1] Values at 1.00-Vac non and cos d= 1. Consult Power Electronics for deraing curves. [2] Consult P-0, charts available: QIKVAr)=(ISIKWP1.

(3) Consult Power Electronics for other configurations.
[4] Hoaling resistors kit option below -20°C.
[5] Readings taken 1 meter from the back of the unit.

FREEMAQ PCSK 33

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 630V

| INTERNATION OF SAMES BA | | - Lucium | FRAME 2 |
|--------------------------|---|---|--|
| NUMBER OF MUDULES | | 4 | 9 |
| REFERENCES | | FP2100K | FP3150K |
| AC | AC Output Power (KVA/KW) @50°CIII | 2100 | 3150 |
| | AC Output Power (KVA/KW) @25°Clil | 2310 | 3465 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity la | 11 0% (depending on preload conditions) | prefoad conditions) |
| | Operating Grid Voltage (VAC) | 630V±10% M | 10% 101 |
| | Operating Grid Frequency (Hz) | 50/60 Hz |) H2 |
| | Current Harmonic Distortion (THDi) | < 3% per IEEE519 | IEEE519 |
| | Power Factor (cosine phi) ^{ra} | 0.5 leading0.5 lagging | 0.5 ladding |
| | Reactive power compensation | Four quadrant operation | t operation |
| 2 | DC Voltage Range (full power) | V0151-V1310V | 310V |
| | Maximum DC voltage | V003T | AG |
| | DC Voltage Ripple | < 3% | 8 |
| | Max. DC continuous current (A) | 2646 | 3966 |
| | Battery Technology | All type of batteries (BMS required) | Ь. |
| | Battery Connections | Up to 18 positive and 18 negative connections | I negative connections |
| EFFICIENCY & AUX, SUPPLY | Efficiency (Max) (ŋ) | 98.8% | *** |
| | Max. Standby Consumption | < approx. 50W/per module | //per module |
| CABINET | Dimensions [WxDxH] (ft) | 5×7×7 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 2.7 x 2.2 x 2.2 | 3.7 x 2.2 x 2.2 |
| | Weight (lbs) | 10802,65 | 15432.36 |
| | Weight (kg) | 4900 | 7000 |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / (P54 / (P65 Optional) | (IP65 Optional) |
| | Permissible Ambient Temperature | -35°CM to +60°C, >50°C / Active Power derating (>50°C) | ive Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | Condensing |
| | Max. Altitude (above sea level) | 2000m / >2000m power derating (Max. 4000m) | derating (Max. 4000m) |
| | Noise level ⁽³⁾ | < 79 dBA | IBA |
| CONTROL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | / Optional Freesun App display |
| | Communication protocol | Modbus TCP | s TCP |
| | Power Plant Controller | Optional. Third party SCADA systems supported | ADA systems supported |
| | Keyed ON/OFF switch | Standard | land |
| | Digital I/O | Optionalia | nalisi |
| | Analog I/O | Optionalia | Maria |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | foring device |
| | Humidity control | Active Heating | eating |
| | General AC Protection & Disconn. | Circuit Breaker | reaker |
| | General DC Protection & Disconn, | Fuses + Contactors | ontactors |
| | Overvoltage Protection | AC and DC protection (type 2) | action (type 2) |
| CERTIFICATIONS | Safety . | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 32109-1, IEC62109-1, IEC62109-2 |
| | | | a section of the sect |

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 615V

| | | FRAME 1 | FRAME 2 |
|--------------------------|---|---|--------------------------------|
| NUMBER OF MODULES | | 4 | 9 |
| REFERENCES | | FP2050K | FP3075K |
| AC | AC Output Power (kVA/kW) @50°C™ | 2050 | 3075 |
| | AC Output Power (KVA/KW) @25°C ⁽¹⁾ | 2255 | 3380 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity (2) | 110% (depending on preload conditions) | reload conditions) |
| | Operating Grid Voltage (VAC) | M %OLT ASL9 | 0% м |
| | Operating Grid Frequency (Hz) | 20/00 H2 | 4 |
| | Current Harmonic Distortion (THDI) | < 3% per IFFE519 | 510 |
| | Power Factor (cosine phi) ^[2] | 0.5 leading0.5 landing | .5 lacging |
| | Reactive power compensation | Four duadrant operation | Operation |
| DC | DC Voltage Range (full power) | V0151-V078 | 1100 |
| | Maximum DC voltage | V0001 | > |
| | DC Voltage Ripple | %E v | |
| | Max: DC continuous current (A) | 2646 | 3969 |
| | Battery Technology | All type of batteries (BMS required) | 4 |
| | Battery Connections | Up to 18 positive and 18 negative connections | negative connections |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (ŋ) | 98.8% | 59 |
| | Max. Standby Consumption | < approx. 50W/ber module | per module |
| CABINET | Dimensions [WxDxH] (ft) | 7×7×9 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 2.7×2.2×2.2 | 3.7×2.2×2.2 |
| | Weight (lbs) | 10802,65 | 15432.36 |
| | Weight (kg) | 4900 | 7000 |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / IP54 / (IP65 Optional) | (IP65 Optional) |
| | Permissible Ambient Temperature | -35°CM to +60°C, >50°C / Active Power derating (>50°C) | Je Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | ondensing |
| | Max. Altitude (above sea level) | 2000m / >2000m power derating (Max. 4000m) | derating (Max. 4000m) |
| | Noise level M | < 79 dBA | 3.4 |
| CONTROL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | Optional Freesun App display |
| | Communication protocol | Modbus TCP | TCP |
| | Power Plant Controller | Optional. Third party SCADA systems supported | A systems supported |
| | Keyed ON/OFF switch | Standard | ırd |
| | Digital I/O | Optional® | [i] |
| | Analog I/O | Optionali | aliti |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | oring device |
| | Humidity control | Active Heating | ating |
| | General AC Protection & Disconn. | Circuit Breaker | eaker |
| | General DC Protection & Disconn. | Fuses + Contactors | ntactors |
| | Overvoltage Protection | AC and DC protection (type 2) | ction (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 2109-1, IEC62109-1, IEC62109-2 |
| | Utility interconnect | UL1741SA / IEEE1547.1 | EE1547.1 |
| | | | |

[1] Values at 1 00-vac norm and cos ϕ = 1. Consult Power Electronics for detailing curves. [2] Consult P-Q charts available: Q(RVA#)=/(S(RVA)-P(RWP).

(3) Consult Power Electronics for other configurations.
[4] Hoating resistors kit option below -20°C.
[5] Readings taken 1 meter from the back of the unit.

FREEMAQ PCSK 35

FREEMAQ PCSK 600V

TECHNICAL CHARACTERISTICS

| | | FRAME 1 | FRAME 2 |
|--------------------------|---|---|---------------------------------|
| NUMBER OF MODULES | | 4 | 9 |
| REFERENCES | | FP2000K | FP3000K |
| AC | AC Output Power (kVA/kW) @50*C** | 2000 | 3000 |
| | AC Output Power (KVA/KW) @25°C ⁽¹⁾ | 2200 | 3300 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity A | 110% (depending on preload conditions) | preload conditions) |
| | Operating Grid Voltage (VAC) | 110% 110% III | 10% 11 |
| | Operating Grid Frequency (Hz) | 50/60 Hz | 0 Hz |
| | Current Harmonic Distortion (THDI) | < 3% per IEEE519 | IEEE519 |
| | Power Factor (cosine phi) ^[3] | 0.5 leading 0.5 lagging | 0.5 lagging |
| | Reactive power compensation | Four quadrant operation | nt operation |
| 2 | DC Voltage Range (full power) | W1310V | Ole |
| | Maximum DC voltage | 1500V | AQ. |
| | DC Voltage Ripple | ×3% | % |
| | Max. DC continuous current (A) | 2646 | 3969 |
| | Battery Technology | All type of batteries (BMS required) | |
| | Battery Connections | Up to 18 positive and 18 negative connections | 3 negative connections |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (n) | 98.8% | 88% |
| | Max. Standby Consumption | < approx. 50W/per module | Wher module |
| CABINET | Dimensions (WxDxH) (ft) | 7×7×9 | 7×7×7 |
| | Dimensions (WxDxH] (m) | 2.7×2.2×2.2 | 3.7×2.2×2.2 |
| | Weight (lbs) | 10802,65 | 15432.36 |
| | Weight (kg) | 4900 | 7000 |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / IP54 / (iP65 Optional) | / (IP65 Optional) |
| | Permissible Ambient Temperature | -35°CM to +50°C, >50°C / Active Power derating (>50°C) | tive Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | Condensing |
| | Max. Altitude (above sea level) | 2000m / >2000m power derating (Max. 4000m) | derating (Max. 4000m) |
| | Noise level ¹⁴ | < 79 dBA | dBA |
| CONTROL INTERFACE | interface | Graphic Display (inside cabinet) / Optional Freesun App display | / Optional Freesun App display |
| | Communication protocol | Modbus TCP | s TCP |
| | Power Plant Controller | Optional. Third party SCADA systems supported | ADA systems supported |
| | Keyed ON/OFF switch | Standard | lard |
| | Digital I/O | Optional | malia |
| | Analog I/O | Optional | nalid |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | itoring device |
| | Humidity control | Active Heating | leating |
| | General AC Protection & Disconn. | Circuit Breaker | 3reaker |
| | General DC Protection & Disconn. | Fuses + Contactors | pntactors |
| | Overvoltage Protection | AC and DC protection (type 2) | ection (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22,2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 62109-1, IEC62109-1, IEC62109-2 |
| | Utility interconnect | 111 17A1SA JIECE16A7 | CCC15474 |

[1] Values at 1,00-Vac nom and cos Φ* 1.
Consult Power Electronics for derating curves.
[7] Consult P C charts evalebie C((kWr)=\((S(kN))^2, P(kWp)),

(3) Consult Power Electronies for other configurations. [4] Healing resistors kit option below 20°C. [5] Readings taken 1 meter from the back of the unit.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 530V

| | | FRAME 1 | FRAME 2 |
|--------------------------|---|---|-------------------------------|
| NUMBER OF MODULES | | 4 | 9 |
| REFERENCES | | FP1765K | FP2650X |
| AC | AC Output Power (kVA/kW) @50"CPI | 1765 | 2650 |
| | AC Output Power (kVA/kW) @25*Clil | 1940 | 2915 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity (2) | T10% (depending on preload conditions) | eload conditions) |
| | Operating Grid Voltage (VAC) | 530V ±10% PI | 18 % III |
| | Operating Grid Frequency (Hz) | 20/60 Hz | 72 |
| | Current Harmonic Distortion (THDi) | < 3% per IEEE519 | EE519 |
| | Power Factor (cosine phi) ^{E1} | 0.5 leading 5 leading | Slanging |
| | Reactive power compensation | Four quadrant preparion | operation |
| DC | DC Voltage Range (full power) | 7507-1310/ | \O |
| | Maximum DC voltage | 15000 | |
| | DC Voltage Ripple | % Y | |
| | Max, DC continuous current (A) | 2646 | 3969 |
| | Battery Technology | All type of batteries (BMS regulred) | |
| | Battery Connections | Up to 18 positive and 18 negative connections | egative connections |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (ŋ) | %8.86 | |
| | Max. Standby Consumption | < approx. 50W/per module | er module |
| CABINET | Dimensions [WxDxH] (ft) | 7×7×6 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 2.7 × 2.2 × 2.2 | 37×99×99 |
| | Weight (lbs) | 10802,65 | 15432 36 |
| | Weight (kg) | 4900 | ZDOU |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / IPS4 / (IP65 Optional) | P65 Ontional |
| | Permissible Ambient Temperature | -35°C ⁴¹ to +60°C. >50°C / Active Power deration (>50°C) | Power deration (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | ndensing |
| | Max. Attitude (above sea level) | 2000m / >2000m power derating (Max. 4000m) | erating (Max. 4000m) |
| | Noise level [5] | V8P 62 > | |
| CONTROL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | Aptional Freeson App display |
| | Communication protocol | Modbus TCP | CP. |
| | Power Plant Controller | Optional, Third party SCADA systems supported | 4 systems supported |
| | Keyed ON/OFF switch | Standard | , p |
| | Digital I/O | Optional | E |
| | Analog I/O | Optionaliti | E |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | ring device |
| | Humidity control | Active Heating | tina |
| | General AC Protection & Disconn. | Circuit Breaker | aker |
| | General DC Protection & Disconn. | Fuses + Contactors | actors |
| | Overvoltage Protection | AC and DC protection (type 2) | Ion (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 109-1, IEC62109-1, IEC62109-2 |
| | Utility interconnect | UL1741SA / IEEE1547.1 | E1547.1 |
| | | | |

[1] Values et 1.00-Vac norm and cos ©= 1.
Consult Power Electronics for densiting curvus.
[2] Consult P.Q. charts evallable: Q(KVM)=-(S|KVA)*-P;KWP].

[3] Consult Power Electronics for other configurations.
[4] Healing resistors kit option below-20°C.
[5] Readings taken 1 meter from the back of the unit.

FREEMAQ PCSK 37

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 500V

| Minipoto Att Monto re- | | | PRAME 2 |
|---|--|---|-------------------------------|
| COMPER OF MODULES | | 4 | v |
| REFERENCES | | FP1665K | FP2500K |
| AC | AC Output Power (kVA/kW) @50°C™ | 1665 | 2500 |
| | AC Output Power (kVA/kW) @25°Clil | 1830 | 2750 |
| | Max. AC Output Current (A) @50°C | 1925 | 2887 |
| | Max. AC Output Current (A) @25°C | 2117 | 3175 |
| | Overload capacity M | 110% (depending on preload conditions) | reload conditions) |
| | Operating Grid Voltage (VAC) | 10% H |)% III |
| | Operating Grid Frequency (Hz) | 50/60 Hz | ZH |
| | Current Harmonic Distortion (THDi) | < 3% per IEEE519 | EE519 |
| | Power Factor (cosine phi) ⁽⁴⁾ | 0.5 leading_0.5 laoging | 5 laoging |
| | Reactive power compensation | Four quadrant operation | operation |
| 2 | DC Voltage Range (full power) | V018-1310V | 70L |
| | Maximum DC voltage | 1500V | |
| | DC Voltage Ripple | 888 | |
| | Max. DC continuous current (A) | 2646 | 3060 |
| | Battery Technology | All type of batteries (BMS required) | 1 |
| | Battery Connections | Up to 18 positive and 18 negative connections | legative connections |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (n) | 98.8% | |
| | Max. Standby Consumption | < approx. 50W/per module | oer module |
| CABINET | Dimensions [WxDxH] (ft) | 7×7×9 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 2.7×2.2×2.2 | 3.7×22×22 |
| | Weight (fbs) | 10802,65 | 1543236 |
| | Weight (kg) | 4900 | 2000 |
| | Type of ventilation | Forced air cooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / (P65 Optional) | P65 Optional) |
| | Permissible Ambient Temperature | -35°CM to +60°C, >50°C / Active Power derating (>50°C) | e Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | ndensing |
| | Max. Altitude (above sea level) | 2000m / >2000m power denating (Max. 4000m) | erating (Mex. 4000m) |
| Assessment of the last of the | Noise level 88 | A8D 67 > | Ą |
| CONTROL INTERPACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | Optional Freesun App display |
| | Communication protocol | Modbus TCP | TCP |
| | Power Plant Controller | Optional. Third party SCADA systems supported | A systems supported |
| | Keyed ON/OFF switch | Standard | Į. |
| | Digital I/O | Optional | in. |
| | Analog I/O | Optional | E E |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | ning device |
| | Humidity control | Active Heating | sting |
| | General AC Protection & Disconn. | Circuit Breaker | aker |
| | General DC Protection & Disconn. | Fuses + Contactors | tactors |
| | Overvoltage Protection | AC and DC protection (type 2) | tion (type 2) |
| CERTIFICATIONS | Safety | UL1741, CSA 22.2 No. 107. 1-01, UL62109-1, IEC62109-1, IEC62109-2 | 109-1, IEC62109-1, IEC62109-2 |
| | Total Contract of the Contract | | |

[3] Values at 1.00-Vac norn and oos $\Phi=1$.
Consult Power Electronies for density, curves.
[2] Consult P.Q. charts available: Q(kVAt)= (S(kVA)=P(kVy)).

[3] Consult Power Electronics for other configurations.
[4] Healing resistors kit option below-20°C.
[5] Readings taken 1 meter from the back of the unit.

FREEMAQ PCSK 480V

| REFERENCES AC Dutput Power ((VAZAMY) @50°C°C) AC Dutput Power ((VAZAMY) @50°C°C) ABAX AC Output Current ((A) @50°C) MAX AC Output Current ((A) @50°C) MAX AC Output Current ((A) @50°C) Overload epapeidy.* Overload epapeidy.* Overload epapeidy.* Overload epapeidy.* Overload epapeidy.* Overload epapeidy.* MAX AC Output Current ((A) @50°C) Overload epapeidy.* Overload epapeidy.* MAX Dought Grid Power Dought Epiple MAX Dought Grower) MAX Dought Grossermation CABINET CABINET Omensions (MACAH) ((1)) Make Standy Consemption Efficiency (Max) ((1)) Omensions (MACAH) ((1)) Make Standy Consemption Permissible Arribent Temperature Relative Humidity Neight (63) Neight (63) Neight (64) Neight (6 | KVAARW) @SD-CH KVAARW) @SD-CH TITEN (A) @SD-C TITEN (A) @SD-C TITEN (A) @SD-C TITEN (A) @SD-C TITEN (A) @SD-C TITEN (A) @SD-C TITEN (A) @SD-CH TITEN (A) @SD-CH | 4 FP1600K 1600 1760 | 6 FP2400K |
|--|--|---|-------------------------------|
| AUX. SUPPLY AUX. | KWARW) @50°C°II KWARW) @25°C°II Irrent (A) @25°C age (VAC) ge (VAC) Distortion (THD) Distortion (THD) | FP1600K 1600 1760 1925 | FP2400K |
| AUX. SUIPPLY I | KVA/kW) @SO*C** KVA/kW) @SO*C** Irrent (A) @SO*C a age (VAC) Tuency (Hz) Sistorition (THD) me phij) ³¹ | 1600 1760 1925 | |
| AUX. SUPPLY AUX. SUPPLY | KVA/kW) @25°C ⁰⁰ rrent (A) @25°C age (VAC) quency (Hz) Distortion (THD)) | 1760 | 2400 |
| AUX. SUPPLY | irrent (A) @50°C irrent (A) @25°C age (VAC) quency (Hz) pletortion (THD)) ne phij ³ l | 1925 | 2640 |
| AUX. SUIPPLY FERFACE | intent (A) (@25°C age (VAC) quency (Hz) Distortion (THDi) | | 2887 |
| AUX. SUPPTY AUX. SUPPTY | age (VAC) quency (Hz) Distortion (THDi) ne phi) ^[a] | 2117 | 3175 |
| AUX. SUPPLY | age (VAC) tuency (Hz) Distortion (THDi) ne phi)⊠ | 110% (depending on preload conditions) | reload conditions) |
| AUX. SUIPPLY FERFACE | quency (Hz) Distortion (THDi) ne phi) ² | 480V+10% PI | 1 m |
| AUX. SUPPTY AUX. SUPPTY | Distortion (THDi) | 50/60 Hz | 42 |
| AUX. SUPPLY | ne phi) ^[3] | < 3% per lEFE510 | EE510 |
| AUX. SUPPLY ERFACE | montarion | 0.5 leading 0.5 lagging | Sladding |
| AUX. SUIPPLY ERFACE | I post i patroli | Four quadrant operation | Constation |
| AUX. SUPPLY | (full power) | V0T81-V6Z9 | 000 |
| AUX. SUPPLY ERFACE | eć. | 15000 | |
| AUX. SUIPPLY ERFACE | | 860 V | |
| AUX. SUPPLY | s current (A) | 2646 | 3969 |
| AUX. SUPPLY | | All type of batteries (BMS required) | |
| AUX. SUPPLY AUX. SUPPLY | s | Up to 18 positive and 18 negative connections | egative connections |
| ERFACE | | %8.86 | |
| ERFACE | umption | < approx. 50W/per module | oer mochile |
| ERFACE | H(#) | 7×7×6 | T×7×21 |
| ERFACE | H(m) | 2.7×2.2×2.2 | 3.7×22×22 |
| ERFACE | | 10802,65 | 15432 36 |
| ERFACE | | 4900 | 2000 |
| ERFACE | | Forced air cooling | |
| | c | NEMA 3R / IP54 / (iP65 Optional) | P65 Optional) |
| 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | nt Temperature | -35°CM to +60°C, >50°C / Active Power derating (>50°C) | e Power derating (>50°C) |
| | | 4% to 100% Condensing | ndensing |
| | e sea level) | 2000m / >2000m power derating (Max, 4000m) | erating (Max. 4000m) |
| 18 18 15 1 | | < 79 dBA | |
| Communication pre Power Plant Contre Keyed ON/OFF swi | | Graphic Display (inside cabinet) / Optional Freesun App display | Optional Freesun App display |
| Power Plant Contro Keyed ON/OFF swi | stocol | Modbus TCP | CP |
| Keyed ON/OFF swi | ller | Optional. Third party SCADA systems supported | A systems supported |
| | ch | Standard | q |
| Digital I/O | | Optional | lal . |
| | | Optionalia | lal . |
| PROTECTIONS Ground Fault Protection | tlon | Insulation monitoring device | ring device |
| Humidity control | | Active Heating | tina |
| General AC Protection & Disconn, | on & Disconn, | Circuit Breaker | aker |
| General DC Protection & Disconn. | on & Disconn. | Fuses + Contactors | lactors |
| | ion | AC and DC protection (type 2) | ion (type 2) |
| CERTIFICATIONS Safety | | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 109-1, IEC62109-1, IEC62109-2 |
| Utility interconnect | | UL1741SA / IEEE1547.1 | E1547.1 |

FREEMAQ PCS

UTILITY SCALE BATTERY INVERTER



POWER CONVERSION SYSTEM



AUTOMATIC REDUNDANT POWER MODULE SYSTEM



MODULAR DESIGN



4 QUADRANT

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13

3 LEVEL TOPOLOGY

PROVEN HARDWARE AND ROBUST OUTDOOR DESIGN FEATURED WITH THE LATEST CONTROL The Freemaq PCS is a modular solution from 690kW to 3000kW with configurable DC and AC voltages making it compatible with all battery technology and manufacturers. Power Electronics is a proven partner in the solar and energy storage market. The Power Electronics Freemaq PCS offers proven hardware to meet storage and grid support challenges.

The energy production industry is embracing renewable energy sources. However, high penetration creates power transmission instability challenges, thus Grid Operators require stringent dynamic and static grid support features for solar inverters and Power Conversion Systems (PCS).

Invarious and Power Conversion Systems (PCS).

The Freemag PCS can perform grid support functions such as: Peak Shaving, Ramp Rate Control, Frequency Regulation, Load Leveling and Voltage Regulation, controlled by a Power Plant Controlled by a Power

The Freemaq PCS stations are turn-key solutions ready for connection to the battery container and MV power distribution wiring. Units are designed for concrete pads, open skids or integrated into full container solutions.

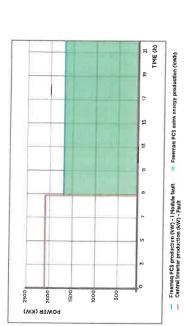
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FREEMAQ PCS 43

AUTOMATIC REDUNDANT POWER MODULE SYSTEM

Freemaq PCS is a modular central battery inverter based on an Automatic Redundant Power Module (up to 400kVA per stage). If there is a fault in one power module, it is taken off-line and its output power is distributed evenly among the remaining functioning modules. All power modules work in parallel controlled by a dual redundant main control.

As the main governor of the system it is responsible for the battery charge / discharge, synchronization sequence and overall protection. The automatic redundant capability based on our industrial systems is able to shift the main control in the event of a fault, restoring the backup control and restarting the station to guarantee high availability.



VAR SUPPORT

The Freemaq PCS inverter can provide reactive power at any time in order to stabilize the grid conditions. The inverter can respond to an external dynamic signal, a Power Plant Controller command or a pre-set reactive power level (KVAr).

ACTIVE HEATING

In cold conditions, and when the unit is not working, the inverter can import a small amount of power from the grid to keep the inverter internal ambient temperature above -20°C, without using external resistors.

This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing maintenance. MYBHTD

EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wift, allowing remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors. The app user friendly interface allows quick and easy access to critical information (energy registers, production and events).

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Avaitable for Apple and Android

The multilevel IGBT topology makes the difference when the DC voltage is above 1000V, being the most efficient way to manage high DC link voltages. Based in our long IGBT experience components used in our Solar and Industrial division,

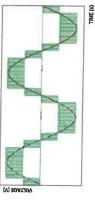
MULTILEVEL TOPOLOGY

the Freemag PCS takes profit of the three level IGBT topology reducing the power stage losses, increasing the efficiency and offering a very low total harmonic distortion.

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TWO-LEVEL INVERTER

THREE-LEVEL INVERTER



(V) SOATJOV

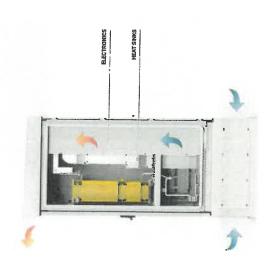
FREEMAQ PCS 45

REVOLUTIONARY COOLING SYSTEM

The Power Electronics Freemaq PCS series includes the innovative and sophisticated iOOOL V performance that allows Freemaq PCS to work up to 50°C at nominal power. The cooling system iCOOL V smartly cools the inverter, regulating the cooling system capacity depending on the data from the temperature sensors.

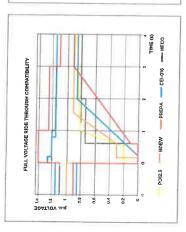
Freemaq PCS modules are divided into two main areas; clean area (electronics) and hot area (heat sink). The electronics are totally sealed and use a temperature control low flow cooling system that reduces filters clogging and maintenance intervals. The hot area integrates a speed controlled fan for each module, simplifying the cooling system and reducing the maintenance tasks.

Furthermore, due to the modular topology, the iCOOL V reduces the Stand-by consumption at low capacity to the maximum, boosting the cooling capacity for the installations situated up to 4000 meters above sea level, (patent pending)



DYNAMIC GRID SUPPORT

Freemaq PCS firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and reactive power curtailment...), and is compatible with all the specific requirements of the utilities.



TAMSFORMER GRID THAMSFORMER T

LVRT or ZVRT (Low Voltage Ride Through)

Inverters can withstand any voltage dip or profile required by the local utility. The Inverter can immediately feed the fault with full reactive power, as long as the protection limits are not exceeded.

Anti-Islanding

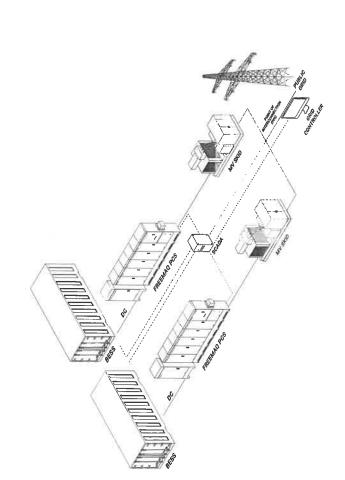
This protection combines passive and active methods that eliminates nuisance tripping and reduces grid distortion according to IEC 62116 and IEEE1547.

BATTERY ENERGY STORAGE SYSTEM

A BESS comprises a battery container connected to a Freemaq PCS (Power Conversion System) that follows the instruction of the main governor of the plant, the PPC (Power Plant Controller) or SCADA.

EXAMPLE 1

EXAMPLE 2



ENERGY STORAGE APPLICATIONS



(CO) TOAD LEVELING

Freemaq PCS series are able to store energy during periods a higher renewable origin. Since PV generation may not be at periods. It also allows grid operators to supply electricity with the same time as peak demand, this facilitates the flexibility energy when there is a higher demand. This has the benefit of selling the energy at a higher market price during peak of low demand from the grid, in order to later supply this and integration of renewable generation into the grid.

STORAGE BATTERY SYSTEM

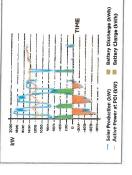
DOMES



RENEWABLE INTEGRATION

- Solar power outpout

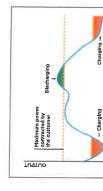
rapid power fluctuations due to sudden or transient conditions power is injected into the grid, and thus reduces the impact of The Freemag PCS series attenuates the intermittent nature of renewable energy sources, to provide a smoother power output. The Freemag PCS controls the ramp rate at which experienced by the PV array. The system monitors the PV inverter output to inject or consume power accordingly to ensure the output remains within the ramp requirements.





PEAK POWER SHAVING

increases significantly its efficiency. Energy is stored instead of reduces the demand at this time. The result is a more flattened demand, it reduces the burden on the distribution network and By delivering stored energy to the grid during periods of high periods this stored energy is then injected into the grid, which injected into the grid during periods of low demand, which as a result increases the load on the grid. However, during peak demand curve which means the grid can avoid switching on more expensive and polluting generators.



- Company Load

(@W) GRID SUPPORT

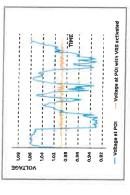
FREEMAQ PCS 49

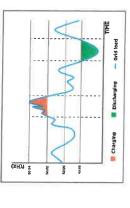
sources, by helping to maintain grid stability and power quality. It can help support the grid voltage by generating capacitive or inductive current. Other features include Voltage Control, Freemaq PCS series helps the integration of renewable Reactive Power Control and Fault Ride Through Support.



FREQUENCY REGULATION SYSTEM

discharging the batteries and injecting more power to the grid. (generation>demand) inverter power output is curtailed and generation<dernand) inverter power output is increased by this energy is stored. When there is a grid under-frequency Freemaq PCS provides ability to regulate grid frequency in both directions. When there is a grid overfrequency





FREEMAQ PCS 690V

| ACCOLINATE PROMISE STATES STATES STATES STATES ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1770 2150 2150 2150 ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1770 2150 2150 2150 ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1705 2150 2150 2150 ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1705 2150 2150 2150 ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1705 2150 2150 2150 ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1705 2150 2150 2150 ACCOLINATE PROMISE (ACADAM) SERVICY 1290 1705 2150 2150 2150 ACADAM SERVICY 1200 1705 1705 2150 2150 ACADAM SERVICY 1200 1705 1705 2150 2150 2150 ACADAM SERVICY 1200 1705 2150 2150 2150 2150 ACADAM SERVICY 1200 1705 2150 2150 2150 2150 ACADAM SERVICY 1200 1705 2150 2150 2150 2150 2150 ACADAM SERVICY 1200 1705 2150 2150 2150 2150 2150 2150 ACADAM SERVICY 1200 1200 2150 | THE PERSON OF PASSESSEE. | | FRAME 3 | PKAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
|--|--------------------------|---|--------------------|------------------------|------------------------|--|-------------------|
| AC Output Power (kVAAAN) @650°C** AC Output Power (kVAAAN) @650°C** Tago AC Output Current (A) @55°C** Tago Overload capacity at Overload capacity at Overload capacity at Overload capacity at Current Harmonic Distraint (Hab) Power Faator (cosine polyla Reactive power compensation CV Valage Range (full power) Max. DC continuous current (A)** Assimum DC voltage Range (full power) Max. DC continuous current (A)** Assimum DC voltage Range (full power) Max. DC continuous current (A)** Battery Technology Max. DC continuous current (A)** Sack Sandby Consumption Max. Bover Consumption Max. Randby Consumption Deres of protection Deres of protection Permissible Anhein Temperature Relative Humdity Max. Altitude (above sea leve) Nobe Revell Nobe Revell Anslag I/O Ground Fault Potection & Discorn General I/C Protection & Discorn General Of Potection & Discorn Ground Fault Potection & Discorn General Of Struction & Discorn Ground Fault Potection & Discorn General Of Struction & Discorn | NUMBER OF MOD | ULES | eo | 4 | 15 | w | 7 |
| AC Outnut Powe (NAJAW) @STOC79 AC Outnut Powe (NAJAW) @STOC79 Max. AC Outnut Current (A) @STOC7 Max. AC Outnut Current (A) @STOC7 Departing dird Vollege (NAC) Operating dird Vollege Current Harmonic Distortion (THD) Power Fabror (Cosine puly) Reactive power compensation DC Vollage Range (Lul power) Maximum CD Vollage DC Vollage Range (Lul power) Maximum CD Vollage Max. DC Soft ordineut current (A) Max. CD Controller Max. Athlude (Bove see leve) Gorand Fault Potection General IO E Potection General IO E Potection General IO E Potection & Biscoon General IO E Potection & Biscoon General AC Potection & Biscoon General IO E Potection & Safety Utility meteonect | REFERENCES | | FP1290C | FP1720C | FP2150C | FP2580C | FP3000C |
| Max. AC Output Centent (4), @SSPC 11530 Max. AC Output Centent (4), @SSPC 11580 Max. AC Output Centent (4), @SSPC 11280 Max. AC Output Centent (4), @SSPC 11280 Max. AC Output Centent (4), @SSPC 11280 Operating Gird Verlage (VAC) Operating Gird Verlage (VAC) Operating Gird Verlage (AC) Courtent Harmonic Distortion (THD) Reactive power compensation Max Deconfination current (4) 1600 Max. Deconfination current (4) 1600 Max. Deconfination current (4) 1230 Battery Technology Number of separate DC inputs Battery Technology Number of separate DC inputs Battery Connections Battery Connections Battery Connection Max. Standby Consumption (VA), (W) 2400 Dimensions (MaxDel) (Inches) 119, 5309 Dimensions (MaxDel) (Inches) 1269 Max Controlled (AD) Max Standby Consumption (VA), (W) 2400 Max Weight (40) 2655 All Flow Max Actitute (above see level) Max Actitute (above se | o o | AC Output Power (kVA/kW) @50*CN | 1290 | 1720 | 2150 | 2580 | 3000 |
| Max. A6 Output Current (4), @50°C 1199 Mex. A6 Output Current (4), @50°C 1289 Overload capacity at Country (4), @50°C 1289 Overload capacity at Country (4), @50°C 1289 Operating divid Fleuveroy (14), 9 Current Harmonic Distortion (1140) Reactive power Factor (cosine pri)gate Reactive power for continensation of CV Voltage Range (full power) Mexit mum Ec voltage and Country (As) 1600 Max. DC continuous current (A) 2220 Max. DC continuous current (A) 2220 Max. DC continuous current (A) 2220 Max. DC continuous current (A) 3230 Max. Sanubly Consumption Max. Sonubly Consumption Max. Sonubly Consumption Max. Sonubly Consumption Dimensions (Max) (I) 2400 Max. Altitude (Max. Max. Max. Max. Max. Mittude (A) 2800 Max. Altitude (A) 2800 Gornnumication protection & Discorn General IAC Protection & Discorn General DC Protection & Discorn General DC Protection & Discorn General DC Protection & Safety Utility merconnect | | AC Output Power (kVA/kW) @25°CN | 1530 | 2040 | 2550 | 3060 | 3500 |
| Max. A6 Output Current (A) @25°C 1280 Overload capacity a deveload capacity a deveload capacity a deveload capacity a deveload capacity and oberafulig dird voltage (AC) Operafulig dird voltage (AC) Operafulig dird voltage (AC) Current Hermonic Distortion (THD) Power Factor (cosine pripa Report Corrent (A) Maximum Co Voltage Report (A) Maximum Co Voltage Report (A) Max. DC confinuous current (A) Maximum Co Voltage Report (A) Max. Co Confinuous current (A) Max. Co Confinuous Confinuous Confinuous Confinuous Confinuous Confinuous (Max. Confinuous Max. Confinuous Confinuous Max. Confinuous Confinu | | Max. AC Output Current (A) @50°C | 1080 | 1440 | 1800 | 03160 | 2000 |
| Overload capacity an Operating side Network (Hz) Operating side Resultency (Hz) Max Det Cordish pulps Max. Det Sorticine aurent (A) Max. Det Cordish pulps OE Voklage Ripple Det Voklage Ripple Battery Technology Number of separate Det inputs Battery Technology Murrier of separate Det inputs Battery Technology Murrier of separate Det inputs Battery Technology Max. Samble Vosammytion Max. Samble Vosammytion (H4) (My) Max. Samble Vosammytion (H4) (My) Max. Samble Vosammytion (H4) (My) Max. Revert Consumption (H4) (My) Sage of werlistion Dergree of protection Dergree of protection Dergree of protection Reside of Immarks Max. Altitude (alone sea level) Communication protectol Ground Fault Protection & Discorn General I.C. Protection & Safery Utility meteonnect | | Max, AC Output Current (A) (@25°C | 1280 | 1705 | 2125 | 0220 | 0100 |
| Operating divid voltage (VAC) Operating divid Featurery (H2) Current Harmonic Distortion (THD) Power Factor (cosine pri) ²⁸ Reactive power compensation DC Voltage Rippie Max. DC continuous current (A) ²⁸ Maximum DC voltage DC Voltage Rippie Max. DC continuous current (A) ²⁸ Maximum DC voltage DC Voltage Rippie Max. DC continuous current (A) ²⁸ Satistry Technology Nurrier of separate DC inpuss Battery Technology Nurrier of separate DC inpuss Efficiency (Max) (VA) Max. Ribudo Consumption Max. Standby Consumption Max. Ribudo (Max) (I) (Max) Dimensions (MaxDAII (Inches) Satistry Dimensions (MaxDAII (Inches) Satistry Max. Altitude (MaxDAII (Inches) Max. Altitude (Above see leve) Notes et performed Permissible Ambent Temperature Relative Humidity controller Keyed OlviOFF switch Diversion December of Discorn Ground Fault Potection & Discorn General InC Protection & Discorn General DC Protection & Discorn General Max. Reconnect | | Overload capacity 121 | | 120% (der | ending on proloced | 2300 | 7930 |
| Current Ing. Strid Frequency (1-th) Fourert Harmonic Distriction (THD) Fourert Harmonic Distriction (THD) Fourert Harmonic Distriction (THD) Reactive power compensation DC Voltage Rapple Max. Dc Confinuous current (A) a 2300 Battey Technology Number of separate DC inquiss Battey Technology Max. Brower Consumption (VA) (W) 2400 Max. Standby Consumption (VA) (W) 33036-945211 Standby Consumption (VA) (W) 4265 Max. Standby Consumption (VA) (W) 3008-94521 Max Standby Consumption (VA) (W) 4265 Max. Attitude (above sea leve) Mose level? Max. Attitude (above sea level) | | Operating Grid Voltage (VAC) | | land a second | SON +10% D | o rangonsy | |
| Current Harmonic Distortion (THDs) Reactive power Factor Consider polya? Reactive power Compensation De Voltage Range (full power) Max. De Cordishuous current (A) Reattery Technology Number of separate De inputs Battery Comections Efficiency (Max) (tr) Max. Standby Oxasumption Max. Standby Oxasumption (A) (My) Sandby Weight (By) Dimensions (Max) (funn) Sandby Weight (By) Sandby Weight (By) Sandby Weight (By) Ar Flow Weight (By) Max. Power Controller Relative Hurmarity Max. Athlutte (ahore sea leve) Max. Athlutte (ahore sea leve) Max. Athlutte (ahore sea leve) Digital (10 Cornumination protocol Cornumination protocol Cornumination protocol Cornumination protocol Cornumination Digital (10 Ground Fault Protection & Discorn General I.C. Protection & Discorn General I.C. Protection & Discorn General D.C Protection & Sistery outsidity interconnect | | Operating Grid Frequency (Hz) | | | 50/60 Hz | | |
| Power Factor (cosine prilyal estative power factor (cosine prilyal estative power compensation DC Voltage Range (full power) Maximum DC Voltage Rappe (full power) DC Voltage Rappe (full power) Max. DC contitions current (A)a 2220 Max. DC contitions current (A)a 2220 Max. DC soffucircuit current (A)a 2220 Max. DC soffucircuit current (A)a 2220 Max. DC soffucircuit current (A)a 2220 Max. Comections Efficiency (Max) (V) 24(D) Max. Standby Consumption (VA) (W) 22320 Max. Comection Contensions (MaxD4f) (Inches) 33308-964217.84 Dimensions (MaxD4f) (Inches) 25805 May. Diversions (MaxD4f) (Inches) 25805 May. Altitude (A)a 2400 Max. Altitude (A)a 2400 Max | | Current Harmonic Distortion (THDI) | | | 200 per literato | | |
| Reactive power compensation DC Voltage Rept full power) Makinhum Cb Voltage Rept full power) DC Voltage Rept full power) Max. DC continuous current (A) Battey Tethnology Number of separate DC inputs Battey Tethnology Number of separate DC inputs Battey Tethnology Number of separate DC inputs Bettey Tethnology Max. Dc and Consumption (VA) (W) Max. Consumption (VA) (W) Max. Standby Consumption (VA) (W) Max. Standby Consumption (VA) (W) Max. Standby Consumption (VA) (W) Sassa Max. Standby Consumption (VA) (W) Max. Standby Consumption (VA) (W) Sassa Max. Standby Consumption (CA) Weight (Ba) Sassa Max. Standby Consumption (Consumption Consumption (Consumption Consumption Consum | | Power Factor (cosine phi)[7] | | C | O leading 0.0 logs | | |
| DC Voltage Range (full power) DC Voltage Range (full power) Max. DC continuous current (A) Muncher (creamed DC inputs) Battery Connections Efficiency (Max) (n) Max. Standby Consumption Max. Standby Consumption Max. Evener Connections Efficiency (Max) (n) Max. Standby Consumption Degree of protection Permissions (Maxbell (Inm) Degree of protection Permissions Ambent Temperature Register Hummitty Max. Altitude (above sea level) Nobse level in Interface Consumption Controller Keyed ON/OFF switch Analog VO Crount Fault Protection & Discorn General AC Protection & Discorn General Controller Humfilly control General AC Protection & Discorn General AC Protection & Discorn General DC Protection & Discorn General AC Protection & Safety Utility interconnect | | Reactive power compensation | | 9 15 | ar alladram aparati | Si | |
| Mesuhrum DC voltage Rippie Max. DC confinuous current (A) Multar of separate DC inputs Battery Technology Munther of separate DC inputs Efficiency (Max) (Ma) Max. Sandby Consumption Max. Rower Consumption Max. Rower Consumption Max. Rower Consumption Max. Rower Consumption Dimensions (Max) (Max) (Max) Max. Rower Consumption Dimensions (Max) (Max) (Max) Max. Rower Consumption Dimensions (Max) (Max) (Max) Max. Rower Consumption Dimensions (Max) (Max) Max. Affluction Mester (Max) Mobie Revieth Max. Affluction (A) Mobie Revieth M | 0 | DC Voltage Range (full power) | | | OZEV-1210V | | |
| DC Voltage Ripple Max. Dc continuous current (A) Max. Dc continuous current (A) Max. Dc continuous current (A) Battary Technology Number of separate DC inputs Battery Featurology Max. Exchology Max. Startoly Construption Max. Matter (Ba) Startoly Metght (Ba) Startoly Metght (Ba) Startoly Metght (Ba) Startoly Max. Athitude (above see level) Max. Athit | | Maximum DC voltage | | | 10101-1010 | | |
| Max. DC continuous current (A) Max. DC continuous current (A) Max. DC continuous current (A) Battary Technology Number (or separate DC inputs) Battary Connections Efficiency (Max) (r) Max. Schardby Consumption Dimensions (Max) (r) Max. Minuted (a) Max. Altitude (above sea leve) Notice of verifiation Permission Ambern (above sea leve) Notice (above se | | DC Voltage Binnle | | | Annel | | |
| Max, De Schordinicula surfrer (Ay) Battery Technology Number of separate DC inputs Battery Technology Number of separate DC inputs Battery Technology Battery Commercions Efficiency (Max) (My) Max Shandby Consumption Max Shandby Consumption Max Consumption Max Consumption Max Consumption Max Consumption Max Consumption Type of vertiliation Permissible Arribert Temperature Relative Humdity Moles level) Moles level) Moles level Moles leve | | More Do seem and a seem a seem and a seem a seem and a seem a seem and a seem a seem and a seem a seem and a seem a seem and a seem and a seem a seem a seem a seem and a seem and a seem a seem and a seem | | | < 3% | | |
| Batter Treatmology Number of separate DC inputs Batter Treatmology Number of separate DC inputs Batter Treatmology Number of separate DC inputs Batter Treatmology Max Power Contemprison (NA)(W) Dimensions (MacDell (Inches) (119,528) 27,98 Dimensions (MacDell (Inches) (119,528) 27,98 Dimensions (MacDell (Inches) (119,528) 27,98 Dimensions (MacDell (Inches) (119,528) 28,98 Max Power Contemprison (NA)(W) Weight (Ro) Degree of protection Permissible Ambient Temperature Referive Humdity Max Athitute (above sea level) Note (everlished Ambient Temperature Referive Humdity Note (everlished Ambient Temperature Referive Humdity Digital (VO Ground Fault Protection Ground Fault Protection & Discorn General IAC Protection & Discorn General IAC Protection & Discorn General DC Protection & Discorn General IAC Protection & Sisfery Utility Intercornect | | Max. Oc continuous current (A) | 1600 | 2135 | 2665 | 3200 | 3660 |
| Battery Technology Number of separate DC inputs Battery Connections Efficiency (Mas) (r) Max. Standby Consumption (Ma) (Max. Bowed Beatter) (May. Batter) Type of verificien Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Notice Jesus Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. Althude Advove sea leve) Note Permissible Ambent Temperature Register (Max. | | Max. DC shortcircuit current (A) ⁽³⁾ | 2320 | 3100 | 3880 | 4650 | 5450 |
| Number of separate DC inputs Battary Commetrions Efficiency (Mas) (ry) Max Shandby Consumption Max Shandby Consumption Max Shandby Consumption Max Shandby Consumption Max Power Consumption (VA) (W) 2400 Directions (Wabch4] (mm) 2809 Weight (top) Merght (top) Merght (top) Type of ventilation Permissible Arribent Temperature Relative Humdity Motive Review) Motive Review Review Review Review Revi | | Battery Technology | | all type | of batteries (BMS re | quired) | |
| Bartery Connections Efficiency (Mas) (n) Max Stanuby Connamy (190) Max Rower Consumption Max Power Consumption (NA) (w) Dimensions (Machel (Inches) 3028-94x-217-86 Dimensions (Machel (Inches) 3028-94x-217-86 Weight (6g) 263-5 Air Flow Weight (6g) 263-5 Air Flow Weight (6g) 263-5 Air Flow May Athlutic (above sea leve) Max Athlutic (above sea leve) Note level (Inmidity Interface Residue Humdity Note (Inches (Inches Connoller Residue (Inmidity Conno | | Number of separate DC inputs | | L | DC input per inverte | ş | |
| Efficiency (Max) (n) Max. Standby Costumption Max. Sandby Costumption Max. Power Consumption (NA) (w) 2400 Dimensions (MaxDell (Inches) 3038945x212x8 Dimensions (MaxDell (Inches) 3038945x212x8 Weight (lips) 3609 Weight (lips) 2635 Air Flow Type of vertilation Degree of protection Pedieve of protection Residere Humdity Max. Altitude (above sea leve) Digital (10 Communication protecol Power Plant Controller Keyed ON/OFF switch Humdity control Gramal In Potection & Discorn, German In C Protection & Discorn Ground Fault Potection Ground Fault Potection Safety Utility interconnect | | Battery Connections | FSD | K style battery cabin | of With 8 positive and | 18 negative connect | lons. |
| Max. Standby Consumption Max. Standby Consumption Max. Event Consumption Dimensions (Mobble) (Inches) Dimensions (Mobble) (Inches) Dimensions (Mobble) (Inches) Dimensions (Mobble) (Inches) Sego Weight (Egy) Arr Flow Weight (Egy) Arr Flow Permissions Ambient Temperature Register (Inches) Mobble Heelell (Inches) Nobles Heelell (Inches) Ambient Temperature Register | FICIENCY & | Efficiency (Max) (η) | | 7 | 28% | 50.00 | |
| Max Power Consumption (VA) (W) 2400 Dimensions (Mucbaf (Inches) 119.6.2872.73.0 Dimensions (Mucbaf (Inches) 3.038-946.73.1 Dimensions (Mucbaf (Inches) 3.038-946.73.1 Meght (Ibg) 2.655 Alf Flow Type of vertillation Permissible Arribent Temperature Relative Humidity Moles elevel) Moles elevel | JX. SUPPLY | Max. Standby Consumption | | V | Domy 50M/nermor | hilo | |
| Dimensions (Motokel) (Inches) 119.57:27.27.8 Dimensions (Motokel) (Inches) 30.389-948-21.9 Weight (Rg) 2635 Air Flow Type of vernitation Degree of protection Relative Humdrily and Humdrily Mex. Altitude (altone sea leve) M | | Max. Power Consumption (VA) (W) | 2400 | | ADDO. | | 4000 |
| Dimensions (Muchal) (mm) 30389-945x21 Weight (bb) 5809 Weight (bb) 2685 Alr Flow World (bb) 2685 Alr Flow Weight (bb) 2685 Alr Flow World (bb) 2685 Alr Flow Communication protocol Power Plent Communication protocol Power Plent Communication protocol Power Plent Communication Protocol Analog (VO Ground Fault Protection & Discorn, General AC Protection & Siefey Utility Interconnect | ABINET | Dimensions [WxDxH] (inches) | 119.6'x37,2'x86.5" | 147.6'x37.2'x86.5" | 175 7"437 7"486 5" | 300 0,027 2,006 61 | - 11 |
| Weight (fbs) 5809 Weight (bg) 2635 Air Flow Type of vertiliation Pertrassible Arnblent Temperature Relative Humidity Interface Communication protocol Power Paint Controller Reyed Old/OFF switch Humidity control Power Paint Controller Reyed Old/OFF switch Humidity control General NC Protection & Discorn, General NC Protection & Discorn, General OF Protection & Discorn, General De Protection & Sistey Utility interconnect | | Dimensions [WxDxH] (mm) | 3038x945x2198 | 3751x945x2198 | 4464x945x2798 | 5177×045×2109 | 231.9 X37.2 X86.5 |
| Weight (kg) Weight (kg) Alf Flow Type of vertiliation Degree of protection Permissible Arribinat Temperature Referive Humdity Max Athitude (abrove sea level) Mose level In Interface Communication protecol Power Plant Communier Keyed ON/OFF switch Digital I/O Ground Fault Notection Ground Fault Notection Ground Fault Potection Gremeal I/C Protection & Discorn, General I/C Protection & Discorn General I/C Protection & Discorn General I/C Protection & Discorn General I/C Protection & Sistery Utility Intercornect | | Weight (lbs) | 5806 | 7253 | 8697 | 10141 | 11505 |
| Aur Flow Type of ventilation Degree of protection Permissible Amblent Temperature Permissible Amblent Temperature Permissible Amblent Temperature Permissible Amblent Temperature MacA Altitude (abrove sea leve) Noise level! Interface Communication protocol Power Pelan Comtroller Reyed ON/OFF switch Degrial 1/O Analog 1/O Ground Fault Protection General AC Protection & Discorn General DC Protection & Sistey Utility Interconnect | | Weight (kg) | 2635 | 3290 | 3945 | 4600 | 11363 |
| Type of vertillation Degree of production Permissible Ambient Temperature Relative Humidity Relative Humidity Index Altitude (allove sea leve) Nobee level) Interface Communication protocol Power Pant Commonler Keyed Okt/OFF switch Reyed Okt/OFF switch Ansieg UO Ground Fault Protection Ansieg UO Ground Fault Protection General NC Protection & Discorn, General OF Protection & Discorn, General OF Protection & Discorn, General OF Protection & Sistery Utility interconnect | | Air Flow | | Rottom | ntake Exhanet ton | OCCUPATION AND ADDRESS AND ADD | 9239 |
| Degree of protection Redarke Humidsty Max. Ahruleur Benissible Armblent Temperature Redarke Humidsty Max. Ahruleur danove sea level) Noise level in Minteface Communication protocol Power Plant Comtroller Keyed ON/OFF switch Digital 1/O Analog I/O Cround Fault Protection Cround Fault Protection Cround Fault Protection Cound Fault Protection & Discorn, General DC Protection & Discorn, General DC Protection & Sistey Utility interconnect | | Type of ventilation | | | Formal Lindings (Op) | cal veril | |
| Permissible Amblent Temperature Bediethe Humdidy Mac Altitude (abrove sea leve) Noise level! Interface Communication protocol Power Plant Controller Reyed ON/OFF switch Digital 1/O Analog I/O Ground Fault Protection General AC Protection & Discorn General DC Protection & Sistey Utility Interconnect | VIRONMENT | Degree of protection | | | NEWA 20 / 1054 | | |
| Relative Humidity Mar. Altitude (ahove see level) Nobee level) Interface Communication protocol Power Paint Controller Keyed Old/OFF switch Reyed Old/OFF switch Analog I/O Ground Fault Protection Analog I/O Ground Fault Protection Centeral I/O Protection & Discorn, General I/O Protection & Sistery Utility interconnect | | Permissible Amblent Temperature | | -35°04 to 160°C | FOOT A ANTHON | de la constante de la constant | |
| Max. Altitude (alove see level) Interface Communication prolocol Power Plant Comitoller Keyed ON/OFF switch Digital I/O Analog I/O Analog I/O Ground Fault Protection Ground Fault Protection Ground Fault Protection & Discorn. General DC Protection & Discorn. General DC Protection & Discorn. General DC Protection & Sistery Utility mitterconnect | | Relative Humidity | | 7 00 0 | oo o' yellaa Lowe | cerating (>50°C) | |
| Noise level® Interface Communication protocol Power Plant Controller Reyed ON/OFF switch Digital 1/O Ground Fault Protection General AC Protection & Discorn General DC Protection & Discorn G | | Max. Altitude (above sea level) | | 1 0000 | to 100% Condensir | 5 | |
| Interface Communication protocol Communication protocol Power Plant Controller Reyed ON/OFF switch Digital I/O Ground Fault Protection Ground Fault Protection General I/O Protection & Discorn, General I/O Protection & Discorn, General I/O Protection & Discorn General Protection & Discorn Convoltage Protection Safety Utility interconnect | | Noise levels | | 2000m / >200 | Om power derating | Max. 4000m) | |
| Communication protocol Power Plant Controller Keyed ON/OFF switch Digital //O Analog I/O Analog I/O Ground Fault Protection Hunfally control General DC Protection & Discorn, General DC Protection & Discorn, General DC Protection & Siever Safety Utility interconnect | MTDO | Noise levels | | | < 79 dBA | | |
| Communication protocol Power Pain Cominder Reyed ON/OFF switch Reyed ON/OFF switch Analog U Ground Fault Protection General AC Protection & Discorn, General DP Protection & Discorn, General Protection & Discorn, General Protection & Uilly interconnect | FREACE | Interrace | | sraphic Display (insid | e cabinet) / Optional | Freesun App display | |
| Power Plant Controller Keyed ONUOFF switch Digital //O Analog I/O General AD Protection & Discorn, General DC Protection & Discorn, General DC Protection Safety Utility interconnect | | Communication protocol | | | Modbus TCP | | |
| Keyed ON/OFF switch Digital 1/0 Analog I/O Cround Fault Protection Ground Fault Protection General AC Protection & Discorn, General DC Protection & Discorn, Overvoltage Protection Safety Utility interconnect | | Power Plant Controller | | Optional, Thir | barty SCADA syste | ms stipported | |
| Digital I/O Avabag I/O Ground Fault Protection Humidity control General AC Protection & Discorn, General De Protection & Discorn, General De Protection & Discorn Safety Uilly interconnect | | Keyed ON/OFF switch | | | Standard | | |
| Analog I/O Cound Fault Protection Humidity control General AC Protection & Discorn. General DC Protection & Siscorn. General DC Protection Sistery Utility interconnect | | Digital I/O | | | Ontional® | | |
| Ground Fault Protection Humidity control General AC Protection & Discorn. General DC Protection & Discorn. General DC Protection & Discorn. General DC Protection & Sistery. Utility interconnect | | Analog I/O | | | Optionally | | |
| Humblity control General AC Protection & Discorn, General DC Protection & Discorn, Overvoltage Protection Utility interconnect Utility interconnect | OTECTIONS | Ground Fault Protection | | JISU | ation monitoring de | ori, | |
| General AC Protection & Discorn, General DC Protection & Discorn, General DC Protection Safety Ullify interconnect | | Humidity control | | | Arrive Heating | 200 | |
| General DC Protection & Discorn. Overvoltage Protection Safety Uliffy interconnect | | General AC Protection & Disconn. | | | Circuit Breaker | | |
| Overvoltage Protection Safety Utility interconnect | | General DC Protection & Disconn. | | Tectara | Disconnecting United | Parkins | |
| Safety Utility interconnect | | Overvoltane Protection | | PACIFICA | Disconnecting Only | abinet | |
| Utility interconnect | RTIFICATIONS | Cafety | | AC SI | id UC protection (typ | e 2) | |
| | | I Hilbert improvement and | 70 | 741, CSA 22.2 No.10 | 7.1-01, UL62109-1, I | EC62109-1, IEC6210 | 19-2 |
| | | Utility interconnect | | UL 1741SA | Sept. 2016 / IEEE 15 | 47.1 | 2005 |

[1] Values at 1,00-Ver rom and cos Ф. 1. Gransult Power Electronics for desping curves. [2] Consult Pro chants available: Q(kVAt)=v(S(kVAt-P(kWP);

(3) Consult Power Electronics for other configurations. [4] Heating resistors kit option below-20°C. [5] Residings falson 1 meter from the back of the unit.

FREEMAQ PCS 51

TECHNICAL CHARACTERISTICS

FREEMAQ PCS 645V

| | | PKAME 3 | HRAME 4 | FRAMES | FRAME 6 | FDAME 7 |
|-------------------|---|--------------------|--|---|--------------------------|--|
| NUMBER OF MODULES | ULES | 60 | 4 | | | A STATE OF THE PARTY OF THE PAR |
| REFERENCES | | FP1200C | FP1600C | FP2000C | CDOACOD | - |
| AC | AC Output Power (kVA/kW) @50°C! | 1200 | 1600 | 3000 | 2400 | PPZ800C |
| | AC Output Power (kVA/kW) @25°CM | 1430 | 2040 | 2000 | 2400 | 2800 |
| | Max. AC Outbut Current (A) @50°C | 1070 | 0407 | 0997 | 3060 | 3200 |
| | Most An Outside Contract (A) (Section) | cont | 1430 | 1790 | 2150 | 2505 |
| | Max. Ac Cutput Current (A) (@25°C | 1280 | 1710 | 2140 | 2560 | 2995 |
| | Overload capacity w | | 120% (der | 120% (depending on preload conditions) ⁶⁹ | onditions) ⁶⁹ | |
| | Operating Grid Voltage (VAC) | | | 645V±10% M | | |
| | Operating Grid Frequency (Hz) | | | 50/60 Hz | | |
| | Current Harmonic Distortion (THDI) | | | < 3% per IEEE519 | | |
| | Power Factor (cosine phi) ^{RI} | | 0 | 0.0 leading . 0.0 lauging | ina | |
| | Reactive power compensation | | u | Four madrant operation | ñ. 6 | |
| 20 | DC Voltage Range (full power) | | | 0197.19104 | 5 | |
| | Maximum DC voitage | | | ACIONAL POLICE | | |
| | DC Voltage Rinnle | | | Annel | | |
| | May DC continues and active | 0000 | | × 0% | | |
| | Max. DC communds current (A) | 1600 | 2135 | 2665 | 3200 | 3660 |
| | Max, DC shortcircuit current (A)44 | 2320 | 3100 | 3880 | 4650 | 5450 |
| | Battery Technology | | all type | all type of batteries (BMS required) | equired) | |
| | Number of separate DC inputs | | | 1 DC input per inverter? | 犁 | |
| | Battery Connections | FSD | FSDK style battery cabinet with 8 positive and 8 negative connections. | et with 8 positive an | d B negative connect | ions. |
| EFFICIENCY & | Efficiency (Max) (η) | | A STATE OF THE STA | GR9. | ional | |
| AUX, SUPPLY | Max. Standby Consumption | | | Control Collings and de- | de de | |
| | Max. Power Consumption (VA) (W) | 2400 | 0008 | phica, out // per mo | ainc | |
| CABINET | Dimensions [WxDxH] (inches) | 119.6*x37.2*x86.5* | 147 6 | 175 7*** 25**** | 4000 | |
| | Dimensions [WXDxH] (mm) | 3038x945x2198 | | 4464v945v2109 | | ١١ |
| | Weight (lbs) | 5809 | 7253 | 2607 | DE12X545X5150 | R617X95X069G |
| | Weight (kg) | 2635 | 3200 | 2004 | 10141 | 11585 |
| | Air Flow | | Rottom | Rottom Intake Exhaust for concrete | 4000 | 9299 |
| | Type of ventilation | | | Forced air cooling | ear verill | |
| ENVIRONMENT | Degree of protection | | | NEWA 30 / IDEA | | |
| | Permissible Ambient Temperature | | -35°CM to +60°C | -35°CM to +60°C > 50°C / Artista Bosson domestica / 500°C | a domein of Coop | |
| | Relative Humidity | | 48 | 4% to 100% Condension | Co ocal Billiano | |
| | Max. Altitude (above sea level) | | 2000m / >200 | 2000m / >2000m power deration (Max Approxi | (May ADDOM) | |
| | Noise level ¹⁹ | | | < 79 dRA | Contract Total | |
| CONTROL | Interface | | Graphic Display (Inside cabinet) / Optional Freesun App display | e cabinet) / Optiona | Freeson App display | |
| VI ERPAGE | Communication protocol | | | Modbus TCP | nder Lhaman | |
| | Power Plant Controller | | Optional, Thin | Optional. Third party SCADA systems supported | me supported | |
| | Keyed ON/OFF switch | | | Standard | na poddag au | |
| | Digital I/O | | | Onthonalt | | |
| | Analog I/O | | | Ontionalia | | |
| PROTECTIONS | Ground Fault Protection | | Juent | Inestigation monitoring devices | police | |
| | Humidity control | | | Active Heating | 200 | |
| | General AC Protection & Disconn. | | | Circuit Breaker | | |
| | General DC Protection & Disconn. | | External | External Disconnecting Upit Cabinet | Cabinet | |
| | Overvoltage Protection | | ACar | AC and DC protection (hype 2) | Je 2) | |
| CERTIFICATIONS | Safety | L, | UL 1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1 | 7.1-01, UL62109-1, | FC62109-1 JFC6210 | 0.0 |
| | Littlifty interconnect | | | | במסקום יי ורססקום | 7.5 |

[3] Consult Power Electronics for other configurations.
[4] Hearing resistors kii option below-20°C.
[5] Readings taken I meter from the back of the unit.

FREEMAQ PCS 600V

| | | FRAME 3 | FRAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
|-------------------|---|--------------------|---|---|---|---------------|
| NUMBER OF MODULES | OLES | ю | 4 | so | w | 7 |
| KELEKENCES | | FP1100C | FP1475C | FP1850C | FP2225C | FP2660C |
| AC | AC Output Power (kVA/kW) (@50°Cli) | 1100 | 1475 | 1850 | 2225 | 2600 |
| | AC Output Power (kVA/kW) (@25°CPI | 1335 | 1780 | 2225 | 2660 | 3110 |
| | Max. AC Output Current (A) @50°C | 1060 | 1420 | 1780 | 2140 | 2500 |
| | Max. AC Output Current (A) @25°C | 1285 | 1715 | 2140 | 2560 | 2005 |
| | Overload capacity (2) | | 120% (de | 120% (depending on preload conditions) ^M | onditions)M | |
| | Operating Grid Voltage (VAC) | | | 600V ±10% tst | | |
| | Operating Grid Frequency (Hz) | | | 50/60 Hz | | |
| | Current Harmonic Distortion (THDI) | | | < 3% ner IFFE10 | | |
| | Power Factor (cosine phi) ²¹ | | | 0.0 leading 0.0 lagging | ina | |
| | Reactive power compensation | | | Four quadrant oneration | 8 | |
| DC | DC Voltage Range (full power) | | | 849/41310/ | 5 | |
| | Maximum DC voltage | | | 1500V | | |
| | DC Voltage Ripple | | | A0001 | | |
| | Max. DC continuous current (A) | 1605 | 2140 | 25.75 | TO NO | |
| | Max. DC shortcircult current (A)(N | 2320 | 3100 | 2002 | 20192 | 3/40 |
| | Battery Technology | | out lie | l hma of hatterion (BASS and In | 4650 | 5450 |
| | Number of separate DC inputs | | w/S III | or patternes (DIVIS) | shall early | |
| | Battery Connections | FSI | 1 DC Input per inverter ⁽²⁾ FSDK style battery cabinet with 8 positive and 8 negative connections. | T DC Input per inverter ¹² inet with 8 positive and 8 | d 8 negative connect | tions. |
| EFFICIENCY & | Efficiency (Max) (n) | | raid | Larger FSUK cabinets optional | tional | |
| AUX. SUPPLY | Max. Standby Consumption | | | SOA SOA | led- | |
| | Max. Power Consumption (VA) (M) | 2400 | 9000 | approx. Sowyper 1110 | Н | |
| CABINET | Dimensions (Wxf)xHl (inches) | 110 6"497 7"406 F" | | | | |
| | Dimensions [WxDxH] (mm) | 3038x945x719R | 3751x945x2108 | 4464v046x2100 | 203.8'x37.2'x86.5" | 14 |
| | Weight (lbs) | 5806 | 7953 | 0607 | 2017894387198 | 2890X943X2198 |
| | Weight (kg) | 2635 | 2000 | 1600 | 10141 | 11585 |
| | Air Flow | 2002 | 3290 | 3945 | 4600 | 5255 |
| | There are second and a | | Bottom | Bottom intake. Exhaust top rear vent | ear vent | |
| - Contraction | Type of ventilation | | | Forced air cooling | | |
| ENVIRONMENT | Degree of protection | | | NEMA 3R / IPS4 | | |
| | Permissible Ambient Temperature | | -35°CH to +60°C, | -35°Cl4 to +60°C, >50°C / Active Power derating (>50°C) | r derating (>50°C) | |
| | Relative Humidity | | 4 | 4% to 100% Condensing | Br | |
| | Max. Aftitude (above sea level) | | 2000m / >20 | 2000m / >2000m power derating (Max, 4000m) | (Max, 4000m) | |
| | Noise level (s) | | | < 79 dBA | | |
| CONTROL | Interface | | Graphic Display (Inside cabinet) / Optional Freesun App risplay | le cabinet) / Optiona | Freesun App displar | 2 |
| NIERMAGE | Communication protocol | | | Modbus TCP | and an all an | |
| | Power Plant Controller | | Optional. Thir | Optional. Third party SCADA exsterns supported | potavouna aut | |
| | Keyed ON/OFF switch | | | Standond and a | nan rodding gur | |
| | Digital I/O | | | Standard | | |
| | Application and | | | Optionalia | | |
| DDOTEMBOUR | O/I figure | | | OptionalPl | | |
| COLECTIONS | Ground Fault Protection | | nsul | Insulation monitoring device | vice | |
| | Humidity control | | | Active Heating | | |
| | General AC Protection & Disconn. | | | Circuit Breaker | | |
| | General DC Protection & Disconn. | | Externa | External Disconnecting Unit Cabinet | Cabinet | |
| | Overvoltage Protection | | ACa | AC and DC protection (type 2) | (2 ac | |
| CERTIFICATIONS | Safety | Ξ | 2 34(3) 1000000 10000000 10000000 10000000 1000000 | 77 1-01 (11 62100 1 | Formula 1 indicate | |
| | Utility interconnect | 3 | UL 1741SA | VL 1741SA-Sept 2016 / IEEE 1547 1-2005 | EC62109-1, IEC6210 | 2-60 |
| | | | | מבחר בייות ודדר יי | 247. I-2003 | |

[1] Values at 1.00-Vac nom and cos Φ= 1.
Consult Power Electronics for derating curves.
[2] Consult P-O charts available: Q(κ/Ax)=-V[S(KVA)+P(KWP).

[3] Consult Power Electronics for other configurations.
[4] Healing resistors kit option below -20°C.
[5] Readings taken 1 mater from the back of the unit.

FREEMAQ PCS 53

TECHNICAL CHARACTERISTICS

FREEMAQ PCS 530V

| | | PRAME 3 | r HAME 4 | FRAME 5 | FRAME 6 | FRAME 7 |
|-------------------|---|--------------------|--|---|---|-------------------|
| NUMBER OF MODULES | UES | က | + | un | 9 | 7 |
| REFERENCES | | FP0990C | FP1320C | FP1650C | EDTORNE | 2010100 |
| AC | AC Output Power (kVA/kW) @50°CH | 066 | 1320 | 1650 | 1090 | TPZSTUC |
| | AC Output Power (kVA/kW) (@25°C ⁽⁾⁾ | 1180 | 1575 | 1970 | 1300 | 2310 |
| | Max. AC Output Current (A) @50°C | 1080 | 1440 | 1705 | 2166 | 27.33 |
| | Max. AC Output Current (A) @25°C | 1285 | 1715 | 2145 | 2530 | 6162 |
| | Overload capacity [2] | | 12D% (den | 120% (depending on preload conditional) | S2/U | 3000 |
| | Operating Grid Voltage (VAC) | | | 5307 +10% 3 | olumnoloj. | |
| | Operating Grid Frequency (Hz) | | | 50/60 Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% ner IEEE510 | | |
| | Power Factor (cosine phi) ^(a) | | | Dibloading Ontagging | in a | |
| | Reactive power compensation | | ı | Four dualitant operation | 2 0 | |
| DC | DC Voltage Range (full power) | | | 7501/-1310V | | |
| | Maximum DC voltage | | | 1500 | | |
| | DC Voltage Ripple | | | 2000 | | |
| | Max. DC continuous current (A) | 1605 | 2145 | 2600 | 0,000 | |
| | Max. DC shortcircuit current (A) ⁽³⁾ | 2320 | 3100 | 2800 | 3210 | 3/20 |
| | Battery Technology | | | all type of hatteries (BMS zaruired) | | 9420 |
| | Number of separate DC inputs | | | DC input per inverterial | Tall and the same of the same | |
| | Battery Connections | FSD | FSDK style battery cabinet with 8 positive and 8 negative connections. | pabinet with 8 positive and 8 ne | d 8 negative connecti | ions. |
| EFFICIENCY & | Efficiency (Max) (n) | | Congress | osaminers op | nonai | |
| AUX. SUPPLY | Max. Standby Consumption | | 0 | c annew EOM/nor monthly | ch de | |
| | Max. Power Consumption (VA) (W) | 2400 | 3200 | Anno | ADAD | 1000 |
| CABINET | Dimensions [WxDxH] (inches) | 119.6'x37.2'x86.5" | 147.6°x37.2°x86.5° | 147.6°x37.2°x86.5° 175.7°x37.2°x86.5° | 202 B* | 201 00,02 0,.02 0 |
| | Dimensions [WxDxH] (mm) | 3038x945x2198 | 3751x945x2198 | 4464x945x2198 | | |
| | Weight (lbs) | 5809 | 7253 | 8697 | 10141 | 11505 |
| | Weight (kg) | 2635 | 3290 | 3945 | 4600 | 2303 |
| | Air Flow | | Bottom | Bottom intake, Exhaust top rear vent | rear vent | CENT |
| | Type of ventilation | | | Forced air cooling | | |
| ENVIRONMENT | Degree of protection | | | NEMA 3R / IPS4 | | |
| | Permissible Ambient Temperature | | -35°CH to +60°C, | 35°CM to +60°C, >50°C / Active Power deration (>50°C) | r derating (>50°C) | |
| | Relative Humidity | | 449 | 4% to 100% Condensing | (a co) 6 | |
| | Max. Altitude (above sea level) | | 2000m / >200 | 2000m / >2000m power derating (Max. 4000m) | (Max. 4000m) | |
| | Noise level ¹⁹ | | | < 79 dBA | | |
| CONTROL | Interface | | Graphic Display (Inside cabinet) / Optional Freesun App display | e cabinet) / Optiona | Freesun App display | |
| I ENTROE | Communication protocol | | | Modbus TCP | | |
| | Power Plant Controller | | Optional. Thin | Optional. Third party SCADA systems sunnorted | Ems sunnorted | |
| | Keyed ON/OFF switch | | | Standard | no loddon ou | |
| | Digital I/O | | | Ontionalli | | |
| | Analog I/O | | | Ontional® | | |
| PROTECTIONS | Ground Fault Protection | | usul | Insulation monitoring device | vice | |
| | Humidity control | | | Active Heating | | |
| | General AC Protection & Disconn. | | | Circuit Breaker | | |
| | General DC Protection & Disconn. | | External | External Disconnecting Unit Cabinet | Cabinet | |
| | Overvoltage Protection | | AC at | AC and DC protection (type 2) | (2 ot | |
| CERTIFICATIONS | Safety | , JO | UL 1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IFC62109-2 | 7.1-01. UL62109-1. | EC62109-1 JFC6210 | 0.0 |
| | Utility Interconnect | | UL 1741SA. | Ul 17415A-Sent 2016 / IEEE 1547 1-2006 | 247 1 0000 | 7.0 |

[3] Consult Power Electronics for other configurations. [4] Heating resistors kit option below-20°C. [5] Readings taken 1 meter from the back of the unit.

FREEMAQ PCS 500V

| | | 2 | | | | - Tallian |
|-------------------|---|--------------------|--|---|---------------------------|---------------|
| NUMBER OF MODULES | DULES | m | 4 | ur) | 9 | 7 |
| REFERENCES | | FP0935C | FP1245C | FP1560C | FP1870C | FP2180C |
| AC | AC Output Power (kVA/KW) @50*Ciii | 935 | 1245 | 1560 | 1870 | 2180 |
| | AC Output Power (kVA/kW) @25*Chi | 1115 | 1485 | 1855 | 2230 | 2600 |
| | Max. AC Output Current (A) @50°C | 1080 | 1440 | 1800 | 2160 | 2515 |
| | Max. AC Dutput Current (A) @25°C | 1285 | 1715 | 2140 | 2575 | 3000 |
| | Overload capacity [3] | | 120% (dep | 120% (depending on preload conditions) ^{IM} | onditions) ⁴ | 0000 |
| | Operating Grid Voltage (VAC) | | | 500V ±10% [3] | - | |
| | Operating Grid Frequency (Hz) | | | 50/60 Hz | | |
| | Current Harmonic Distortion (THDi) | | | < 3% per FFF519 | | |
| | Power Factor (cosine phi) ¹⁸ | | 0 | 0.0 leading 0.0 landing | Du | |
| | Reactive power compensation | | | Four quadrant operation | 8 00 | |
| DC | DC Voltage Range (full power) | | | 708V-1310V | 5 | |
| | Maximum DC voitage | | | 15000 | | |
| | DC Voltage Ripple | | | 4 280 | | |
| | Max. DC continuous current (A) | 1500 | 2135 | 25.65 | 0000 | 4 |
| | Max. DC shortcircuit current (A) ⁽³⁾ | 2320 | 3100 | 3880 | 3500 | 3000 |
| | Battery Technology | | alltrug | all type of hatterine (BMS rounined) | | 5450 |
| | Number of separate DC inputs | | | 1 DC input ner inverter | dall car | |
| | Battery Connections | FSI | FSDK style battery cabinet with 8 positive and 8 negative connections. | et with 8 positive and | 8 negative connect | ions. |
| EFFICIENCY & | Efficiency (Max) (n) | | Cata | Larger Pour Cabinets optional | lional | |
| UX. SUPPLY | Max. Standby Consumption | | 1 | Countries EQUADOS security | 4 | |
| | Max. Power Consumption (VA) (W) | 2400 | 3200 | Anno Anno Anno | ann | 400 |
| CABINET | Dimensions [WXDxl-] (Inches) | 119.6"x37.2"x86.5" | 147 6 | 175 7"v37 9"va6 E" | 4000 | - 1 |
| | Dimensions [WxDxH] (mm) | 3038x945x2198 | | 4464x945x2198 | 5177x945x21q8 | 5800v045v2108 |
| | Weight (lbs) | 5809 | 7253 | 8697 | 10141 | 11585 |
| | Weight (kg) | 2635 | 3290 | 3945 | 4600 | 5965 |
| | Air Flow | | Bottom | Bottom intake, Exhaust top rear yent | ear vent | 0070 |
| | Type of ventilation | | | Forced air cooling | | |
| ENVIRONMENT | Degree of protection | | | NEMA 3R / IP54 | | |
| | Permissible Ambient Temperature | | -35°CI4 to +60°C, | -35°C ¹⁴ to +60°C, >50°C / Active Power derating (>50°C) | r derating (>50°C) | |
| | Relative Humidity | | 44 | 4% to 100% Condensing | la la | |
| | Max. Altitude (above sea level) | | 2000m / >200 | 2000m / >2000m power derating (Max, 4000m) | (Max. 4000m) | |
| | Noise level ¹⁸¹ | | | < 79 dBA | | |
| CONTROL | Interface | | Graphic Display (inside cabinet) / Optional Freesun App display | de cabinet) / Optiona | Freesun App displar | > |
| NIERRACE | Communication protocol | | | Modbus TCP | | |
| | Power Plant Controller | | Optional, Thir | Optional. Third party SCADA systems supported | ms supported | |
| | Keyed ON/OFF switch | | | Standard | nos coddon ou | |
| | Digital I/O | | | Optionally | | |
| | Analog 1/0 | | | Optionali | | |
| PROTECTIONS | Ground Fault Protection | | usul | Insulation monitoring device | vice | |
| | Humidity control | | | Active Heating | | |
| | General AC Protection & Disconn. | | | Circuit Breaker | | |
| | General DC Protection & Disconn, | | External | External Disconnecting Unit Cabinet | Cabinet | |
| | "1 | | ACal | AC and DC protection (type 2) | pe 2] | |
| CERTIFICATIONS | | . TO | UL 1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 | 77.1-01, UL62109-1, I | EC62109-1, IEC6210 | 19-2 |
| | Utility interconnect | | A2124 | 2006-17541 3381 7 A106 to Sept 1741 EL | 2000-1-200 | |

|| Yellus at 1.00-You norm and cos Φ= 1. Consult Power Rectronics for dessting curves. |2| Consult P-Q charts available: Q(KVA)=-(S(KA))=P(kW)*).

[3] Consult Power Electronics for other configurations.
[4] Healing resistors kit option below 20°C.
[5] Readings teken 1 meter from the back of the unit.

FREEMAQ PCS 55

TECHNICAL CHARACTERISTICS

FREEMAQ PCS 480V

| | | | | O TANKS | L LANGE O | A STATE A |
|-------------------|---|--------------------|--|---|---------------------|--------------------|
| NUMBER OF MODULES | ULES | en | 4 | un | 10 | 7 |
| REFERENCES | | FP0900C | FP12010 | FP1500C | FP1800C | EP2100F |
| AC | AC Output Power (kVA/kW) @50°C ⁽¹⁾ | 006 | 1200 | 1500 | 1800 | 2100 |
| | AC Output Power (kVA/kW) @25°C ^い | 1070 | 1425 | 1780 | 2140 | 2465 |
| | Max. AC Output Current (A) @50°C | 1085 | 1445 | 1805 | 2165 | 2636 |
| | Max. AC Output Current (A) @25°C | 1285 | 1715 | ONTO | 2526 | 0000 |
| | Overload capacity (2) | | 120% (der | 120% (denending on prelond consistent and | COLO | 3000 |
| | Operating Grid Voltage (VAC) | | dan) progra | Agon 110s lil | predigonsy | |
| | Operating Grid Frequency (Hz) | | | # # # # # # # # # # # # # # # # # # # | | |
| | Current Harmonic Distortion (THD) | | | ZH 00/00 | | |
| | Power Factor (cosing shall) | | | < 3% per IEEE519 | | |
| | Reactive power componentian | | 0 | 0.0 (eading 0.0 lagging | Du . | |
| 2 | Contract points compensation | | | Four quadrant operation | no | |
| 3 | Dr. Vortage Range (full power) | | | 679V-1310V | | |
| | Maximum DC voltage | | | 15007 | | |
| | DC Voltage Ripple | | | 800 V | | |
| | Max. DC continuous current (A) | 1600 | 2135 | 2665 | 3900 | 9260 |
| | Max DC shortcircuit current (A) ^{BI} | 2320 | 3100 | 3880 | 4550 | 3000 |
| | Battery Technology | | all type | But the of hatteries (BMS required) | | 0400 |
| | Number of separate DC inputs | | t different | 2 DC input nor insurand | danca) | |
| | Battery Connections | FSD | FSDK style battery cabinet with 8 positive and 8 negative connections. | cabinet with 8 positive and 8 ne | 8 negative connecti | ons. |
| EFFICIENCY & | Efficiency (Max) (n) | | To a second | do spandaniers opi | lonar | |
| AUX. SUPPLY | Max. Standby Consumption | | | Antonio EMatters mand de | 1.1 | |
| | Max. Power Consumption (VA) (W) | 2400 | 3000 | Anna Anna | Anne Anne | |
| CABINET | Dimensions [WxDxH] (Inches) | 110 6'v37 9'v86 5" | 1476 | 177 TO TO TO TO | 4800 | 2000 |
| | Dimensions (WxDxH) (mm) | 3038x945x9198 | - 1 | 4464v045v3100 | 203.8'x37.2'x86.5' | 231.9*x37.2*x86.5* |
| | Weight (lbs) | 5800 | 2952 | 0517X0434044 | 8612X645X716 | 5890x945x219B |
| | Weight (kg) | 2625 | 0000 | 7600 | 10141 | 11585 |
| | Air Flow | 2002 | 0530 | 0340 | 4600 | 5255 |
| | Type of ventilation | | Bottom | Bottom Intake, Exhaust top rear vent | ear vent | |
| FNVRONMENT | Degrap of profession | | | Forced air cooling | | |
| | Dominish American | | | NEMA 3R / IP54 | | |
| | Deletin III and All Deletine | | -35°CM to +60°C, : | 35°CM to +60°C, >50°C / Active Power derating (>50°C) | r derating (>50°C) | |
| | March And Hallmany | | 49 | 4% to 100% Candensing | £, | |
| | Max. Affitude (above sea level) | | 2000m / >20I | 2000m / >2000m power derating (Max. 4000m) | (Max. 4000m) | |
| CONTROL | Noise level H | | | < 79 dBA | | |
| NTEDEACE | Interface | | Graphic Display (Inside cabinet) / Optional Freesun App display | le cabinet) / Optional | Freesun App display | |
| | Communication protocol | | | Modbus TCP | | |
| | Power Plant Controller | | Optional. Thir | Optional. Third party SCADA systems supported | ms supported | |
| | Keyed ON/OFF switch | | | Standard | | |
| | Digital I/O | | | Optionalpi | | |
| | Analog I/D | | | Optiona | | |
| PROTECTIONS | Ground Fault Protection | | nsul | Insulation monitoring device | vice | |
| | Humidity control | | | Active Heating | | |
| | General AC Protection & Disconn. | | | Circuit Breaker | | |
| | General DC Protection & Disconn. | | External | External Disconnecting Unit Cabinet | Cabinet | |
| | Overvoltage Protection | | ACar | AC and DC protection (type 2) | ve 2) | |
| CERTIFICATIONS | Safety | UL 1 | UL 1741, CSA 22.2 No.107.1-01. UI 62109-1 IEC62109-1 IEC62109-2 | 77.1-01. UI 62109-1 | FC62100-1 IEC6210 | 0.0 |
| | | | | COLTON COLON | 1, ILOUZ 10 | 7.6 |

[1] Values at 1.100-Vac norm and cos de= 1.
Consult Power Electronics for derating curves.
[2] Consult P.Q. charts available: Q(KMAr)=V(S(kMa)-P(KWP)).

[3] Consult Power Electronics for other configurations.
[4] Heating resistors kill option below-20°C.
[5] Readings taken 1 meter from the back of the unit.

FREEMAQ MULTI PCS UTILITY SCALE MULTI PCS INVERTER



POWER CONVERSION SYSTEM



FIELD REPLACEABLE UNITS



IP65 AVAILABLE



MODULAR DESIGN

ICOOL 3

æ

m



4 QUADRANT



- 1-

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. :

3 LEVEL TOPOLOGY

TAKING ADVANTAGE OF THE MOST FLEXIBLE 1500V INVERTER PLATFORM

The Power Electronics Freemaq Multi PCS modular inverter architecture can be designed to support solar generation and either a power module to export PV power or as a bidirectioenergy storage in a single inverter, or even having individual battery systems. Each power module can be designated as nal power module designed to support energy storage.

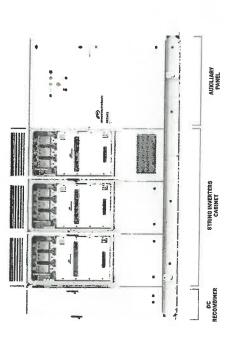
Within this architecture, the AC bus is designed to match the minimum DC voltage on either the solar or battery system. In Peak Shaving, Ramp Rate control, Frequency Regulation and Load Leveling, without the need of an additional transformer. a solar inverter with storage capabilities integrated, such as the DC side, the inputs for each power module are indepen-The Freemaq Multi PCS is the perfect solution for having dent. The Power Electronics Multi PCS Inverter is available with 1 to 6 power modules dedicated to energy storage.

FREEMAQ MULTI PCS 59

COMPACT DESIGN - EASY TO SERVICE

By providing full front access the Freemaq Mutit PCS series simplifies the maintenance tasks, reducing the MTTR (and achieving a lower OPEX). The total access allows a fast swap of the FRUs without the need of qualified technical personnel.

With the Freemaq Multi POS, Power Electronics offers its most compact solution, achieving 3.8MW in just 12ft long, reducing installation costs and labor time.



STRING CONCEPT POWER STAGES

The Freemaq Multi PCS combines the advantages of a central inverter with the modularity of the string inverters. Its power stages are designed to be easily replaceable on the field without the need of advanced technical service personnel, providing a safe, reliable and fast Plug&Play assembly system. Following the modular philosophy of the Freemaq series, the Multi PCS is commosed of 6 FRI is first resultanceable.

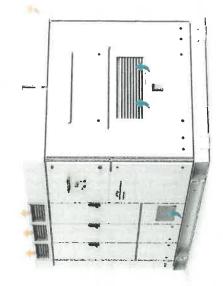
Following the modular philosophy of the Freemag series, the Multi POS is composed of 6 FRUs (field replaceable units), being able to work with up to 6 different DC inputs.



INNOVATIVE COOLING SYSTEM

Based on more than 3 years of experience with our MV Variable Speed Drive, the iCOOL3 is the first air-cooling system allowing IP65 degree of protection in an outdoor converter. ICOOL3 delivers a constant stream of clean air to the FRUs, being the most effective way of reaching up to IP65

degree of protection, without having to maintain cumbersome dust filters or having to use liquid-cooling systems, avoiding the commonly known inconveniences of it (complex maintenance, risk of leaks, higher number of components...), therefore resulting in an OPEX cost reduction.



VAR AT NIGHT

At night, the Freemaq Multi PCS inverter can shift to reactive power compensation mode. The inverter can respond to an external dynamic signal, a Power Plant Controller command or pre-set reactive power level (kVA).

ACTIVE HEATING

At night, when the unit is not actively exporting power, the inverter can import a small amount of power to keep the inverter internal ambient temperature above -20°C, without using external resistors.

This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing the maintenance.

MULTILEYEL TOPOLOGY

The multilevel IGBT topology is the most efficient approach in the 1,500 Vdc design. Power Electronics has many years to manage high DC link voltages and makes the difference of power design in both inverters and MV drives and the

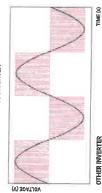
Freemaq Multi PCS design is the result of our experience with 3 level topologies. The 3 level IGBT topology reduces stage losses, increases inverter efficiency and minimizes total harmonic distortion.

Freemaq Multi PCS firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and

DYNAMIC GRID SUPPORT

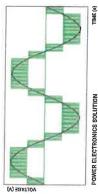
reactive power curtailment...), and is compatible with all the specific requirements of the utilities.

TWO-LEVEL INVERTER



THREE-LEVEL INVERTER

FULL VOLTAGE RIDE THROUGH COMPATIBILITY

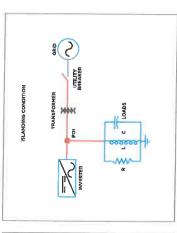


8.0

LVRT or ZVRT (Low Voltage Ride Through)

Inverters can withstand any voltage dip or profile required by with full reactive power, as long as the protection limits are the local utility. The inverter can immediately feed the fault

TTME (s)



Anti-Islanding

TIME (s) CEI-016 MAN HECO

PO12.3 --- BDEW --- PREPA

This protection combines passive and active methods that eliminates nulsance tripping and reduces grid distortion according to IEC 62116 and IEEE1547.

EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wifi, allowing remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors.

to critical information (energy registers, production and events), The app user friendly interface allows quick and easy access



| AVAILABLE INFORMATION | Grid and PV field data, inverter and bower module data (vol- stages, currents, power, temperatures, I/O status, 1.1. Alarms and warnings events. Alarms and warnings events. Energy registers. |
|-----------------------|--|
| FEATURES | Easy Wireless connection, Comprehensive interface, Real time data. Save and copy settings, |
| LANGUAGE | English, Spanish, |
| SYSTEM REQUIREMENTS | iOS or Android devices, |
| SETTINGS CONTROL | Yes |

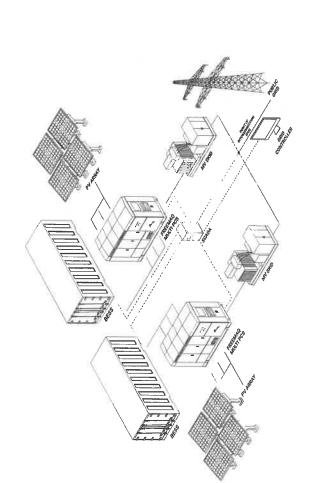


BATTERY ENERGY STORAGE SYSTEM

A BESS comprises a battery container connected to a Freemaq Multi PCS (Power Conversion System) that follows the instruction of the main governor of the plant, the PPC (Power Plant Controller) or SCADA,

EXAMPLE 1

EXAMPLE 2



Power connections

ENERGY STORAGE APPLICATIONS



LOAD LEVELING

peak periods. It also allows grid operators to supply electricity periods of low demand from the grid, in order to later supply not be at the same time as peak demand, this facilitates the benefit of selling the energy at a higher market price during Freemaq Multi PCS series are able to store energy during flexibility and integration of renewable generation into the this energy when there is a higher demand. This has the with a higher renewable origin. Since PV generation may grid.



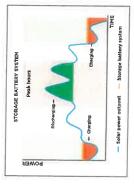
RENEWABLE INTEGRATION

power output. The Freemaq Multi PCS controls the ramp rate transient conditions experienced by the PV array. The system monitors the PV inverter output to inject or consume power The Freemaq Multi PCS series attenuates the intermittent nature of renewable energy sources, to provide a smoother at which power is injected into the grid, and thus reduces accordingly to ensure the output remains within the ramp the impact of rapid power fluctuations due to sudden or requirements.

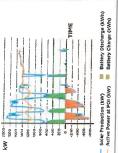


(AA) UTILITY CURTAILMENT RECOVERY

storage system, the excess energy from the PV field can be

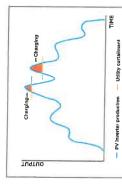








the grid during certain periods. With this AC-coupled energy grid operator, due to the high energy sources penetration in Utility scale inverter production can be curtailed by the stored in the BESS and then delivered when needed,



Voltage at PD! with VRS activated J.W. Voltage at POI 1,06 104 1.02 98.0 96'0 96'0 0.92 **YOLTAGE**

capacitive or inductive current. Other features include Voltage

Control, Reactive Power Control and Fault Ride Through

Support.

Freemaq Multi PCS series helps the integration of renewa-

GRID SUPPORT

(@™)

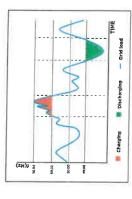
ble sources, by helping to maintain grid stability and power

quality. It can help support the grid voltage by generating

(Bd)

FREQUENCY REGULATION SYSTEM

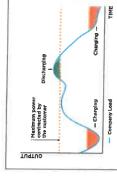
discharging the batteries and injecting more power to the grid. Freemaq Multi PCS provides ability to regulate grid frequen-(generation>demand) inverter power output is curtailed and (generation<demand) inverter power output is increased by this energy is stored. When there is a grid under-frequency cy in both directions. When there is a grid over-frequency

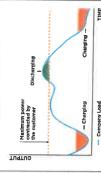




PEAK POWER SHAVING

the grid can avoid switching on more expensive and polluting injected into the grid, which reduces the demand at this time. stored instead of injected into the grid during periods of low network and increases significantly its efficiency. Energy is The result is a more flattened demand curve which means of high demand, it reduces the burden on the distribution demand, which as a result increases the load on the grid. However, during peak periods this stored energy is then By delivering stored energy to the grid during periods generators.





TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCS 480V TO 615V

| | 400 | A004 | Anne | 2300 | 2009 | 6150 |
|--------------|-------------------------------------|-----------|---------------------|---|---------------|-----------|
| 2 | AC Uliput Power (KVA/KW) @SU-C III | 1600-2400 | 1665-2500 | 1765-2650 | 2000-3000 | 2050-3075 |
| | Output Power (kVA/kW) (@25°C iii | 1760-2640 | 1830-2750 | 1940-2915 | 2200-3300 | 2255,33BA |
| | Operating Grid Frequency (Hz) | | | SO/60 Hy | | 2500.000 |
| | Current Harmonic Distortion (THDi) | | | 2 90 mm January | | |
| | Power Factor (cosine phi)21 | | | o bear increased | | |
| | Description control of | | o | v.v leading v.v lagging | | |
| | Reactive hower compensation | | Œ | Four quadrant operation | | |
| 20 | DC Voltage Range (Vdc) | 679-1310 | 708-1310 | 750-1310 | 849-1310 | 870-1310 |
| | DC Voltage Ripple | | | <3% | | |
| | Max. DC continuous current (A) | | 2645 - 3970 (d | 2645 - 3970 (depending on the PCS configuration) | Officiality | |
| | Battery Technology | | All tyne | All type of hatteries (BMS rossifred) | in a second | |
| | Number of separate DC inputs | | | Ho to 6 M | lea) | |
| EFFICIENCY & | Efficiency (Max) (n) | | | 98% (preliminany | | |
| AUX. SUPPLY | Max. Standby Consumption | | G V | sannor Shiftner module | | |
| | Max. Power Consumption (VA) (W) | | 2400-560074 | proof or the Don | | |
| | External Auxiliary Supply | | בבתה מחחה לוו | | nulguration) | |
| CABINIET | | | | Optional | | |
| ADINE | Dimensions [WxDxH] (ft/mm) | Frame 1 | | 9×7×7/27×22×22 | 2.2 | |
| | | Frame 2 | | 12×7×7/37×2.2×2.2 | 2.2 | |
| | Weight (lbs/kg) | Frame 1 | | 4900 - 10802,65 | | |
| | | Frame 2 | | 7000 - 15432.36 | | |
| | Air Flow | | Bottor | Bottom intake, Exhaust too vent | t | |
| | Type of ventilation | | | Forced air cooling | | |
| NVIRONMENT | ENVIRONMENT Degree of protection | | IP54 | P54 / NEMA3R (i65 Optional) | 9 | |
| | Permissible Ambient Temperature | | -35°CM to +60 | -35°CM to +60°C / >50°C Active Power deration | r deration | |
| | Relative Humidity | | 0% t | 0% to 100% Non confension | Simple I | |
| | Max. Altitude (above sea level) | | 2000m / >200 | 2000m / >2000m power deration (Max 4000m) | 4000m) | |
| | Noise level 191 | | | < 79 dBA | fileson w | |
| CONTROL | Interface | | Graphic Display (Ir | Graphic Display (Inside cabinet) / Ontional Freesun App | i Freezin Ann | |
| ERFACE | Communication protocol | | | Modbus TCP | | |
| | Power Plant Controller | | Optional, Thire | Optional. Third party SCADA systems supported | Silonorted | |
| | Keyed ON/OFF switch | | | Standard | nabhairn | |
| | Digital I/O | | | Ontional® | | |
| | Analog I/O | | | Ontionate | | |
| ROTECTIONS | PROTECTIONS Ground Fault Protection | | han | Insulation monitoring daving | | |
| | Humidity control | | | Antive Healing | | |
| | General AC Protection & Disconn. | | | Circuit Breaker | | |
| | General DC Protection & Disconn, | | | Contactor + Fisees | | |
| | Overvoltage Protection | | AC AV | AC and DC parties of hos OA | | |

[1] Values at 1.00-Ver norm and oos 6--1.
Comist Power Exchantis for derating aurwes.
[2] Consult Put charts available: Q(KVAri--(S)EKAVP)-P(EVP).

FREEMAQ MULTI PCS 67

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCS 630V TO 690V

| Control Cont | Ac | AC Outhirt Dower (V/A /UMA GEORGE) | 0400000 | | | 8060 |
|--|--------------|--|-----------|--|--|-----------|
| Page 247 2310-3465 2365-3350 2420-3450 2420- | | Company of the compan | 2100-3450 | 2750-3225 | 2200-3300 | 2300-3450 |
| Solv60 Hz | | Output Power (kVA/kW) @25°C III | 2310-3465 | 2365-3550 | 2420-3530 | 2530.3 |
| 10 10 10 10 10 10 10 10 | | Operating Grid Frequency (Hz) | | 50760 | Н | 10.0003 |
| Post quadrant operation Post quadrant operation | | Current Harmonic Distortion (THDi) | | Solver see | GEERIO | |
| Tearling Sept-1310 Sept- | | Power Factor (cosine phi) ^{p3} | | adjood 00 | O broaden | |
| 10 10 10 10 10 10 10 10 | | Reactive power compensation | | - Buons po | v.v iogginiy | |
| 13-10 913-1310 934-1310 934-1310 934-1310 934-1310 934-1310 934-1310 934-1310 938-1310 9 | DC | DC Voltage Dance Aide) | 2000 | rou doadran | t operation | |
| Inputs Inputs Inputs Inform Inform Inform Informed Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 4 Frame 1 Frame 1 Frame 1 Frame 2 Frame 6 Invel | | DO Welliam Dinni | 891-1310 | 913-1310 | 934-1310 | 976-1310 |
| Inputs Inputs Inputs Inputs Inputs Inm Inputs Input | | oc voltage rippie | | %E> | | |
| itipulis ition an (VA) (VA) (VA) frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 4 Frame 6 Frame 6 Frame 6 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 1 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame | | Max. DC continuous current (A) | | 2645 - 3970 (depending on | the PCS configuration) | |
| Inputs Infon In(A) (W) (W) Inform Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 4 Frame 1 Frame 1 Frame 1 Frame 1 Frame 1 Frame 2 Frame 3 Frame 1 Frame 1 Frame 1 Frame 1 Frame 2 Frame 3 Frame 1 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 3 Frame 3 Frame 4 Frame 3 Frame 4 Frame 4 Frame 5 Frame 6 Frame 6 Frame 7 F | | Battery Technology | | All type of batteries | (BMS recuired) | |
| n (v/s) (w) y Frame 1 Frame 2 Frame 3 | | - 1 | | of all | , market 197 | |
| no (vA) (W) Traine 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 1 Frame 1 Frame 1 Frame 1 Frame 2 Frame 3 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 3 | EFFICIENCY & | 1 | | 98% (melin | minary | |
| on (vA) (tV) y Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 4 Frame 1 Frame 6 Frame 1 Frame 6 Frame 1 Frame 1 Frame 1 Frame 2 Frame 3 Frame 2 Frame 3 Frame | AUX. SUPPLY | Max. Standby Consumption | | Mind wounds | Incress of the contract | |
| /mm) Frame 1 Frame 2 Frame 2 Frame 2 Frame 3 Frame 6 Itive() Machine 1 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 1 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 | | Max. Power Consumption (VA) (W) | | 2400 - 5600 (depending on | the Doc one | |
| mm) Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Frame 1 Frame 1 Frame 1 Frame 1 Frame 1 Frame 2 Frame 3 Frame 2 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 2 Frame 1 Frame 1 Frame 1 Frame 2 Frame 2 Frame 2 Frame 2 Frame 3 Fr | | External Auxiliary Supply | | Total Control | the ros corniguration) | |
| Frame 2 Invel) Machine 1 Mac | CABINET | Dimensions (M/vDvH] (ff/mm) | Frame 1 | /2×2×6 | 27x22x22 | |
| Frame 2 Frame 2 Interesture Identity M M M M M M M M M M M M M M M M M M M | | filling fragger and supplier | Frame 2 | ,TxTx21 | /3.7×2.2×2.2 | |
| Frame 2 Imperature I (cont) Maccom. Disconn. | | | Frame 1 | 4900 | -10802.65 | |
| mperature Ievel) Discorn. Discorn. | | (8) | Frame 2 | 7000 | -15432.36 | |
| npersture level) Disconn. | | Air Flow | | Bottom intake Evi | hallet from wort | |
| mperature I level) Meconn. Disconn. | | Type of ventilation | | rate berned | ooolino. | |
| mperature level) Discorn. Discorn. | ENVIRONMENT | T Degree of protection | | IDEA / NEWARDS | See Onstantin | |
| i level) M Disconn. Disconn. | | Permissible Ambient Temperature | | Cooper Cooper of March 255- | and optional | |
| i leveli) ii Discom, Discom, | | Relative Humidity | | 10 000 /0 001 00 00 00 00 00 00 00 00 00 00 00 0 | Active Power derating | |
| i M Discom. Discom. | | May Altitude (show see low) | | 0% to 100% Non | condensing | |
| i Discom, Discom | | Malor Intellige | | 2000m / >2000m power d | Jerating (Max. 4000m) | |
| Blecom. Diecom. | Contract | HOISE IGNELIA | | JD 6.2 > | BA | |
| i Disconn, Disconn, | MITTER | Interface | | Graphic Display (inside cabine | et) / Optional Freesun Ann | |
| Disconn, Disconn, | TOWN WATER | Communication protocol | | Modbus | TCP | |
| Disconn. Disconn. | | Power Plant Controller | | Optional. Third party SCAD | A systems supported | |
| Discom. Discom. | | Keyed ON/OFF switch | | chaet | and a second sec | |
| Discom. Discom | | Digital I/O | | polito | ige ige | |
| Discom, Discom, | | Analog I/O | | Chucule | The state of the s | |
| Disconn, Disconn. | ROTECTIONS | Ground Fault Protection | | ationiqo | | |
| | | Humidity control | | III SHARINGIII MOUIIG | oring device | |
| | | General AC Protection & Disconn, | | Active ries | anng | |
| | | General DC Protection & Disconn. | | Calcul Bit | Caker | |
| | | Overvoltage Protection | | בסווומכוטו + | ruses | |

|1] Values at 1,00-Vec nom and cos Ф= 1, Constit Power Electronies for dereiting curves. |2] Consult P-O charts available: Q(KVAr)=V(S(KV)):P(KWP);

FREEMAQ STATCOM

UTILITY SCALE STATIC COMPENSATOR



FIELD REPLACEABLE UNITS



MODULAR DESIGN



ICOOL 3



P65 AVAILABLE



W

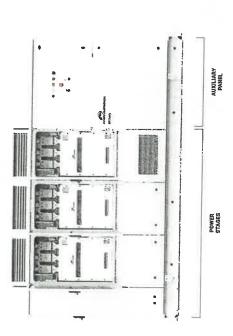
.

TAKING ADVANTAGE OF THE MOST FLEXIBLE 1500V INVERTER PLATFORM Freemag STATCOM is a high power, utility scale, modular static compensator. It is ideal for dynamic reactive response, VAR support and grid voltage stabilization in either industrial locations or distributed generators such as renewable energy plants. Its modular design and redundant topology make it the perfect solution for the most demanding installations. As an outdoor solution, it doesn't need to be installed in a technical room and neither does it need additional cooling thanks to its revolutionary iCOOL 3 system. It is evailable in 2 different frames ranging from 2300 kVAr to 3800 kVAr.

COMPACT DESIGN - EASY TO SERVICE

By providing full front access the Freeman Statcom series simplifies the maintenance tasks, reducing the MITR (and achieving a lower OPEX). The total access allows a fast swap of the FRUs without the need of qualified technical personnel.

With the Freemag Statcom, Power Electronics offers its most compact solution, achieving 3.8MW in just 12tt long, reducing installation costs and labor time.



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The Freemag Statoom combines the advantages of a central inverter with the modularity of the string inverters. Its power stages are designed to be easily replaceable on the field without the need of advanced technical service personnel, providing a safe, reliable and fast Plug&Play assembly system.

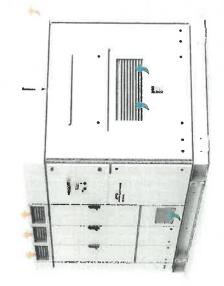


INNOVATIVE COOLING SYSTEM

FREEMAQ STATCOM 71

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degree of protection, without having to maintain cumbersome dust filters or having to use liquid-cooling systems, avoiding the commonly known inconveniences of it (complex maintenance, risk of leaks, higher number of components...), therefore resulting in an OPEX cost reduction.



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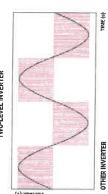
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TWO-LEVEL INVERTER



(V) EDATION

THREE-LEVEL INVERTER

POWER ELECTRONICS SOLUTION

TIME (s)

EASY TO MONITOR

our inverters. All our inverters come with built-in wift, allowing The Freesun app is the easiest way to monitor the status of remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors.

to critical information (energy registers, production and events). The app user friendly interface allows quick and easy access





| 0 | 11 | rett | 10 | |
|----|----|------|-----|---|
| | | 7 == | a (| |
| पं | | | 1 | 9 |

Grid and PV field dath.
Inverter and Power module data (Vollages, current), power, temperatures, I/O status...).
Weather conditions.
Admms and warnings events.
Admms and warnings events.
Checy registers...
Basy Wireless connection.
Casy Wireless connection.
Carp Wireless connection.
Seave and copy settings.
English, Spanish.

AVAILABLE INFORMATION

iOS or Android devices,

SYSTEM REQUIREMENTS

LANGUAGE

FEATURES

Yes

SETTINGS CONTROL

TECHNICAL CHARACTERISTICS

FREEMAQ STATCOM 690V

FREEMAQ STATCOM 73

| | | FRAME 1 | FRAME 2 |
|--------------------------|--|---|--------------------------------|
| NUMBER OF MODULES | | • | 10 |
| REFERENCES | | FT2300 | ETAKSO |
| AC | AC Output Power (kVA/kW) @50°C ^{II} | 2300 | 3450 |
| | Max. AC Output Current (A)@50°C | 1925 | 2887 |
| | Operating Grid Voltage (VAC) | # %01∓ \069 | |
| | Operating Grid Frequency (Hz) | 20/90 Hz |) Hz |
| | Current Harmonic Distortion (THDI) | < 3% per IEEE519 | EEE519 |
| EFFICIENCY & AUX. SUPPLY | Efficiency (Max) (ŋ) | %8'86 | %5 |
| | Max. Standby Consumption | < approx. 50W/ber module | //per module |
| CABINET | Dimensions [WxDxH] (ft) | 7×7×6 | 12×7×7 |
| | Dimensions [WxDxH] (m) | 2.7×2.2×2.2 | 3.7×2.2×2.2 |
| | Weight (lbs) | 10802,65 | 15432.36 |
| | Weight (kg) | 4900 | 7007 |
| | Type of ventilation | Forced africooling | |
| ENVIROMENT | Degree of protection | NEMA 3R / IP54 / (IP65 Outlanal) | (IP65 Optional) |
| | Permissible Ambient Temperature | -35°CM to +60°C, >50°C / Active Power derating (>50°C) | tve Power derating (>50°C) |
| | Relative Humidity | 4% to 100% Condensing | Condensing |
| | Max, Altitude (above sea fevel) | 2000m / >2000m power derating (Max. 4000m) | derating (Max. 4000m) |
| | Noise level ^[3] | < 79 dBA | 18A |
| CONTROL INTERFACE | Interface | Graphic Display (inside cabinet) / Optional Freesun App display | / Optional Freesun App display |
| | Communication protocol | Modbus TCP | \$ TCP |
| | Power Plant Controller | Optional, Third party SCADA systems supported | DA systems supported |
| | Keyed ON/OFF switch | Standard | ard |
| | Digital I/O | Optional | nal |
| | Analog I/O | Optional | nal |
| PROTECTIONS | Ground Fault Protection | Insulation monitoring device | toring device |
| | Humidity control | Active Heating | eating |
| | General AC Protection & Disconn. | Choult Breaker | reaker |
| | Overvoltage Protection | Court | 9 |

[1] Values at 1.00-Vac nom and $\cos \varphi$ = 1. Consult Power Flectronics for derating curves.

[2] Heating kit option required below -20°C.
[3] Sound pressure level at a distance of 1m from the rear part.

POWER PLANT CONTROLLER POWER PLANT CONTROLLER





RENEWABLE INTEGRATION



(AA) UTILITY CURTAILMENT RECOVERY



CLIPPING RECOVERY





ENHANCE THE DYNAMIC GRID SUPPORT OF YOUR PV PLANT

Power Electronics experience in integrating its products into different global electrical networks enables us to offer a set of solutions that can be customized to your requirements to control different sources of energy into the same grid.

unprecedented opportunity to reduce operational costs to off The integration of an alternative power source creates an grid industrial and commercial facilities.



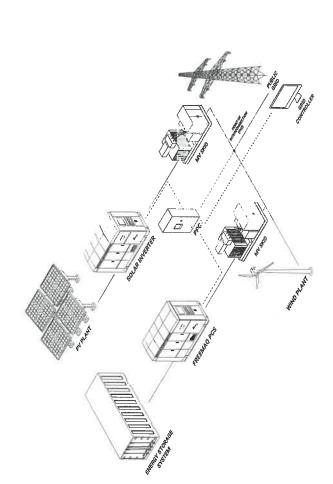
PPC 77

POWER PLANT CONTROLLER

The Power Plant Controller (PPC) can be the main governor of the most complex Multi PCS systems by monitoring the point of interconnection (POI) and at the same time controling the power generation and storage equipment.

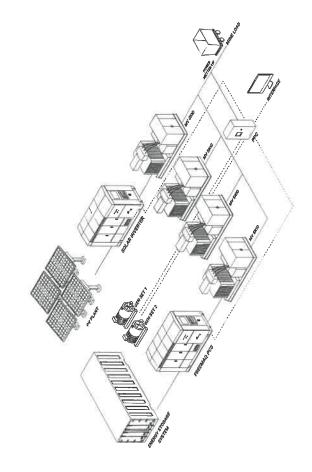
The PPC is equipped with the latest PLC based microprocessor that interacts through the programmable digital/

The PPC together with the Freesun solar inverter or the Freeanalogue signals and communication ports (Modbus TCP). maq series can be customized for those countries (Puerto Rico, Hawaii...) that require full compliance to stringent dynamic grid support response at POI.



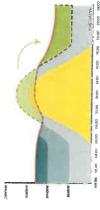
 Multiple renewable power sources: solar, wind, etc. PPC main governor and interface of the system. Power smoothing – Enable ramp rate control. Centralized dynamic grid support at POI. Storage equipment control.





- Power shaping - Enhanced broad implementation of Multiple GenSets and storage equipment control. PPC main governor and interface of the system. Centralized dynamic grid support at PO!. decentralized PV.

Power smoothing ~ Enable ramp rate control.



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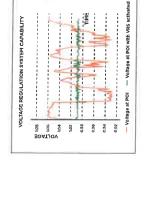
DYNAMIC GRID SUPPORT

flexible control algorithms. The PPC helps the grid controller to manage the performance of the PV plant, guaranteeing The Power Electronics Power Plant Controller is a device used to manage PV plants in order to comply with all the utility and customer requirements, thanks to its fast and grid quality requirements.

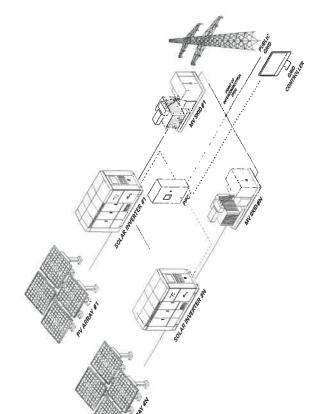
FREGUENCY REGULATION CAPABILITY

(.u.q)q

power at the POI with a fast response time. This flexible plant The PPC includes the latest utility interactive specifications control device allows the user to customize the unit, in order to support the grid, by controlling the reactive and active to comply with any grid code standards and regulations.



f(p.u.)



TECHNICAL CHARACTERISTICS

PPC 79

PPC

| GENERAL DATA | Dimensions (WxDxH) mm | 415 x 230 x 515 |
|----------------------------|---|--|
| | Weight (kg) | 10 |
| | Mounting system | Wall mounted |
| | Compatible Inverters | HE, HEC, HEM, HEMK and Freemag PCS |
| | Power Supply | 250W |
| I/O and COMMUNICATIONS III | 4 x Digital Inputs | Programmable inputs and active high (24Vdc). Optically isolated. |
| | 1 x RS485 Port | 3 wires (GND,A,B), Modbus RTU |
| | 1 x USB Port | PC connectable using a master.Modbus configurator (ModScan or similar). Reserved for TS. |
| | 1 x CAN Port | 3 wires (LO, GND, Hi), Modbus RTU |
| | 1 x Ethernet Port (RJ45) | Modbus TCP/IP |
| ENVIRONMENTAL. | Operation Temperature | 0~50°C (32°~122°F) |
| CONDITIONS | Storage temperature | ·20~80°C (-4*~176*F) |
| | Humidity | 5-95% non-condensing |
| | Degree of protection | P42 |
| CERTIFICATIONS | CE CE | |
| OTHERS | Web interface for local and remote monitoring | Dring |
| | Output I was | |

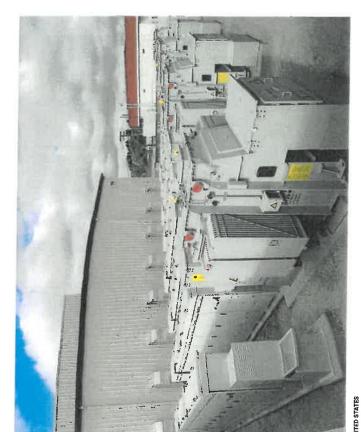
[1] Communication ports can be customised depending on PV plant design without prior notice.

REFERENCES

More than 12GW installed around the world.



Ballarat, 30MW FREEMAQ PCS AUSTRALIA



UNITED STATES Vists, 43.2MW FREEMAQ PCS



UNITED STATES

UNITED STATES Pima, 11MW



81

FREEMAQ DC/DC Citrus, 2MW



UNITED STATES
Caaco Bay, 18MW
FREEMAQ PCS

WARRANTY

Power Electronics (The Seller) warrants that their Energy Storage And Power free of faults and defects when its condition and performance is in compliance from the date of delivery to the Buyer. It shall be understood that a product is Quality Products are free of faults and defects for a period of 3 years, valid with its specification.

implementation of authorized repairs or modifications. (v) if serial numbers are coupled directly by the Buyer or by the final customer, (vii) accidents or events regarding the transport, installation, functioning, maintenance and the storage of the Products, (iii) repairs or modifications made by the Buyer or third party modified or illegible, (vi) anomalies caused by, or connected to, the elements that place the Product outside Its storage and operational specification, viii) The warranty shall not extend to any Products whose defects are due to (I) careless or improper use, (ii) fallure to observe the Seller's instructions without prior written authorization of the Seller, (iv) negligence during the continued use of the Products after identification of a fault or defect.

The warranty excludes components that must be replaced periodically such and tear. The warranty excludes external parts that are not manufactured by as fuses, lamps & air filters or consumable materials subject to normal wear the Seller under the brand of Power Electronics.

be undertaken by the Seller except in cases of approved intervention by the Buyer Product or its part that demonstrates a fault or defect, which is in conformance with the disassembly/assembly, transport and customs of equipment will also with the aforementioned terms of the warranty. Reasonable costs associated The Seller undertakes to replace or to repair, himself, at their discretion, any and/or their representative where cost allocation has been previously agreed.

In case of fault or defect, the Buyer shall notify the Seller in writing by using the following contact email: quality@power-electronics.com, of the presence number of the defective product plus a brief description of the fault must be included in the email. Failure to notify the Seller of fault or defect within this of any fault or defect within 15 days of the fault or defect event. The serial time period may result in the warranty becoming invalid.

In the event of replacement of defective Product or part thereof, the property of the Product or part shall be transferred to the Seller.

virtue of applicable mandatory law provisions. In any case, the Seller shall not even as manufacturer of the Products, other than that expressly provided by be liable for indirect or consequential damages of whatsoever nature as, by The Seller shall bear no liability for damages to property or third persons, way of example, production losses or unearned profits.

the total sum of the contract and payment has not been reached in accordanc The Seller shall, at their discretion, forfelt all warranty rights of the Buyer if with the agreed conditions of the contract.

Products including, but not limited to, any implied warranty of merchantability No other warranties, express or implied, are made with respect to the or fitness for a particular purpose.

amount equal to no more than the price obtained by the Seller of the faulty or In any case, the Buyer's right to damages shall be limited to a maximum

defective Products

These conditions shall apply to any repaired or replacement products. Not withstanding the above, the replacement of a Product does not imply an extension of the term of warranty outside that of the original term.



ADDITIONAL WARRANTY

Power Electronics stands by the quality and durability of our inverters. That is why we offer a comprehensive 3 year warranty on our equipment. As the inverter is the critical component of the Instaliation, it must not shutdown.

confidence further in our products, Extended Warranty packages up to 20 years This is why we have made it our top priority to create a robust and reliable product and give the best service and warranty along with it. To boost your are also available

HEADQUARTERS

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WARRANTY & CONTACT 83

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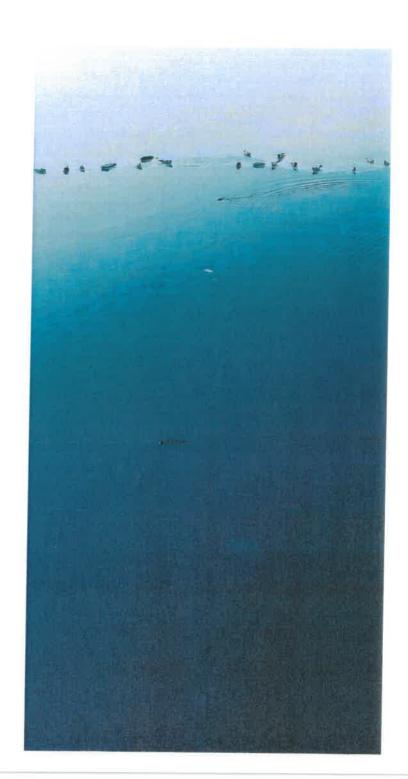
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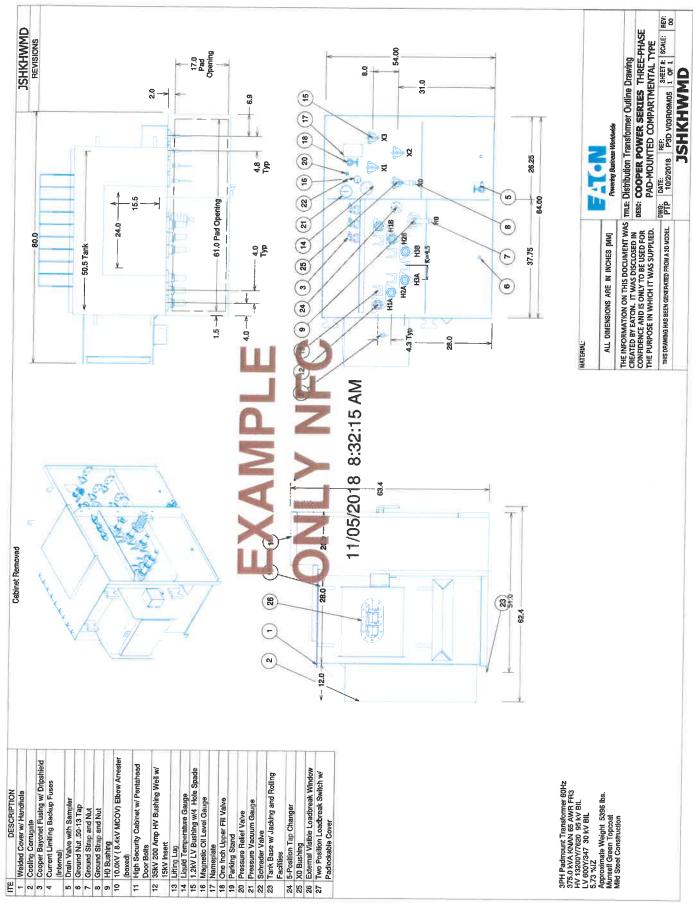
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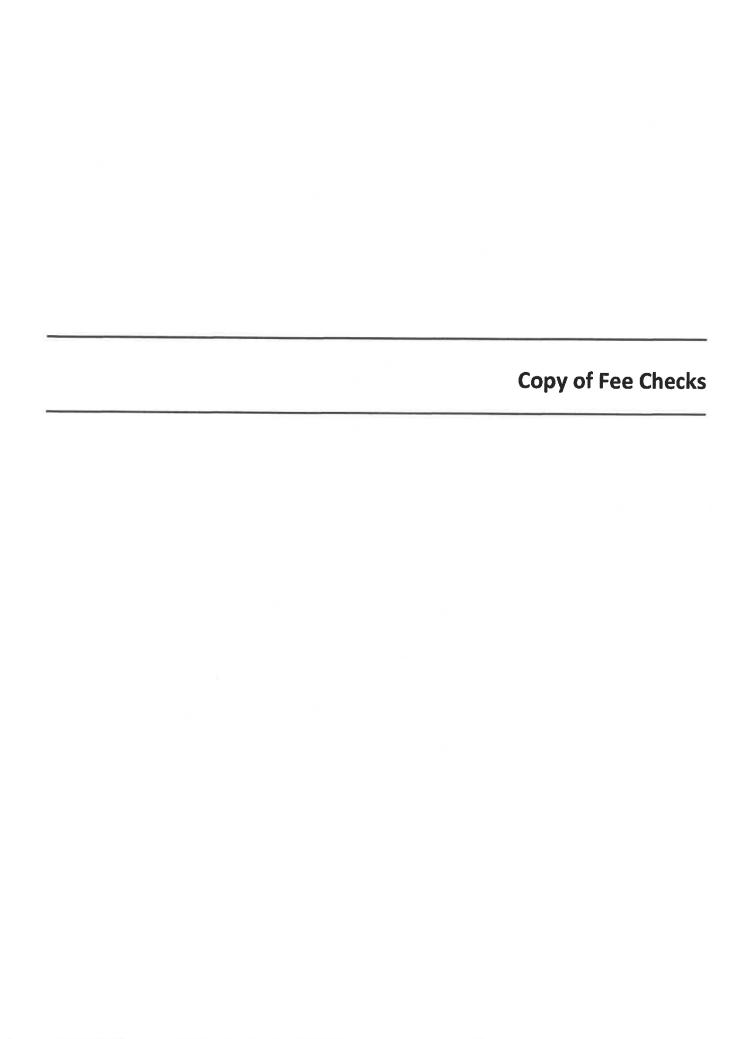
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