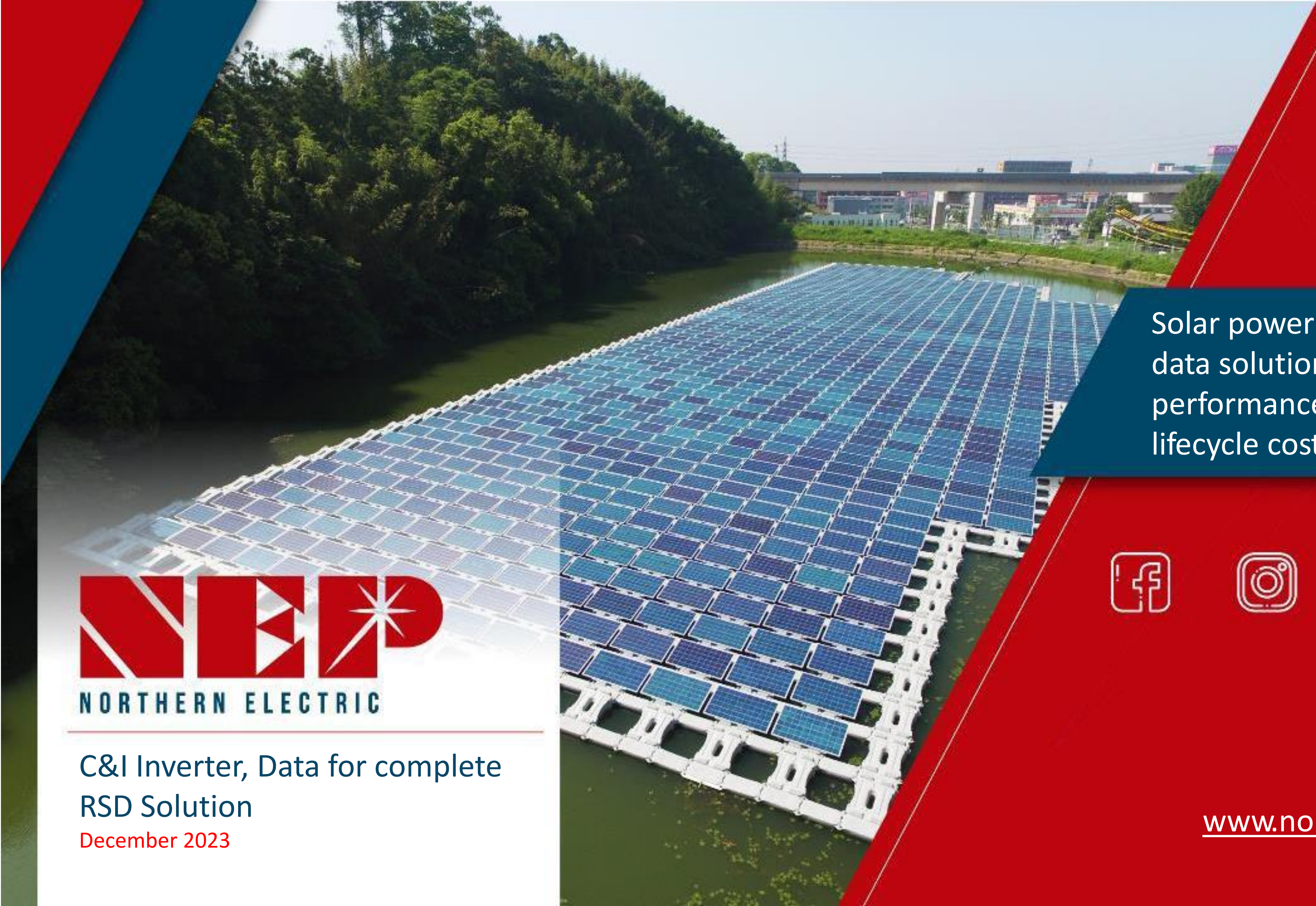


NORTHERN ELECTRIC

# C&I Inverter, Data for complete RSD Solution

December 2023

Solar power conversion and data solutions for safety, performance and best lifecycle cost

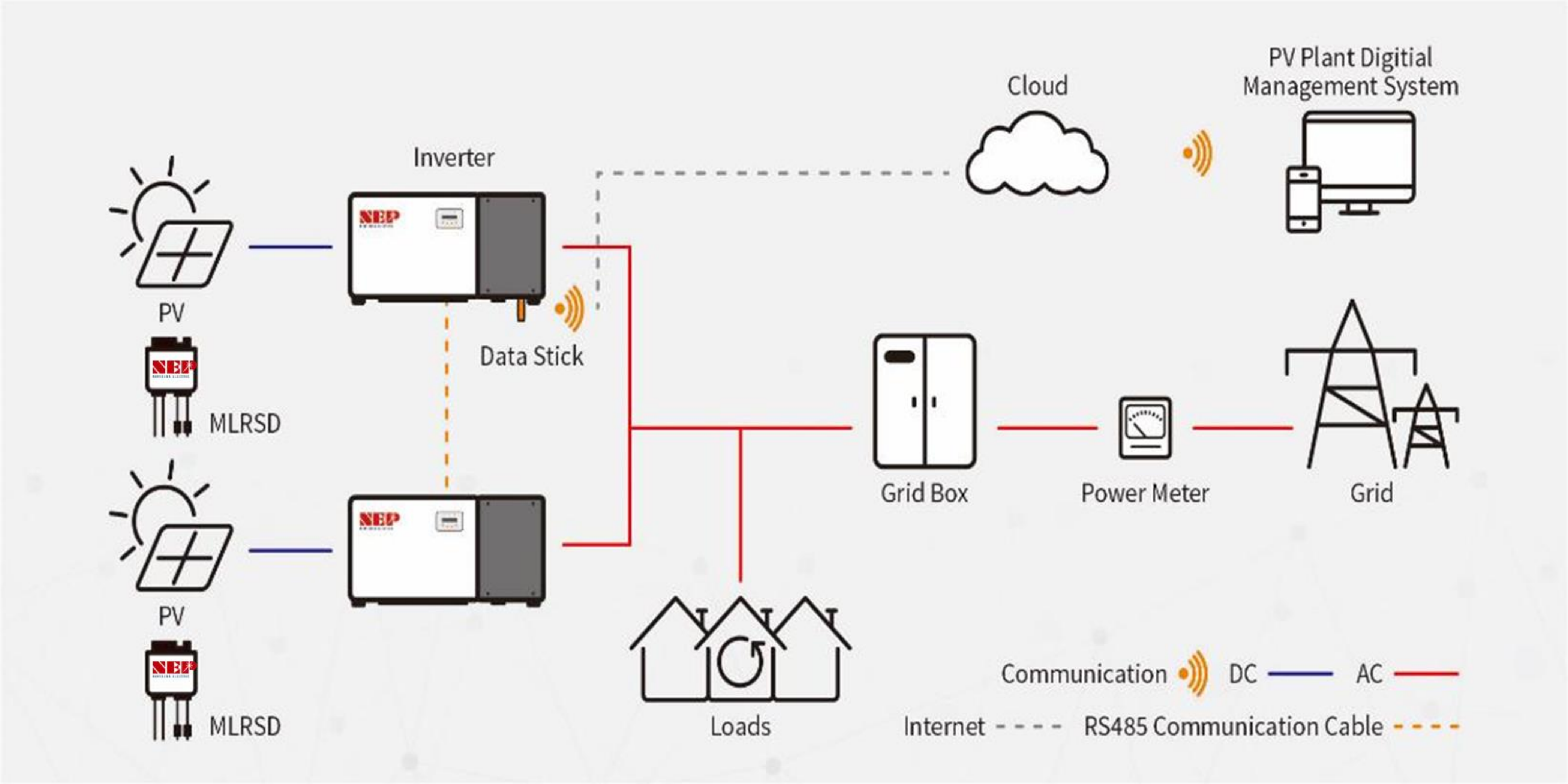
www.northernep.com

# NEP Expanded RSD Solution

**Data, Communications – "Galaxy" Solutions**

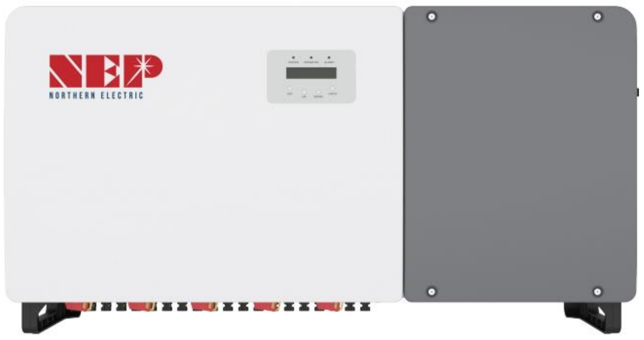
- Hardware
- Integration
- Smart phone and Web data

# Complete RSD + Inverter + Data Solution… All from NEP


PV Plant Digitial Management System
Cloud
Inverter
PV
MLRSD
Data Stick
Grid Box
Power Meter
Grid
PV
MLRSD
Loads
Communication
DC
AC
Internet
RS485 Communication Cable

NORTHERN ELECTRIC

# Inverters for any and all C&I Rooftops



NEP-75KW
NEP-100KW

NEP-33KW
NEP-50KW
NEP-30KW-208Vac

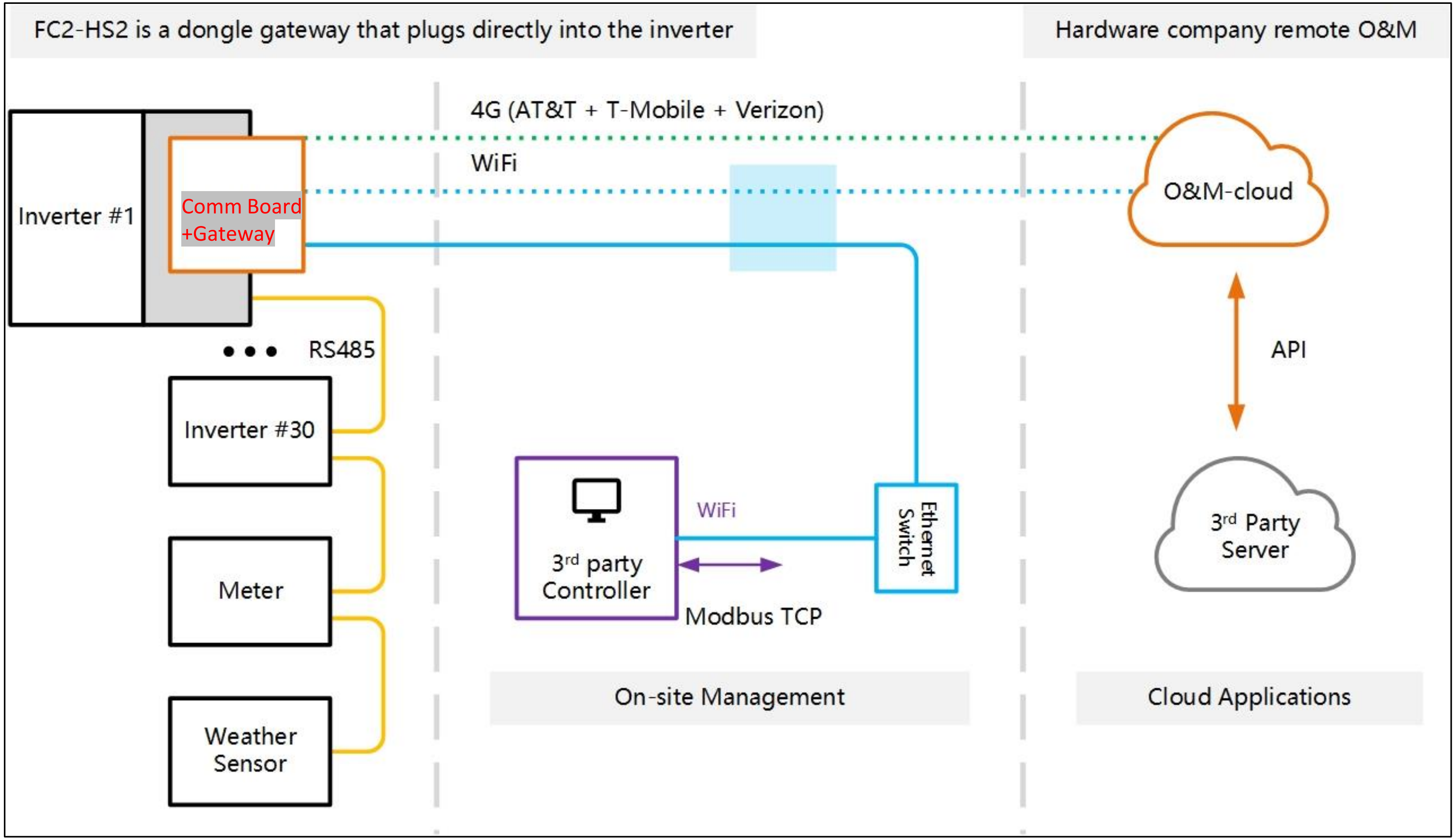
+

Integrated
Transmitter

RSD Receivers
PVG-2, PVG-3

- Elegant wire-box integration of NEP transmitter
- NEP Gateway inside wire-box
- No supplemental RSD related enclosures necessary
- NEP warranty wrap

# “Galaxy” Data, Communications Solution – (non-RSD example)

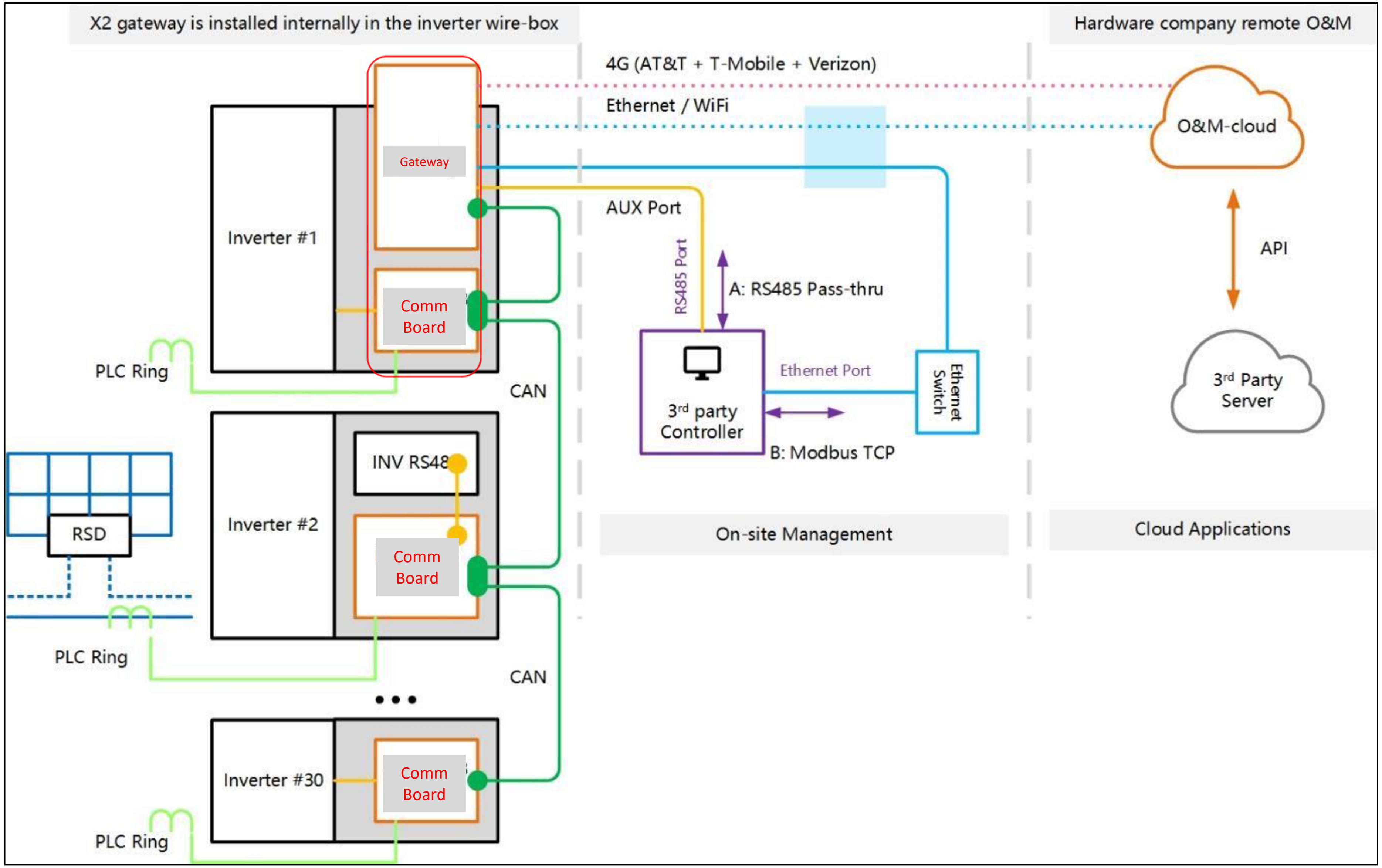

FC2-HS2 is a dongle gateway that plugs directly into the inverter
Hardware company remote O&M
4G (AT&T + T-Mobile + Verizon)
WiFi
Inverter #1
Comm Board
+Gateway
O&M-cloud
API
RS485
Inverter #30
Meter
Weather Sensor
3rd party Controller
WiFi
Ethernet Switch
Modbus TCP
3rd Party Server
On-site Management
Cloud Applications

The "Smart Link" function of the APP allows users to automatically match complex hardware scenarios with just one click.

* Architecture example with no RSD functions

NORTHERN ELECTRIC

# "Galaxy" Data communications – Rapid Shutdown Architecture


X2 gateway is installed internally in the inverter wire-box
Hardware company remote O&M
4G (AT&T + T-Mobile + Verizon)
Ethernet / WiFi
Gateway
O&M-cloud
Inverter #1
AUX Port
RS485 Port
API
A: RS485 Pass-thru
Comm Board
PLC Ring
Ethernet Port
Ethernet Switch
3rd Party Server
CAN
3rd party Controller
INV RS485
B: Modbus TCP
RSD
Inverter #2
Comm Board
On-site Management
Cloud Applications
PLC Ring
CAN
• • •
Inverter #30
Comm Board
PLC Ring

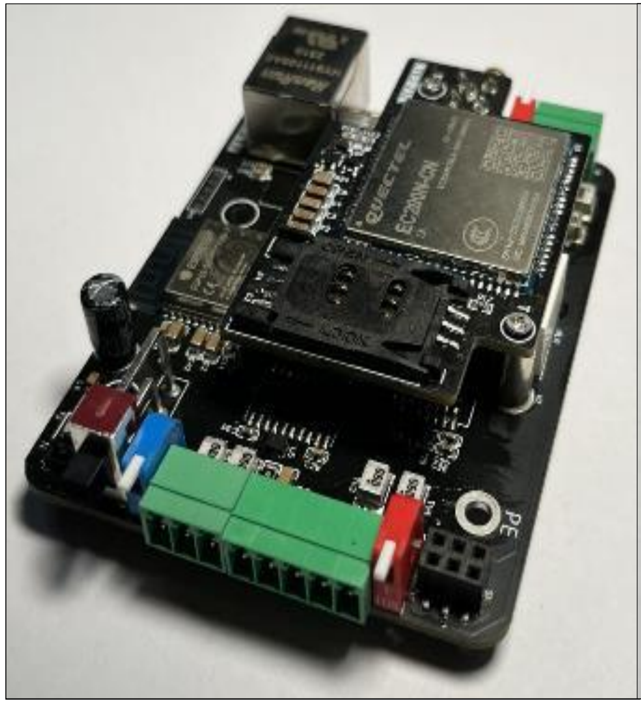
Gateway
+
Comm Board

Inside inverter
wire-box

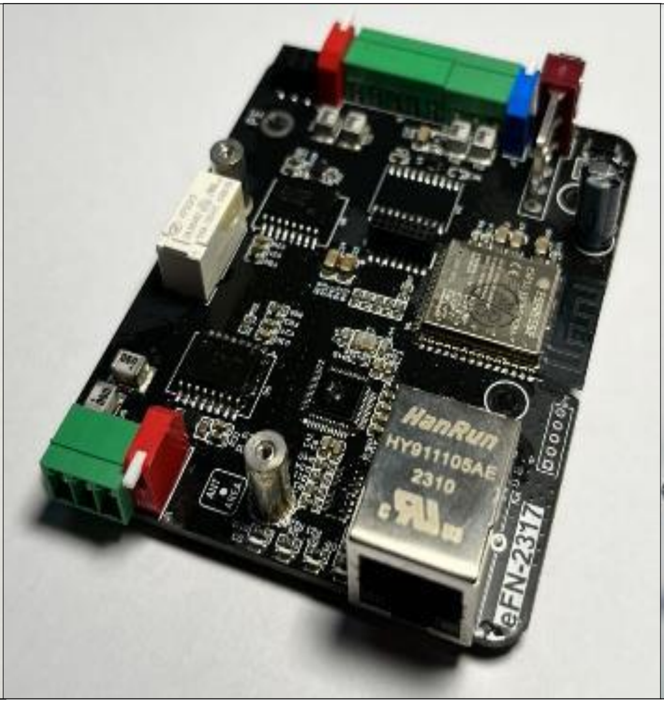
# “Galaxy” Data hardware – Field integrated in NEPTUNE wire-boxes

- Gateway communications boards
- High-performance response to real-time control of large sites
- Automated inverter commissioning
- Energy production management
- Smart Panel Level Monitoring
- Optional Cellular (Wifi, Ethernet standard)
- RSD and Inverter data
- One gateway supports up to 10 networked inverters

Example
Notice the “Cell” version is same Gateway as “Wifi” version with added cellular chip



Galaxy-Cell Gateway



Galaxy-Wifi Gateway

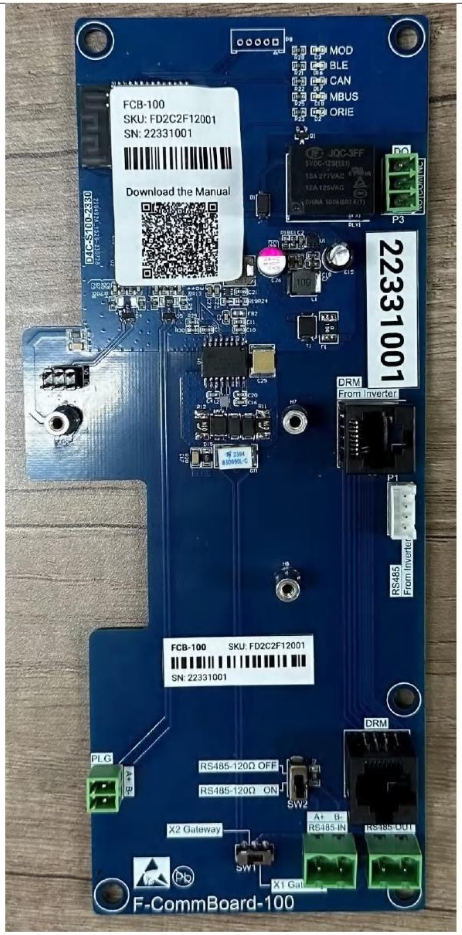
Comes with option for DAS box installation

NORTHERN ELECTRIC

# NEP Data Solution – Galaxy-Maxi (CommBoard-100) for 75/100kW

| | |
|---|---|
| **Model Name** | **FCB-100** |
| **SKU** | **FD2C2F12001** |
| **Customer Code** | TBD |
| | |
| **Protocol Converter Specifications** | |
| | |
| **RS485 Interface** | |
| No. of Ports | 2 (2-pole Terminal Block and 4-pole Terminal Block) |
| Protocol | Modbus RTU and Custom |
| Modbus RTU Mode | Master |
| | |
| **CAN Interface** | |
| No. of Ports | 1 (2-pole Terminal Block) |
| Signals | CAN_L, CAN_H |
| Terminator | 120 ohms (configurable) |
| Isolation | 3 kV (built-in) |
| | |
| **Bluetooth Interface** | |
| Standard | BLE 4.2 |
| Antenna | Built-in |
| | |
| **Power Parameters** | |
| Input Voltage | 5 to 24 Vdc |
| Power Consumption | 1 W, Max. 2 W |
| | |
| **Environmental Limits** | |
| Operating Temperature | -30℃ to 85℃ (-22 to 185°F), Natural convection |
| Storage Temperature | -40 to 85°C (-40 to 185°F) |
| Ambient Relative Humidity | 5 to 85% (non-condensing) |
| | |
| **Physical Characteristics** | |
| IP Rating | IP20 |
| Dimensions | 210 mm / 94 mm / 19 mm |
| Weight (without housing) | 86g |
| | |

| **Packaging and accessories** | |
|---|---|
| Dimension of packaging box | 253*152*40mm |
| Total Weight | 0.17KG |
| Protocol Converter | 1 * FCB-100 |
| Connector | 1 * EDG-3.5-3P, 1 * EDG-3.5-5P, 2 * EDG-5.08-2P |
| Documentation | Quick guide QR-code on stickers |
| | |

| **Packaging and accessories photos** | |
|---|---|
| Protocol Converter |  |

MOD
BLE
CAN
MBUS
ORIE
FCB-100
SKU: FD2C2F12001
SN: 22331001
Download the Manual
P3
22331001
DRM
From Inverter
P1
RS485
From Inverter
FCB-100
SKU: FD2C2F12001
SN: 22331001
DRM
PLC
RS485-120Ω OFF
RS485-120Ω ON
SW2
X2 Gateway
SW1
X1 Gat
RS485-IN
RS485-OUT
F-CommBoard-100

**One CommBoard Per inverter**

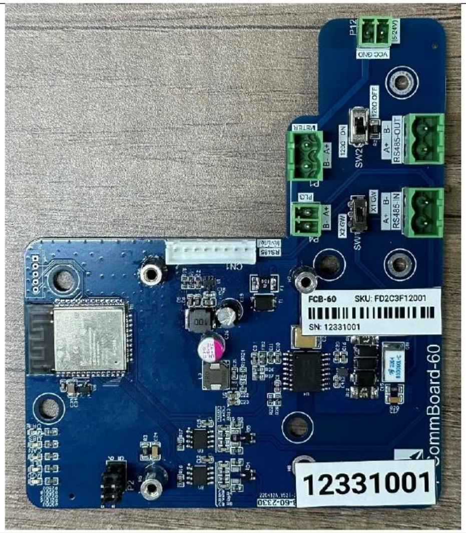
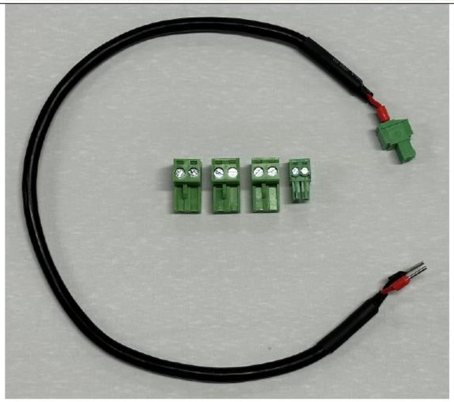
To network up to 10 inverters

Gateway mounts on one inverter CommBoard in the network.

# NEP Data Solution – Galaxy-Mini (CommBoard-60) for the 30/33/50kW

| | |
|---|---|
| **Model Name** | **FCB-60** |
| **SKU** | **FD2C3F12001** |
| **Customer Code** | TBD |
| | |
| **Protocol Converter Specifications** | |
| | |
| **RS485 Interface** | |
| No. of Ports | 2 (2-pole Terminal Block and 8-pole Terminal Block) |
| Protocol | Modbus RTU and Custom |
| Modbus RTU Mode | Master |
| | |
| **CAN Interface** | |
| No. of Ports | 1 (2-pole Terminal Block) |
| Signals | CAN_L, CAN_H |
| Terminator | 120 ohms (configurable) |
| Isolation | 3 kV (built-in) |
| | |
| **Bluetooth Interface** | |
| Standard | BLE 4.2 |
| Antenna | Built-in |
| | |
| **Power Parameters** | |
| Input Voltage | 5 to 24 Vdc |
| Power Consumption | 1 W, Max. 2 W |
| | |
| **Environmental Limits** | |
| Operating Temperature | -30℃ to 85℃ (-22 to 185°F), Natural convection |
| Storage Temperature | -40 to 85°C (-40 to 185°F) |
| Ambient Relative Humidity | 5 to 85% (non-condensing) |
| | |
| **Physical Characteristics** | |
| IP Rating | IP20 |
| Dimensions | 125 mm / 107 mm / 15 mm |
| Weight (without housing) | 48g |
| | |

| **Packaging and accessories** | |
|---|---|
| Dimension of packaging box | 153*153*51mm |
| Total Weight | 0.13KG |
| Protocol Converter | 1 * FCB-60 |
| Cable | 1 * DC power cable |
| Connector | 2 * EDG-3.5-2P, 3 * EDG-5.08-2P |
| Documentation | Quick guide QR-code on stickers |
| | |

| **Packaging and accessories photos** | |
|---|---|
| Protocol Converter |   FCB-60 SKU: FD2C3F12001<br>SN: 12331001<br>CommBoard-60<br>12331001 |
| Accessories |  |

**One CommBoard Per inverter**

To network up to 10 inverters

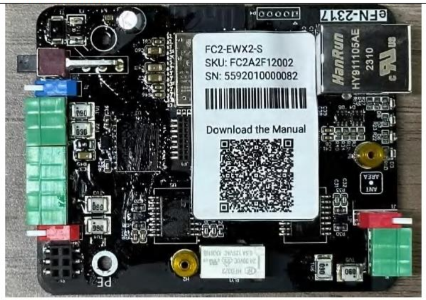
Gateway mounts on one inverter CommBoard in the network.

# NEP Data Solution – Galaxy-Wifi Gateway (mounts on Mini and Maxi CommBoards)

One inverter per site shall host a Gateway in the wire-box mounted on the Comm Board – One Gateway per up to 10 inverters, typically

| | |
|---|---|
| **Model Name** | **FC2-EWX2-S** |
| **SKU** | **FC2A2F12002** |
| **Customer Code** | TBD |
| | |
| **Gateway Specifications** | |
| | |
| **RS485 Interface** | |
| No. of Ports | 1 (5-pole Terminal Block) |
| Protocol | Modbus RTU |
| Modbus RTU Mode | Master |
| | |
| **CAN Interface** | |
| No. of Ports | 1 (3-pole Terminal Block) |
| Signals | CAN_L, CAN_H, CAN Signal GND |
| Terminator | 120 ohms (configurable) |
| Isolation | 3 kV (built-in) |
| | |
| **AUX Interface** | |
| No. of Ports | 1 (5-pole Terminal Block) |
| Protocol | Modbus RTU |
| Modbus RTU Mode | Slave (RS485 Pass-thru) |
| Terminator for RS485 | 120 ohms |
| Isolation | 5 kV |
| | |
| **Ethernet Interface** | |
| 10/100BaseTX Ports | 1 (RJ45 Connector) |
| Cloud Applications | MQTT |
| SCADA controllers on the same LAN subnet | Modbus TCP |
| | |
| **Modbus TCP** | |
| Mode | Server (Slave) |
| Max. No. of Client Connections | 2 |
| | |
| **WLAN Interface** | |
| WLAN Standards | 802.11 b/g/n |
| Frequency Band | 2.4 GHz |
| Wireless Security | WEP, WPA/WPA2 |
| Antenna | Built-in |
| | |
| **Bluetooth Interface** | |
| Standard | BLE 4.2 |
| Antenna | Built-in |
| | |
| **Power Parameters** | |
| Input Voltage | 5 to 24 Vdc |
| Power Consumption | 2.5 W, Max. 5 W |
| | |
| **Environmental Limits** | |
| Operating Temperature | -30℃ to 85℃ (-22 to 185°F), Natural convection |
| Storage Temperature | -40 to 85°C (-40 to 185°F) |
| Ambient Relative Humidity | 5 to 85% (non-condensing) |
| | |
| **Physical Characteristics** | |
| Housing | Plastic |
| IP Rating | IP20 |
| Dimensions (without housing) | 93 mm / 69 mm / 21 mm |
| Dimensions (includes housing) | 95 mm / 77 mm / 32 mm |
| Weight (without housing) | 48g |
| Weight (includes housing) | 148g |
| | |
| **Standards and Certifications (DoC)** | |
| CE-EMC | EN 55032<br>EN 55035<br>EN 61000-3-2<br>EN 61000-3-3 |
| CE-RED | EN 301 908<br>EN 300 328<br>EN 301 489-1 / -17 / -52<br>EN 62368-1 |
| CE-LVD | EN 62368-1 |
| FCC SDoC | Part 15B |
| FCC ID | Part 15C |
| | |

| | |
|---|---|
| **Packaging and accessories** | |
| Dimension of packaging box | 235*125*65mm |
| Total Weight | 0.26KG |
| Gateway | 1 * FC2-EWX2-S |
| Plastic housing | 1 * Housing, 1 * DIN rail mounting clips, 2 * M4 Screw<br>3 * Standoff and M3 Screw |
| Cable | 1 * CAN jumper, 1 * DC power cable |
| Connector | 2 * EDG-3.5-3P, 1 * EDG-3.5-5P, 1 * EDG-5.08-2P |
| Documentation | Quick guide QR-code on stickers |
| | |

| | |
|---|---|
| **Packaging and accessories photos** | |
| Gateway |  FC2-EWX2-S<br>SKU: FC2A2F12002<br>SN: 5592010000082<br>Download the Manual |
| | FC2-EWX2-S SKU: FC2A2F12002<br>SN: 5592010000082 |

NORTHERN ELECTRIC

# NEP Data Solution – Galaxy-Cell Gateway (mounts on Mini and Maxi CommBoards)

One inverter per site shall host a Gateway in the wire-box mounted on the Comm Board – Typically one Gateway per up to 10 inverters
This is the Gateway with optional Cellular functionality on board. Includes sim card with 5 years of cellular data.

| | |
|---|---|
| **Model Name** | **FC2-EHX2-S** |
| **SKU** | **FC2A2F12001** |
| **Customer Code** | TBD |
| | |
| **Gateway Specifications** | |
| | |
| **RS485 Interface** | |
| No. of Ports | 1 (5-pole Terminal Block) |
| Protocol | Modbus RTU |
| Modbus RTU Mode | Master |
| | |
| **CAN Interface** | |
| No. of Ports | 1 (3-pole Terminal Block) |
| Signals | CAN_L, CAN_H, CAN Signal GND |
| Terminator | 120 ohms (configurable) |
| Isolation | 3 kV (built-in) |
| | |
| **AUX Interface** | |
| No. of Ports | 1 (5-pole Terminal Block) |
| Protocol | Modbus RTU |
| Modbus RTU Mode | Slave (RS485 Pass-thru) |
| Terminator for RS485 | 120 ohms |
| Isolation | 5 kV |
| | |
| **Ethernet Interface** | |
| 10/100BaseTX Ports | 1 (RJ45 Connector) |
| Cloud Applications | MQTT |
| SCADA controllers on the same LAN subnet | Modbus TCP |
| | |
| **Modbus TCP** | |
| Mode | Server (Slave) |
| Max. No. of Client Connections | 2 |
| | |
| **WLAN Interface** | |
| WLAN Standards | 802.11 b/g/n |
| Frequency Band | 2.4 GHz |
| Wireless Security | WEP, WPA/WPA2 |
| Antenna | Built-in |
| | |
| **Bluetooth Interface** | |
| Standard | BLE 4.2 |
| Antenna | Built-in |
| | |
| **Cellular Interface** | |
| Cellular Standards | LTE-FDD/LTE-TDD |
| No. of SIM Slot | 1 |
| Cellular Antenna Connectors | 1 SMA female |
| | |
| **Power Parameters** | |
| Input Voltage | 5 to 24 Vdc |
| Power Consumption | 2.5 W, Max. 5 W |
| | |
| **Environmental Limits** | |
| Operating Temperature | -30℃ to 85℃ (-22 to 185°F), Natural convection |
| Storage Temperature | -40 to 85°C (-40 to 185°F) |
| Ambient Relative Humidity | 5 to 85% (non-condensing) |
| | |
| **Physical Characteristics** | |
| Housing | Plastic |
| IP Rating | IP20 |
| Dimensions (without housing) | 101 mm / 69 mm / 21 mm |
| Dimensions (includes housing) | 103 mm / 77 mm / 32 mm |
| Weight (without housing) | 67g |
| Weight (includes housing) | 167g |
| | |
| **Standards and Certifications (DoC)** | |
| CE-EMC | EN 55032<br>EN 55035<br>EN 61000-3-2<br>EN 61000-3-3 |
| CE-RED | EN 301 908<br>EN 300 328<br>EN 301 489-1 / -17 / -52<br>EN 62368-1 |
| CE-LVD | EN 62368-1 |
| FCC SDoC | Part 15B |
| FCC ID | Part 15C |
| | |

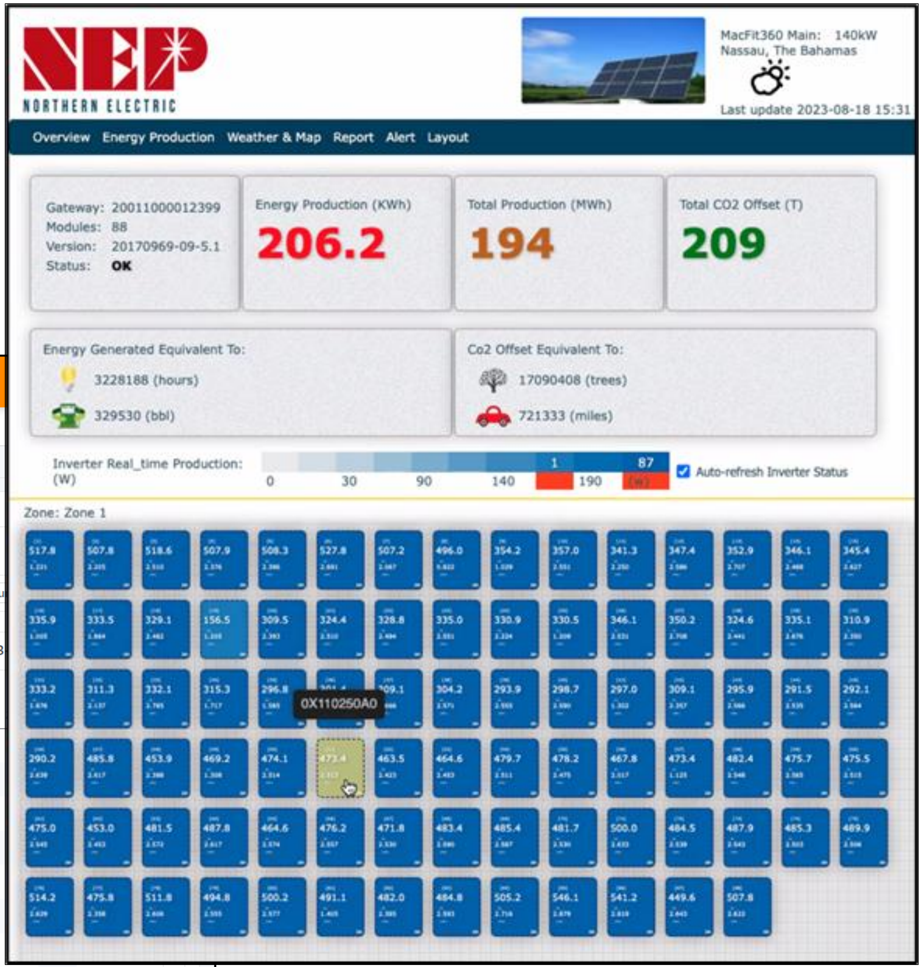
| **Packaging and accessories** | |
|---|---|
| Dimension of packaging box | 260*235*70mm |
| Total Weight | 0.9KG |
| Gateway | 1 * FC2-EHX2-S |
| Plastic housing | 1 * Housing, 1 * DIN rail mounting clips, 2 * M4 Screw<br>3 * Standoff and M3 Screw |
| Cable | 1 * CAN jumper, 1 * DC power cable |
| Connector | 2 * EDG-3.5-3P, 1 * EDG-3.5-5P, 1 * EDG-5.08-2P |
| Documentation | Quick guide QR-code on stickers |
| SIM532 Kit | 1 * IP65 antenna with 3 meters cable, 1 * antenna bracket,<br>1 * SIM already plugged into the gateway |

| **Packaging and accessories photos** | |
|---|---|
| Gateway | FC2-EHX2-S<br>SKU: FC2A2F12001<br>SN: 5542010000082 |
| | FC2-EHX2-S SKU: FC2A2F12001<br>SN: 5542010000082 |

NORTHERN ELECTRIC

# “Galaxy” Data – Web Portal for Inverter and RSD Device Data

- Inverter performance data
- PV Module data
- RSD Device data


NEP
NORTHERN ELECTRIC
Overview
Energy Production
Weather & Map
Report
Alert
Layout
Inverter Real_time Production: (W)
0
30
90
140
1
190
87
Auto-refresh Inverter Status
517.8
507.8
518.6
507.9
508.3
527.8
507.2
496.0
354.2
357.0
341.3
347.4
352.9
346.1
345.4
335.9
333.5
329.1
156.5
309.5
324.4
328.8
335.0
330.9
330.5
346.1
350.2
324.6
335.1
310.9
333.2
311.3
332.1
315.3
296.8
309.1
304.2
293.9
298.7
297.0
309.1
295.9
291.5
292.1
0X110250A0
290.2
485.8
453.9
469.2
474.1
473.4
463.5
464.6
479.7
478.2
467.8
473.4
482.4
475.7
475.5
475.0
453.0
481.5
487.8
464.6
476.2
471.8
483.4
485.4
481.7
500.0
484.5
487.9
485.3
489.9
514.2
475.8
511.8
494.8
500.2
491.1
482.0
484.8
505.2
546.1
541.2
449.6
507.8

MacFit360 Main: 140kW
Nassau, The Bahamas
Last update 2023-08-18 15:31

Gateway: 20011000012399
Modules: 88
Version: 20170969-09-5.1
Status: OK

Energy Production (KWh)
206.2

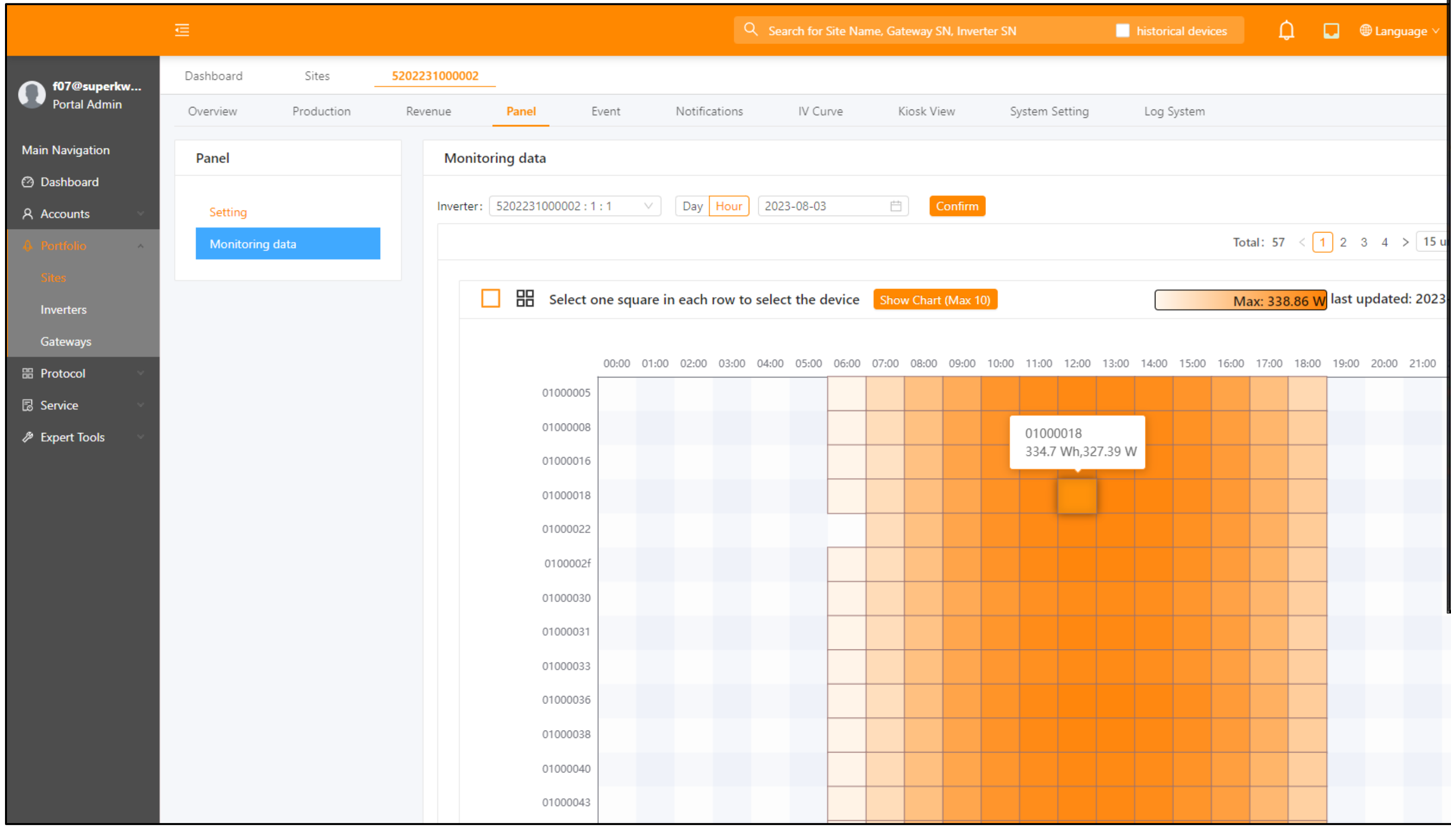
Total Production (MWh)
194

Total CO2 Offset (T)
209

Energy Generated Equivalent To:
3228188 (hours)
329530 (bbl)

Co2 Offset Equivalent To:
17090408 (trees)
721333 (miles)

Zone: Zone 1


Search for Site Name, Gateway SN, Inverter SN
historical devices
Language
f07@superkw...
Portal Admin
Main Navigation
Dashboard
Accounts
Portfolio
Sites
Inverters
Gateways
Protocol
Service
Expert Tools
Dashboard
Sites
5202231000002
Overview
Production
Revenue
Panel
Event
Notifications
IV Curve
Kiosk View
System Setting
Log System
Panel
Setting
Monitoring data
Monitoring data
Day
Hour
Confirm
Select one square in each row to select the device
Show Chart (Max 10)
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
01000005
01000008
01000016
01000018
01000022
0100002f
01000030
01000031
01000033
01000036
01000038
01000040
01000043

Inverter: 5202231000002 : 1 : 1

2023-08-03

Total: 57

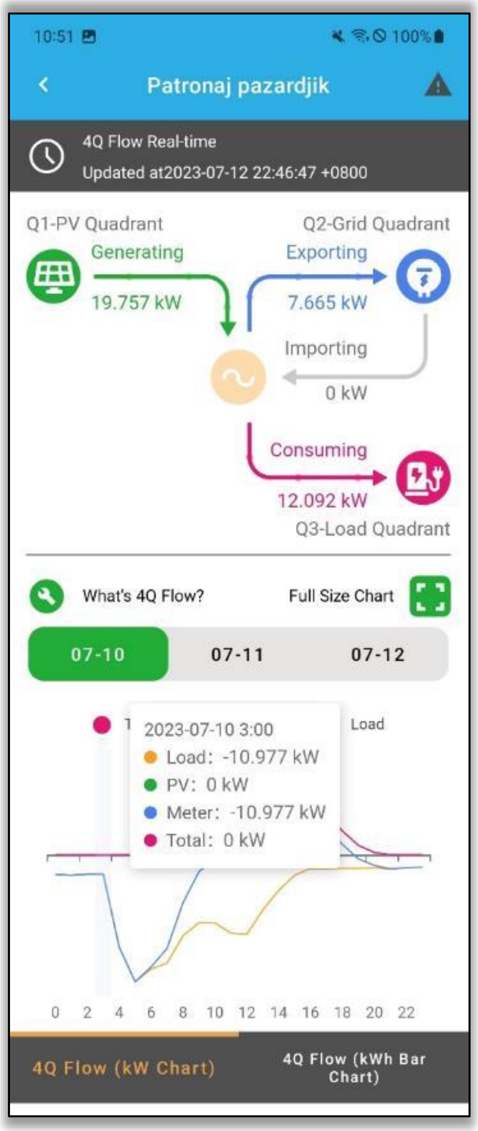
Max: 338.86 W

last updated: 2023

01000018
334.7 Wh,327.39 W

# Smart phone App for commissioning and mobile data

## “NEPTUNE GX”



10:51 100%

Patronaj pazardjik

4Q Flow Real-time
Updated at2023-07-12 22:46:47 +0800

Q1-PV Quadrant
Generating
19.757 kW

Q2-Grid Quadrant
Exporting
7.665 kW

Importing
0 kW

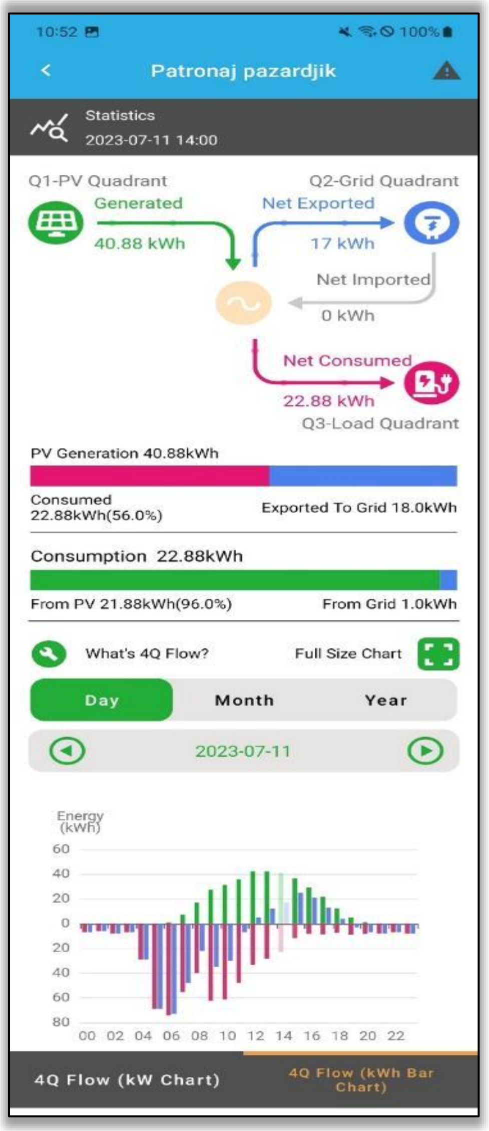
Consuming
12.092 kW
Q3-Load Quadrant

What's 4Q Flow?
Full Size Chart

07-10 | 07-11 | 07-12

2023-07-10 3:00
Load: -10.977 kW
PV: 0 kW
Meter: -10.977 kW
Total: 0 kW

4Q Flow (kW Chart) | 4Q Flow (kWh Bar Chart)



10:52 100%

Patronaj pazardjik

Statistics
2023-07-11 14:00

Q1-PV Quadrant
Generated
40.88 kWh

Q2-Grid Quadrant
Net Exported
17 kWh

Net Imported
0 kWh

Net Consumed
22.88 kWh
Q3-Load Quadrant

PV Generation 40.88kWh
Consumed 22.88kWh(56.0%)
Exported To Grid 18.0kWh

Consumption 22.88kWh
From PV 21.88kWh(96.0%)
From Grid 1.0kWh

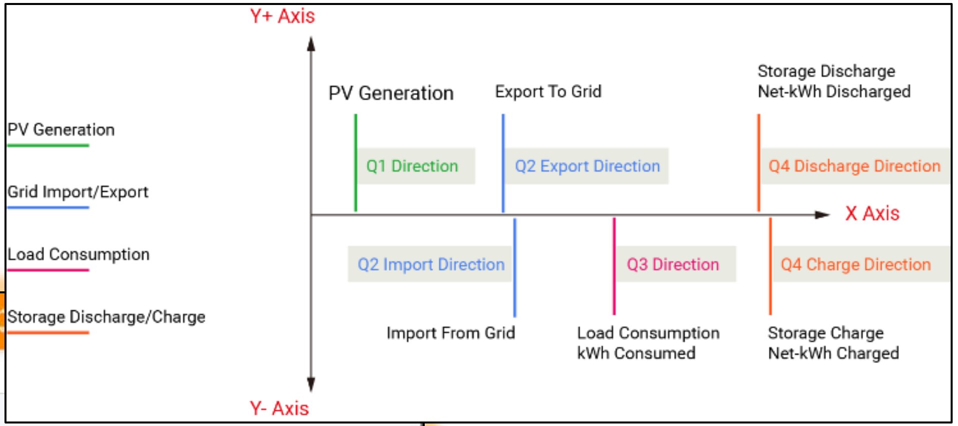
What's 4Q Flow?
Full Size Chart

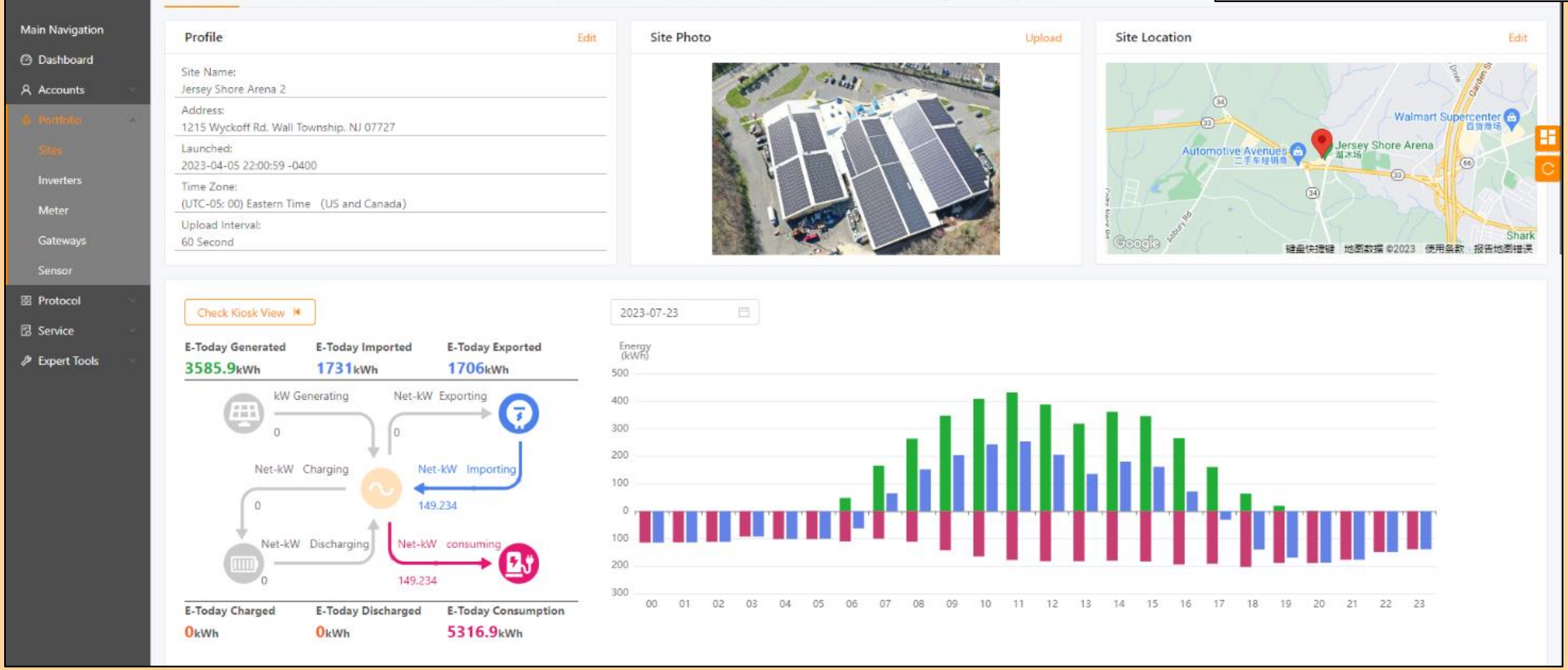
Day | Month | Year

2023-07-11

4Q Flow (kW Chart) | 4Q Flow (kWh Bar Chart)

# “Galaxy” Data Example


Y+ Axis
Y- Axis
X Axis
PV Generation
Grid Import/Export
Load Consumption
Storage Discharge/Charge
PV Generation
Q1 Direction
Export To Grid
Q2 Export Direction
Storage Discharge
Net-kWh Discharged
Q4 Discharge Direction
Q2 Import Direction
Import From Grid
Q3 Direction
Load Consumption
kWh Consumed
Q4 Charge Direction
Storage Charge
Net-kWh Charged


Search for Site Name, Gateway SN, Inverter SN
historical devices
f10@superkw...
Portal Admin
Main Navigation
Dashboard
Accounts
Portfolio
Sites
Inverters
Meter
Gateways
Sensor
Protocol
Service
Expert Tools
Dashboard
Super Customer
Customer
Sites
Jersey Shore Arena 2
Overview
Production
Revenue
Event
Notifications
IV Curve
Kiosk View
System Setting
Log System
Profile
Edit
Site Photo
Upload
Site Location
Edit
Walmart Supercenter
Jersey Shore Arena
Automotive Avenues
Google
Check Kiosk View
kW Generating
Net-kW Exporting
Net-kW Charging
Net-kW Importing
Net-kW Discharging
Net-kW consuming
Energy (kWh)
500
400
300
200
100
0
100
200
300
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23

Site Name:
Jersey Shore Arena 2

Address:
1215 Wyckoff Rd. Wall Township, NJ 07727

Launched:
2023-04-05 22:00:59 -0400

Time Zone:
(UTC-05: 00) Eastern Time (US and Canada)

Upload Interval:
60 Second

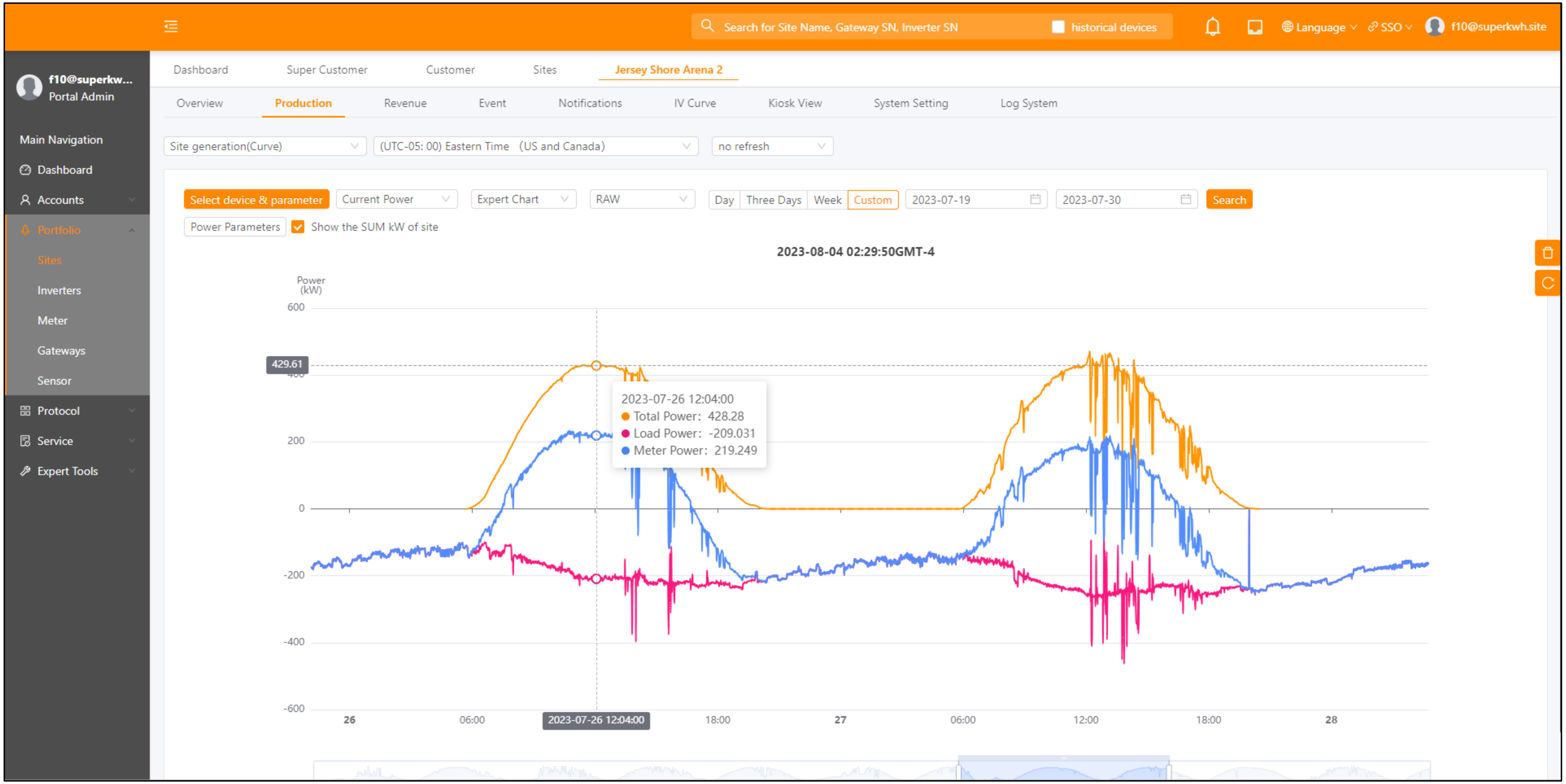
2023-07-23

E-Today Generated: 3585.9kWh
E-Today Imported: 1731kWh
E-Today Exported: 1706kWh

kW Generating: 0
Net-kW Exporting: 0
Net-kW Charging: 0
Net-kW Importing: 149.234
Net-kW Discharging: 0
Net-kW consuming: 149.234

E-Today Charged: 0kWh
E-Today Discharged: 0kWh
E-Today Consumption: 5316.9kWh

# “Galaxy” Data Example


Search for Site Name, Gateway SN, Inverter SN
historical devices
Language
SSO
f10@superkwh.site
f10@superkw...
Portal Admin
Main Navigation
Dashboard
Accounts
Portfolio
Sites
Inverters
Meter
Gateways
Sensor
Protocol
Service
Expert Tools
Dashboard
Super Customer
Customer
Sites
Jersey Shore Arena 2
Overview
Production
Revenue
Event
Notifications
IV Curve
Kiosk View
System Setting
Log System
Select device & parameter
Day
Three Days
Week
Custom
Search
Power Parameters
Power (kW)
600
429.61
200
0
-200
-400
-600
26
06:00
2023-07-26 12:04:00
18:00
27
06:00
12:00
18:00
28

Site generation(Curve)

(UTC-05: 00) Eastern Time (US and Canada)

no refresh

Current Power

Expert Chart

RAW

Custom

2023-07-19

2023-07-30

☑ Show the SUM kW of site

2023-08-04 02:29:50GMT-4

2023-07-26 12:04:00
● Total Power: 428.28
● Load Power: -209.031
● Meter Power: 219.249

NORTHERN ELECTRIC