ROCKSOLAR

20 kW High-Voltage Off-Grid Solar System

21.6 kW Solar Array + 40.96 kWh LiFePO4 Energy Storage

Inverter	1 x Isuna U20K-POH high-voltage split-phase inverter
AC Output	20,000 W, 120/240 VAC split-phase
Solar Array	36 x 600 W Philadelphia Solar modules = 21,600 W
Battery Storage	1 x GSL-R40K HV LiFePO4 system = 40.96 kWh nominal
PV Configuration	SIX strings of SIX panels in series (6S x 6 strings)
MPPT Allocation	MPPT 1: 2 strings | MPPT 2: 2 strings | MPPT 3: 1 | MPPT 4: 1

CRITICAL PV WIRING	The 36 supplied 600 W modules are configured as six independent 6-panel series strings. Do not create longer or unequal strings without a new engineering review. Each string must be verified for polarity and cold-weather open-circuit voltage before energization.

BATTERY COMMISSIONING HOLD POINT	The GSL-R40K voltage range is compatible on paper with the U20K-POH battery window, but final BMS protocol and use of the inverter's two independent battery ports must be confirmed for the exact shipped hardware and firmware. Do not bridge both battery ports to one battery cluster unless explicitly approved by Isuna and GSL.

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1. Introduction and Intended Use

Thank you for choosing the ROCKSOLAR 20 kW High-Voltage Off-Grid Solar System. This system combines one Isuna U20K-POH 20 kW split-phase high-voltage inverter, a 36-panel 21.6 kW Philadelphia Solar array, and one GSL-R40K 40.96 kWh high-voltage LiFePO4 battery system. It is intended for large off-grid homes, farms, workshops, agricultural properties, remote buildings, and backup-power applications requiring 120/240 VAC split-phase power.

The Isuna inverter can coordinate solar, battery, optional grid input, and a dedicated generator input. The system is designed around six equal PV strings of six 600 W modules each. The inverter provides four MPPT trackers and two independent high-voltage battery ports.

QUALIFIED INSTALLATION REQUIRED

This is a system-level operating and commissioning guide. Installation, PV string design verification, high-voltage battery wiring, grounding, overcurrent protection, rapid shutdown, AC distribution, generator integration, and commissioning must be completed by qualified personnel under the applicable NEC or CEC requirements and local authority having jurisdiction.

2. System Overview and Primary Components

Item	Specification
Inverter	1 x Isuna U20K-POH, 20 kW high-voltage hybrid/off-grid split-phase inverter
Solar modules	36 x Philadelphia Solar PS-MNB144(HCBF)-600W design-basis modules
Solar array	21.6 kW DC nominal
Battery storage	1 x GSL-R40K high-voltage LiFePO4 system, 40.96 kWh nominal
PV stringing	6 independent strings x 6 modules in series
PV MPPT allocation	2 strings to MPPT 1; 2 strings to MPPT 2; 1 string to MPPT 3; 1 string to MPPT 4
Balance of system	PV wire/connectors, PV disconnects/OCPD, grounding, rapid shutdown where required, HV battery protection, AC breakers/disconnects, generator equipment, racking and labels are project-specific and must be selected by the installer.

3. Main System Specifications

3.1 Isuna U20K-POH inverter

Item	Specification
Rated AC output	20,000 W
AC output	120/240 VAC split-phase; 50/60 Hz
Rated output current	83.5 A at the 240 V split-phase rating
Overload	110% long-term; 160% for 10 s in the supplied U20K-POH datasheet; overload requires sufficient PV contribution
Dedicated generator input	48 kW / 200 A published input rating

Item	Specification
Off-grid switching time	<10 ms in the supplied U20K-POH datasheet
Maximum PV input	30,000 W
PV startup voltage	95 V
MPPT operating range	80-500 VDC
MPPT trackers	4
PV strings per MPPT	U20K-POH: up to 2 / 2 / 2 / 2 inputs
Maximum MPPT current	36 A per MPPT
Maximum PV short-circuit current	44 A per MPPT
Battery range	80-480 VDC
Battery ports	2 independent HV battery ports
Battery charge/discharge current	50 A + 50 A published
Maximum efficiency	98.0% - supplied U20K-POH datasheet
CEC efficiency	97.1% - supplied U20K-POH datasheet
PV-to-battery efficiency	98.3% - supplied U20K-POH datasheet
Max battery charge/discharge efficiency	96.5% - supplied U20K-POH datasheet
Enclosure	IP66 / NEMA 4X
Operating temperature	-25 to +60 deg C; derating above 40 deg C
Communication	Wi-Fi / LAN / 4G / Bluetooth; battery CAN x2 / RS485 x2
Dimensions / weight	Approx. 800 x 470 x 180 mm; 48 kg / 105 lb

3.2 Philadelphia Solar 600 W array - design basis

The system design basis is the Philadelphia Solar PS-MNB144(HCBF)-600W bifacial N-type module. The following values are used for string calculations; verify the nameplate and current manufacturer datasheet supplied with the actual modules before commissioning.

Item	Specification
Module rated power	600 W
Module Vmp	44.95 V at STC
Module Voc	53.11 V at STC
Module Imp	13.35 A at STC
Module Isc	14.12 A at STC
Voc temperature coefficient	-0.25%/deg C
Maximum series fuse	30 A
Maximum system voltage	1500 VDC module rating
Six-panel string power	3,600 W
Six-panel string Vmp	Approx. 269.7 V at STC
Six-panel string Voc	Approx. 318.7 V at STC
Six-panel string operating current	Approx. 13.35 A

3.3 GSL-R40K high-voltage battery

Item	Specification
Chemistry	LiFePO4 / LFP
Nominal energy	40.96 kWh
Cell configuration	128S1P
Nominal voltage	409.6 V
Working voltage range	358.4-460.8 V
Nominal working current	100 A
Peak charge/discharge current	150 A for 5 s at 25 deg C
Communication	CAN / RS485
Installation	Floor-standing
Enclosure rating	IP20
Published temperature range	Charge: 0 to 55 deg C; Discharge: -20 to 55 deg C

IMPORTANT BATTERY COMPATIBILITY NOTE	The GSL-R40K working-voltage range falls inside the Isuna 80-480 V battery window. Voltage compatibility does not by itself confirm BMS protocol, battery-port topology, pre-charge behavior, current limits, or approved protection. The exact GSL BMS protocol and whether one R40K may use one or both independent U20K-POH battery ports must be confirmed before energization.

4. Safety Information

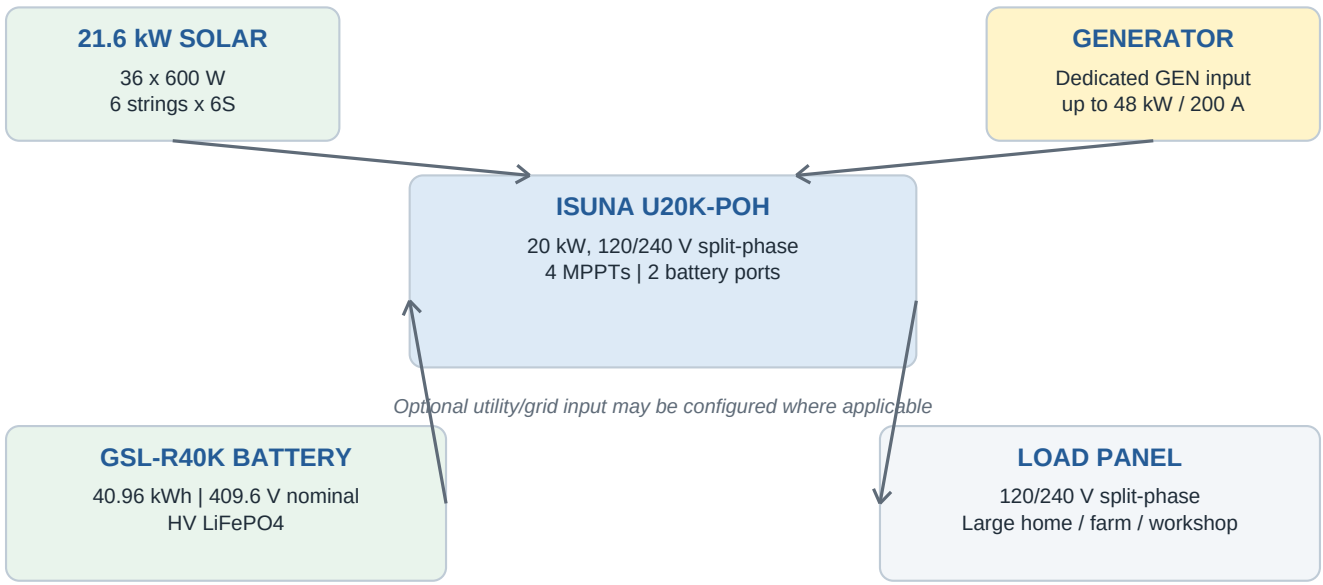
DANGER - HIGH DC AND AC VOLTAGE	This system contains a high-voltage battery operating up to approximately 460.8 V, PV strings that remain energized whenever modules are exposed to light, and 120/240 VAC circuits. Contact with energized conductors can cause severe injury or death.

- Installation, commissioning, service, and electrical modifications must be performed by qualified personnel.
- Use appropriately rated PPE, insulated tools, meters, lockout/tagout procedures, and disconnecting means.
- Verify polarity before connecting any PV or battery conductor.
- Never assume a circuit is de-energized because the inverter display is off.
- Do not open, puncture, short, reverse-connect, or bypass the GSL battery BMS.
- Do not connect or disconnect PV connectors under load unless the connector system and approved procedure permit it.
- Do not exceed the inverter MPPT voltage/current limits or the solar module maximum series-fuse rating.
- Keep unauthorized persons away from inverter, battery, disconnect, and load-panel equipment.
- Do not install the GSL-R40K outdoors unless the final enclosure/system provides the environmental protection required by the battery manufacturer; the published R40K enclosure rating is IP20.

Fire and emergency conditions

If there is fire, heavy smoke, arcing, flooding, damaged high-voltage battery equipment, or exposed conductors, keep people away from the equipment and contact emergency services. Inform responders that the site contains a high-voltage lithium iron phosphate energy-storage system. Do not touch a damaged or submerged battery.

5. System Architecture and Energy Flow



During normal operation, solar power can supply loads and charge the battery. The high-voltage battery supplies loads when PV production is insufficient. A compatible generator may be connected to the inverter's dedicated generator input for extended poor-weather periods or other energy shortfalls. Optional grid input may also be configured where applicable.

GENERATOR INPUT RATING	The published 48 kW / 200 A generator-input rating describes the inverter input interface. It does not mean 48 kW is always available for battery charging or load pass-through. Actual power flow is limited by inverter settings, battery limits, generator capability, and the current manufacturer manual.

6. Site Planning and Equipment Location

Plan the installation around safe service access, environmental limits, cable routing, structural loading, fire access, grounding, and future maintenance. The inverter and battery have different environmental ratings and should not automatically be installed in the same location.

- Mount the Isuna inverter on a solid surface with manufacturer-required clearances and ventilation. The inverter is rated IP66 / NEMA 4X, but all conduit entries and installation details must preserve the intended enclosure protection.
- Install the GSL-R40K on a stable floor in a dry, protected location consistent with its IP20 rating and temperature limits.
- Provide sufficient working space around high-voltage battery disconnects, PV disconnects, AC equipment, and communication devices.
- Keep equipment away from combustible storage, corrosive vapors, standing water, impact hazards, and uncontrolled heat sources.
- Plan PV cable routes to minimize mechanical damage, unnecessary voltage drop, and connector exposure.
- Label the inverter, battery, six PV strings, PV disconnects, AC sources, generator source, and emergency shutdown points.

7. Solar Array Installation

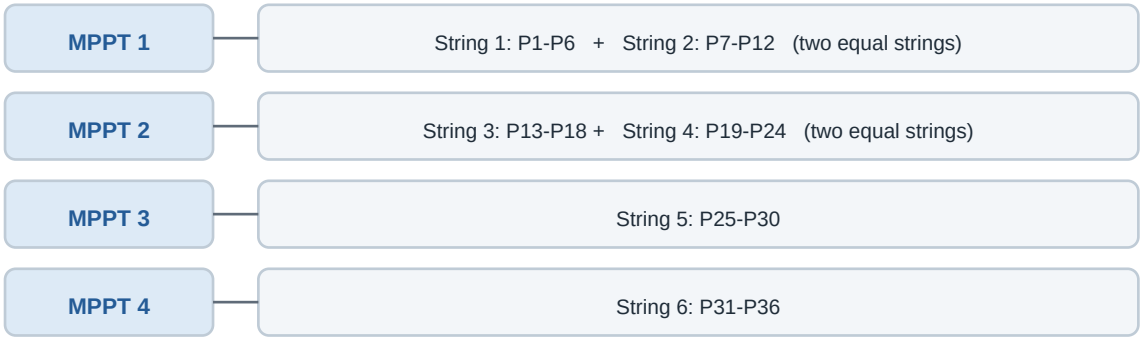
The array consists of 36 matching 600 W Philadelphia Solar modules for 21.6 kW nominal DC power. Install the modules on an approved roof- or ground-mount structure designed for local wind, snow, corrosion, roof structure, clamp zones, and service access.

- Use matching modules within every string and keep string orientations as consistent as practical.
- Avoid shading differences within a string; place different orientations on separate MPPT trackers where practical.
- Inspect glass, frames, junction boxes, leads, and connectors for shipping or installation damage before wiring.
- Support PV conductors and keep connectors away from standing water, sharp edges, and high-heat surfaces.
- Do not mix incompatible PV connector brands or connector families.
- Where bifacial rear-side gain is desired, maintain suitable rear clearance and avoid blocking the active rear surface.

8. PV Wiring - Six 6-Panel Series Strings

REQUIRED CONFIGURATION	36 panels = 6 independent strings x 6 panels in series. MPPT 1 receives Strings 1 and 2; MPPT 2 receives Strings 3 and 4; MPPT 3 receives String 5; MPPT 4 receives String 6. Do not change the string length or combine additional strings on an MPPT without a new electrical review.

PV STRING / MPPT ALLOCATION



All six strings contain exactly six matching 600 W modules in series. Do not change string length without a new design review.

8.1 Series-string connection method

- String 1: connect Panels 1-6 in series. The two unused end leads become String 1 positive and String 1 negative.
- String 2: connect Panels 7-12 in series.
- String 3: connect Panels 13-18 in series.
- String 4: connect Panels 19-24 in series.
- String 5: connect Panels 25-30 in series.
- String 6: connect Panels 31-36 in series.
- Label all six strings before routing them to the inverter area.
- With all PV disconnects open, measure and record polarity and open-circuit voltage of each string using a properly rated meter.
- Connect Strings 1 and 2 to MPPT 1, Strings 3 and 4 to MPPT 2, String 5 to MPPT 3, and String 6 to MPPT 4 using the exact terminal designations in the current Isuna manual.

8.2 MPPT electrical check

Each six-panel string is approximately 269.7 V at maximum power and 318.7 V open circuit at STC. Two equal strings paralleled on one MPPT remain at the same voltage while their current adds to approximately 26.7 A operating current and 28.2 A short-circuit current. These values remain below the supplied U20K-POH MPPT limits of 36 A operating current and 44 A short-circuit current per MPPT.

COLD-WEATHER VOC CHECK	Solar-module Voc rises as temperature falls. The design-basis module lists a -0.25%/deg C Voc coefficient. As an illustration only, a six-module string at -40 deg C module temperature is approximately 370 V open circuit, below the 500 V MPPT upper limit. The installer must calculate the actual site minimum-temperature Voc using the current module datasheet before energization.

9. PV Protection, Grounding and Rapid Shutdown

Each PV string should be treated as an independently identifiable circuit. Final conductor size, PV OCPD/disconnect rating, combiner arrangement, surge protection, grounding/bonding, and rapid-shutdown equipment must be selected under the applicable code and the current component documentation.

DO NOT ASSUME A BREAKER SIZE	The design-basis 600 W module lists Isc approximately 14.12 A and a 30 A maximum series-fuse rating. The final PV breaker/fuse rating must be determined by the qualified designer using applicable NEC/CEC multipliers, conductor ampacity, ambient conditions, equipment listings, and the inverter input arrangement. This manual intentionally does not prescribe a universal PV breaker ampere rating.

- Provide a suitable means to isolate the six PV circuits for service and emergency response.
- Use DC-rated equipment with voltage ratings above the maximum calculated cold-weather string Voc.
- Bond and ground module frames, racking, inverter, enclosures, and other equipment as required by code and manufacturer instructions.
- Where rapid shutdown is required, install a compatible listed rapid-shutdown system. The inverter's quick-shutdown control feature does not by itself establish module-level compliance for every jurisdiction.
- Label PV source circuits, disconnects, and energized conductors according to applicable requirements.

10. GSL-R40K Battery Installation and Communication

The GSL-R40K is a high-voltage 40.96 kWh LiFePO4 battery system with 409.6 V nominal voltage and a published 358.4-460.8 V working range. This voltage range is inside the Isuna U20K-POH 80-480 V battery window.

HIGH-VOLTAGE BATTERY	The R40K is not a 48 V battery. Use only HV-rated disconnects, fusing/protection, cable, connectors, pre-charge procedures, PPE, and test equipment approved for the system. Do not service energized HV battery conductors.

- Install the battery floor-standing in a clean, dry, protected location within its published temperature range.
- Keep the battery OFF and isolated while making power and communication connections.
- Verify polarity and measure voltage with appropriately rated equipment before connecting to the inverter.
- Use the battery manufacturer-approved BMS, control unit, interconnects, grounding, and HV protection arrangement.
- Configure CAN or RS485 communication using the exact protocol and pinout approved for the Isuna/GSL combination.
- Do not connect a single R40K to both independent Isuna battery ports unless Isuna and GSL provide an approved wiring topology for that exact configuration.
- Do not operate with BMS communication bypassed when the approved battery profile requires closed-loop communication.

COMMISSIONING HOLD POINT	Before first energization, obtain confirmation of (1) Isuna-GSL BMS protocol compatibility, (2) which Isuna battery port is used, (3) whether the second port remains unused or may be used in an approved expansion, (4) battery current limits, and (5) required HV protection/pre-charge sequence.

11. AC Output, Grid and Generator Connections

The U20K-POH provides 120/240 VAC split-phase output for North American load distribution. The inverter also provides separate grid and dedicated generator AC inputs. Final AC conductors, breaker ratings, neutral/ground bonding, transfer functions, and interconnection must follow the current Isuna manual and applicable electrical code.

- Connect the load panel using the correct L1, L2, neutral, and protective-earth arrangement.
- Balance large 120 V loads across L1 and L2 where practical.
- Account for motor, pump, compressor, HVAC, welder, EV charging, electric heating, and other high-demand loads during system design.
- Do not backfeed utility wiring or a generator receptacle through an unapproved connection.
- Confirm generator voltage, frequency, neutral/ground configuration, waveform quality, breaker/disconnect rating, and capacity before connection.
- The inverter publishes a dedicated generator-input rating up to 48 kW / 200 A. Actual pass-through and charging behavior is controlled by the inverter and battery limits, not only by this port rating.

Motor-starting and overload capability

The supplied U20K-POH datasheet lists 110% long-term overload and 160% output for 10 seconds when sufficient PV contribution is available. For a 20 kW inverter, 160% corresponds to approximately 32 kW for the specified short duration. This can help with starting pumps, compressors, and HVAC equipment, but it is not a substitute for an actual motor-starting study.

12. Initial Commissioning and Startup

Commissioning must be performed by the installer after all mechanical, electrical, communication, labeling, and protection checks are complete.

Pre-start checklist

- Inverter and battery are securely installed with required clearances.
- Grounding and bonding are complete.
- All AC and DC conductors are correctly sized, protected, torqued, and labeled.
- Each of the six PV strings contains exactly six matching 600 W modules in series.
- String polarity and open-circuit voltage have been measured and recorded for all six strings.
- MPPT allocation is correct: 2 / 2 / 1 / 1 strings across MPPTs 1-4.
- Cold-weather PV Voc calculation is documented and remains within the inverter limit.
- GSL-R40K polarity, HV protection, pre-charge procedure, BMS communication, and operating limits are confirmed.
- Isuna-GSL battery protocol has been validated for the exact equipment.
- AC output, optional grid input, and generator input wiring have been verified.
- Rapid shutdown and emergency disconnect functions have been tested where required.

Typical startup sequence

Follow the current Isuna and GSL manuals for the exact sequence. A typical controlled commissioning sequence is: battery/BMS system ON and validated -> inverter ON -> configure battery communication and limits -> enable permitted AC source if used -> enable PV circuits -> energize AC loads gradually. Do not use this generic sequence if the shipped manufacturer manuals specify a different order.

13. Normal Operation and Energy Priorities

Once commissioned, the inverter manages solar generation, battery charging/discharging, loads, and any configured grid or generator source according to the selected operating priorities.

Item	Specification
Sunny daytime	PV supplies loads and may charge the R40K battery with surplus energy, subject to battery and inverter limits.
Cloudy / high load	Available PV and battery power work together; generator or grid support may be used if configured.
Night operation	The battery supplies loads until the configured reserve or low-SOC threshold is reached.
Low battery	A configured generator or grid source may support loads and/or recharge the battery.
Large motor start	The inverter may use short-duration overload capability when operating conditions permit; repeated hard starts should be evaluated by the installer.
Full battery / low load	The inverter limits battery charging and manages available PV according to system settings.

Load management

A 20 kW inverter can support substantial loads, but simultaneous demand still matters. Electric resistance heating, large water heaters, ranges, dryers, EV charging, large pumps, compressors, and workshop equipment can consume available capacity rapidly. Staggering major loads generally improves runtime and operating margin.

14. Monitoring and User Controls

The U20K-POH supports Wi-Fi, LAN, 4G, and Bluetooth monitoring options, with CAN and RS485 available for battery communication. Monitoring can help identify PV production, battery state, loads, source status, operating mode, and faults, depending on the configured platform.

- Review battery state of charge before adding large discretionary loads.
- Compare MPPT production to identify a weak string, shading, a tripped disconnect, or connector issue.
- Investigate repeated fault codes rather than repeatedly resetting the system.
- Restrict firmware updates and protection-setting changes to qualified personnel where they affect battery or electrical safety.
- Keep network credentials and installer-level access secure.

15. Controlled Shutdown and Emergency Shutdown

Controlled shutdown

Use the exact Isuna/GSL shutdown sequence for the installed equipment. A typical controlled shutdown is: reduce/disconnect major AC loads -> disable grid/generator input if used -> open PV disconnects -> stop/switch off the inverter -> isolate the high-voltage battery using the approved battery procedure.

ENERGY MAY REMAIN PRESENT Switching off the inverter does not make the PV array or battery conductors safe. PV strings remain energized in daylight and the high-voltage battery retains stored energy. Verify de-energization before service.

Emergency shutdown

If there is fire, smoke, arcing, severe overheating, flooding, damaged battery equipment, or exposed conductors, do not approach or touch the equipment. Evacuate the immediate area as needed and contact emergency services. If safe from an accessible disconnect location, isolate AC sources and loads, PV circuits, and the battery system according to the approved emergency procedure.

16. Routine Maintenance

Item	Specification
Monthly	Review inverter/battery status, alarms, state of charge, and production trends. Check ventilation and visible equipment condition.
Every 3-6 months	Inspect accessible PV wiring, connectors, disconnects, conduit, battery enclosure, inverter area, and mounting hardware for damage, corrosion, moisture, or overheating.
Seasonally	Manage snow, vegetation, shading, and debris using safe methods that do not damage modules or wiring.
Annually	Have a qualified technician inspect electrical terminations, breaker/disconnect condition, grounding/bonding, battery condition, communication logs, fault history, and system performance.

Solar-module cleaning

Use clean water and non-abrasive materials when cleaning is necessary. Do not walk on modules, use metal scrapers, or use methods that can damage glass, frames, seals, backsheet, connectors, or cables.

Battery maintenance

Follow the GSL maintenance and storage instructions. Keep the battery area dry and within specified temperature limits. Do not open battery modules. Review BMS warnings and have qualified personnel investigate recurring faults.

17. Troubleshooting

Condition	Recommended action
Inverter will not start	Check battery system status, HV disconnect/pre-charge state, BMS communication, inverter controls, and fault code. Contact installer if the HV system does not initialize.
No solar charging	Confirm daylight, PV disconnect status, and inverter PV voltage. A qualified technician should test each string separately.
One MPPT is low	Compare the assigned strings for shading, soiling, open connectors, polarity, voltage, or a tripped string circuit.
PV input alarm	Open the affected PV circuit(s) and have the installer verify polarity, voltage, cold-weather design, connectors, insulation, and input limits.
Battery not charging	Check BMS communication, battery SOC/temperature, inverter charge settings, source availability, and manufacturer current limits.
Battery communication fault	Do not bypass BMS protection. Verify protocol, cable/pinout, termination, address/settings, and firmware compatibility.

Condition	Recommended action
Generator not accepted	Check generator voltage, frequency, neutral/ground arrangement, breaker, input settings, and generator quality/capacity.
Frequent low battery	Reduce loads, verify all six PV strings are producing, review operating priorities, or evaluate additional storage/generation.
Overload trip	Reduce simultaneous loads and identify high-starting-current equipment. Confirm the overload event is within the manufacturer's published duration/conditions.
Wi-Fi / monitoring offline	Check router/internet status, module power, pairing, LAN/4G configuration, and monitoring credentials.
Repeated fault code	Record the exact code and operating conditions, then contact ROCKSOLAR support or a qualified installer. Do not repeatedly reset a persistent fault.

18. Understanding Available Energy

The GSL-R40K provides 40.96 kWh of nominal stored energy. Actual AC energy available to loads will be lower because of battery reserve settings, conversion losses, temperature, battery limits, and simultaneous solar production. The following examples are theoretical and are not guaranteed runtimes.

Illustrative load	Theoretical nominal-energy runtime
5 kW average load	40.96 kWh / 5 kW = about 8.2 hours before losses and reserve
10 kW average load	about 4.1 hours before losses and reserve
15 kW average load	about 2.7 hours before losses and reserve
20 kW average load	about 2.0 hours before losses and reserve

Solar production

The 21.6 kW array is an STC nameplate rating. Daily energy production depends on location, season, module orientation, tilt, shading, snow, temperature, soiling, bifacial rear irradiance, system limits, and battery/load conditions.

19. Expansion and System Changes

Any change to PV string length, number of strings, battery system, generator size, AC distribution, or inverter count must be engineered before installation.

- Do not add modules to a 6-panel string without recalculating maximum cold-weather Voc and MPPT operating voltage.
- Do not add strings to an MPPT without checking the inverter's published string count, operating current, and short-circuit current limits.
- The U20K-POH has two independent HV battery ports, but battery expansion must use an Isuna-approved and battery-manufacturer-approved topology.
- Do not mix incompatible battery chemistries, BMS protocols, voltage ranges, or firmware families.
- Parallel inverter expansion requires the current Isuna parallel-system design, protection, communication hardware, conductor sizing, and commissioning procedure.
- Permits and inspections may be required for system modifications.

20. Technical Support and Commissioning Checklist

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When requesting support, provide the order number, inverter model/serial number, GSL battery model/serial number, firmware versions if available, fault code, photos of the installation, monitoring screenshots, and measured PV string voltages when safely available.

Commissioning checklist

Commissioning Item	Initial / Date
Inverter mounting and clearances complete	
GSL-R40K installation/location verified	
Grounding and bonding verified	
AC conductors and breakers verified	
Generator/grid input verified if used	
Battery HV protection/pre-charge verified	
Battery BMS protocol confirmed with Isuna	
Battery port assignment documented	
String 1 = exactly 6 panels in series	
String 1 polarity and Voc recorded	
String 2 = exactly 6 panels in series	
String 2 polarity and Voc recorded	
String 3 = exactly 6 panels in series	
String 3 polarity and Voc recorded	
String 4 = exactly 6 panels in series	
String 4 polarity and Voc recorded	
String 5 = exactly 6 panels in series	
String 5 polarity and Voc recorded	
String 6 = exactly 6 panels in series	
String 6 polarity and Voc recorded	
MPPT allocation = 2 / 2 / 1 / 1 verified	

Commissioning Item	Initial / Date
Cold-weather Voc calculation documented	
PV protection/disconnects labeled	
Rapid shutdown verified where required	
Monitoring configured	
Customer startup/shutdown orientation completed	

21. Important Notice and Source Basis

This ROCKSOLAR manual is a system-level guide and does not replace the current installation, operation, commissioning, or service manuals for the individual components. Where any discrepancy exists, the current manufacturer documentation, equipment nameplate, and requirements of the authority having jurisdiction take precedence.

MODEL / REVISION NOTE	This manual is written around the Isuna U20K-POH datasheet supplied for this project. Isuna's current 2026 web literature uses a related U20K-PH-US model name and publishes some revised performance values. Confirm the exact inverter model label and use the documentation shipped with the installed unit for final settings and limits.

Primary technical references used for this manual:

- Isuna / Sinexcel: supplied Split Phase High Voltage Off-Grid 5-20 kW U20K-POH datasheet.
- Isuna: current Split Hybrid Inverter HV 5-20 kW product page for architecture, current model naming, and updated feature information.
- GSL Energy: 20-60 kWh rack high-voltage energy-storage battery product information for the GSL-R40K.
- Philadelphia Solar: PS-MNB144(HCBF) 595-600 W Nexus module datasheet / downloads; 600 W module used as the PV design basis.
- ROCKSOLAR USA and ROCKSOLAR Canada current contact/support pages.
- Applicable NEC or CEC requirements and local authority having jurisdiction for the installation site.

Reference URLs

https://isuna.info/en/split-hybrid-inverter-hv-5-20-kw/

https://www.gslenergybattery.com/20-60kwh-rack-high-voltage-energy-storage-battery-204-614v-scalable-solution

https://philadelphia-solar.com/downloads/

https://rocksolar.io/pages/contact-us

https://rocksolar.ca/pages/contact-us

FINAL INSTALLER RESPONSIBILITY	Before energization, verify actual component model numbers, nameplate ratings, firmware, BMS protocol, PV string measurements, cold-weather voltage calculations, protection ratings, conductor ampacity, grounding/bonding, rapid shutdown requirements, and AC source configuration.