

STORAGEDOCK

48 VOLT BATTERY RANGE

ABEL ENERGY BATTERY RANGE



AB5.4K/48V LiFePO₄ BATTERY

TECHNICAL DATA SHEET WITH INSTALLATION INSTRUCTIONS

ABEL ENERGY 5.4 kWh 48 VOLT	
Product Code	AEB011-48V5.4
Weight	48.5kg
Dimensions	650 x 420 x 170mm



Manufactured by SPECIALIZED SOLAR SYSTEMS
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To be completed by Distributor:

<u>IMPORTANT INFORMATION</u>	
• PROJECT No.	
• CLIENT NAME	
• CLIENT CONTACT DETAILS	
• DATE PURCHASED/INSTALLED	
• SERIAL NUMBER of UNIT	
• SSS REPRESENTATIVE	

Please retain this booklet as proof of your warranty.

If this section has not been completed by a registered SSS Distributor, please submit a copy of the above to the following email address to ensure that your warranty will be valid:

info@specializedsolarsystems.co.za



STORAGEDOCK

ABEL ENERGY BATTERY RANGE

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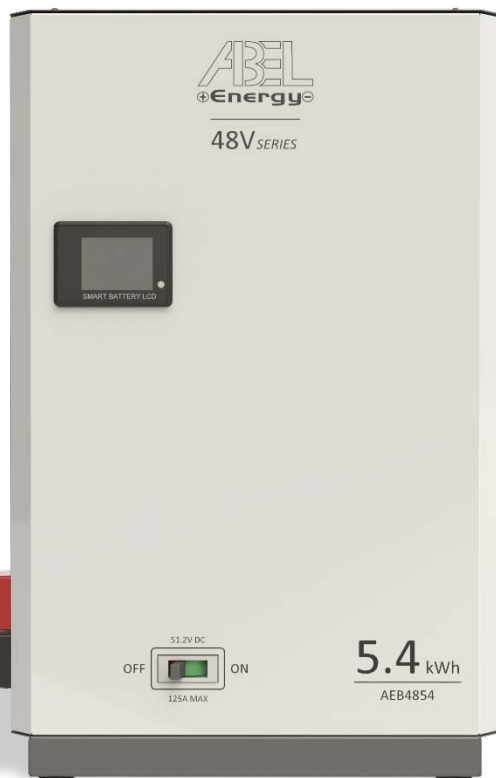
ABEL ENERGY 5.4kWh

INTRODUCTION

Each Storagedock/Abel Energy battery is composed of prime cell A grade lithium iron phosphate (LiFePO₄) cells. The LiFePO₄ battery is one of the most stable forms of lithium-iron technologies available for this specific purpose. This battery uses a lithium-iron-derived chemistry and shares many advantages with other lithium-ion battery chemistries. However, there are significant differences. Lithium iron phosphate chemistry offers a longer cycle life than other lithium-ion approaches. Another important advantage over other lithium-ion chemistries is thermal and chemical stability, which improves battery safety, making these batteries ideal for home and business use.

The Storagedock/Abel Energy batteries are also modular in design which allows one to increase the capacity of your energy system over time, if so required. Up to four units can be connected in parallel.

With a Specialized Solar Systems/Abel Energy custom designed and intelligent BMS (battery monitoring system) with CAN- bus, the health of the battery is automatically maintained from the charging cycle, right through to the discharging floor level State of Charge (SOC) within the various parameters from the battery cell supplier in order to ensure the optimal lifespan, safety and warranty.



The BMS CAN-bus communication protocol integrates seamlessly with the Victron CCGX, Venus GX or Cerbo GX graphical user interfaces for a fully optimised ESS (Energy Storage System). The batteries can be remotely monitored and managed, allowing optimal performance and extended battery life.

The batteries can be wall mounted (bracket provided) or positioned on the floor for ease of installation.

Please see the technical specifications hereafter and please read the installation and operating instructions carefully before operating this unit.



ABEL ENERGY 5.4kWh

COMPONENTS

SERIAL NUMBER

BMS TOUCH SCREEN

BMS ON/OFF AND
PARALLEL CONNECTION
PORTS ON SIDE OF UNIT

MAIN CIRCUIT
BREAKER

FOOT PIECE



2. TECHNICAL SPECIFICATIONS

Technical Specifications AB5.4K	
Battery type	Grade A LiFePO ₄ Prismatic Cells
Nominal Voltage	51.2 VDC
Nominal capacity	106 Ah
Total Energy Capacity	5.40 kWh
Energy Capacity at 80% DoD	4.32 kWh
Standard charge current	50 A
Max charge current	80 A
Charge voltage Bulk/Absorb	56.2 VDC
Float voltage	56.0 VDC
Cycle life	4000 cycles @ 0.5C 80% DOD
Recommended constant discharge	50 A
Max discharge current	100 A
Discharge cut-off voltage	48 V @ 0.005C
BMS	Charge: 100A / Discharge: 125A
Circuit breaker	100 A
Maximum parallel batteries	4 – Master and slave
Inverter size per additional battery	3kVA / 5kVA / 8kVA / 8kVA
Maximum discharge per additional	60A / 100A / 120A / 150A
CAN-bus communication	Yes, Victron GX ready
Operating temperature - Charge:	0 to 45° C
Discharge:	0 to 55° C

General Specifications

Unit Installation type	Indoor wall or floor mounted
Inverter size support	5kVA maximum (<i>please see page 9</i>)
Enclosure material	Aluminum; 409 Stainless steel
Dimensions (length x width x depth)	650mm x 420mm x 170mm
Weight	48.5kg
Ventilation distance	150mm clear on all sides with no obstructions
Installation	Indoors/inside only

The following algorithm has been programmed into the energy system battery:

- Cell over-discharge protection.
- Battery over-discharge protection.
- Cell over-current protection.



- Battery discharge over-current protection.
- Short circuit protection.
- Over / under temperature protection.

3. PROGRAMMING FEATURES WHEN PROGRAMMING BATTERY INTO INVERTER SYSTEM

To achieve optimal performance from your energy system, it needs to be programmed accordingly. The program, be it UPS mode, virtual switch or ESS method of operation, must be done by a qualified service technician. With remote monitoring connected, our monitoring division will be able to support and confirm these settings on behalf of the approved installer, if so required.

4. SAFETY INSTRUCTIONS

4.1 General safety instructions

Please read all documentation supplied with this product first so that you are familiar with the safety indicators and instructions before using this product. This equipment should be used for the designated application only.

WARNING: *Danger and electrical shock*

- This product is used in combination with a permanent energy source (battery). Even if the equipment is switched off, a dangerous electrical voltage can occur at the input or output terminals. Always switch the AC power OFF and disconnect the battery before any maintenance is carried out.
- Never use the product at sites where a gas or a dust explosion could occur. The product is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or with a lack of experience or knowledge.
- An approved service agent must take responsibility of the installation of this product.

4.2 Transport and storage safety instructions

- When transporting or storing the product, ensure that the main supply and the battery leads are disconnected.
- Transport the product in the original packaging only.
- Store all products in a dry environment and preferably at a temperature of 25°C.

WARNING: *Do not lift heavy objects without assistance.*

5. INSTALLATION INSTRUCTIONS

- For electrical work, always follow the National Wiring Standards and Regulations of South Africa.
- Never replace a protective device with a component of a different kind.



- Before switching the energy system on, first check that the input voltage is correct.
- Ensure that the equipment is used in the correct operating conditions.
- Never operate in wet or dusty conditions
- Ensure that there is sufficient free space for ventilation around the installed equipment.
- Install the product in a heat proof environment.
- Ensure that there are no chemicals, plastic pots or curtains in the immediate vicinity of the installation.
- Always ensure that you follow the correct installation video/manual procedures when attempting to install this unit.
- If mounting the system on a wall, ensure that the supporting structure (wall) is able to carry weight accordingly as per section 2 in this document.
- 8-10mm size bolt must be used to secure the unit to the supporting structure.

NB: Battery to be installed by qualified Specialized Solar Systems approved installers only.

5.1 The Initialising Procedure

1. Turn ON the power button on the side of the unit. The screen will indicate state of charge of battery.
2. Using the touch screen, go to 'page 2'. "DISCHARGE" will be "OFF". Change it to "ON".
3. Switch the Circuit Breaker to the "ON" position.
4. The battery will now be operational.



Once the switch is in the "ON" position check the following:

1. That there is available DC power on the output leads.
2. On the display of the battery check that there are NO Alarm lights, SOC Green LED are indicating correctly

The internal BMS of the battery has various safety override functionality:

1. Over Charge Protection
2. Over Discharge Protection
3. Short Circuit Protection
4. Internal Condition Protection

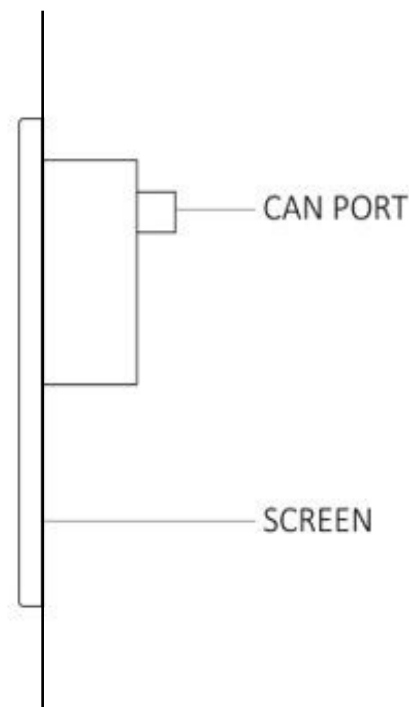
In the event of over-charging the battery, the charge circuit will disconnect separately. In the event of an over-discharge the battery supply will disconnect separately (please familiarize yourself with the FAQ section).

6. CONNECTION BETWEEN BATTERY AND VICTRON DEVICE AND/OR INVERTER

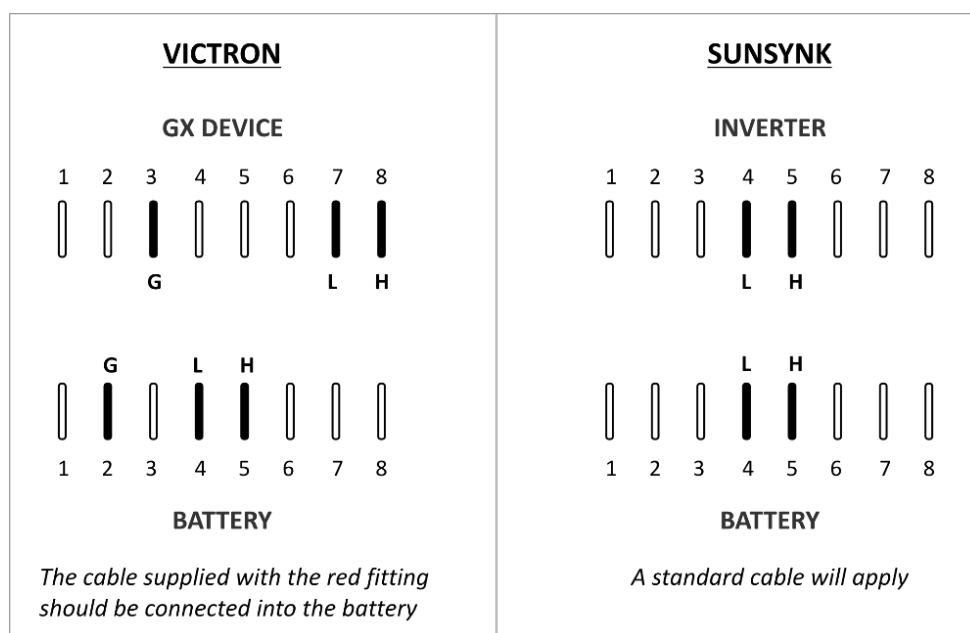
Please note that when connecting this battery to a Victron energy system, the RS485 cable that has been supplied with the battery should be used. In the event the battery is connected to a Sunsynk or Deye inverter, a cable request must be made for the specific inverter.

The communication means is via CAN-bus. The battery comes standard with the Victron RS485 cable which will be plugged into the CAN-port inside the battery.

Behind the screen of the battery there is only one CAN-bus port. If a Victron system is used, the colour end (red) of the RS485 cable will be connected inside the battery and will be tucked away in the foot piece.



CAN-BUS PIN LAYOUT



When connecting the CAN cable into the GX device (CAN port), the battery will automatically be displayed on the “*DEVICE LIST*” of the GX screen notes as “*CAN BMS*”. By clicking on the *CAN BMS*, the detail of the connected battery will now be displayed. In “*DETAILS*”, you will see the highest cell value and the lowest cell value (volts). This will change as the battery is charged or discharged. By selecting the “*INSTALLED CAPACITY*” option, you will see the rated Ah of the connected battery. When connecting batteries in parallel, this value will multiply as you install additional units.

In the “*DEVICE*” section, the battery serial number will be displayed and in the “*PARAMETERS*” section, the maximum allowable charge and discharge values will be indicated. Your battery has now been connected to the Victron GX device.

7. HOW TO CONNECT THE BATTERIES IN PARALLEL

A maximum of four Storedock/Abel Energy batteries may be connected in parallel. When paralleling these batteries, the capacity “*Amp*” of the BMS will be increased. Only proportional sizes of batteries may be paralleled together. Please note that even though the BMS capacity has increased, the limit to this capacity is as indicated below:

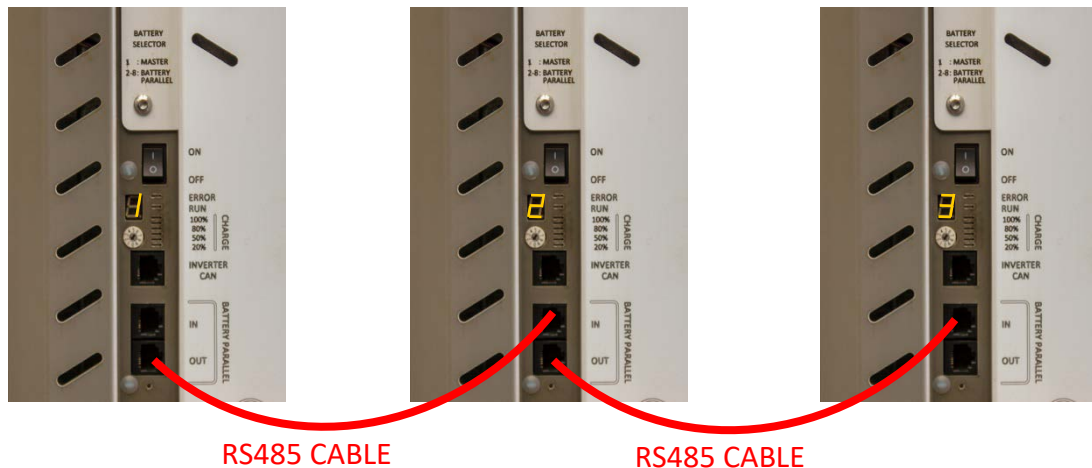
ABEL ENERGY 5.4 kWh				
DESCRIPTION PER UNIT	BATTERY 1	BATTERY 2	BATTERY 3	BATTERY 4
CIRCUIT BREAKER	100 A	100 A	100 A	100 A
RECOMMENDED MAXIMUM DISCHARGE	100A	150 A	200 A	270 A
RECOMMENDED INVERTER SIZE	5 kVA	8 kVA	10 kVA	15 kVA



Using the above information, and under the assumption that you connect four batteries in parallel, one would assume that you could have the capacity of the BMS x four units and therefore, the four batteries could supply up to 400 Amps. However, this would not be correct. The maximum constant Amp that four batteries could supply would be 270 Amps, or 15 kVA from the four batteries. For larger Amperage requirements, please see our Light Commercial Range of batteries.

7.1 How to do the Parallel Connection

The parallel ports of the battery are located on the side panel of the battery (*"Battery Parallel IN/OUT"*):



The Master battery will be set to "1" on the Battery Number dial, and the RS485 cable will be plugged into "OUT" of the Master battery and then into "IN" of Slave 2 (or Pack 2). Pack 2 will then be set to "2" on the Battery Number dial, and then the RS485 should go from "OUT" of Pack 2 to "IN" of Pack 3 (setting to be put on "3" of Pack 3) and the same process with Pack 4. The CAN Coms cable stays in the Master battery only.

If the batteries are connected in parallel, ensure that all the positive and negative cables are connected to a central BUS and that cable thicknesses and lengths are the same.

When connecting the units in parallel, the four BMS's will calculate an average between all the connected batteries' BMS's charge/discharge and SOC and send this information to the GX device.

8. PROGRAMMING PARAMETERS & ASSISTANCE FOR ESS CONFIGURATION

8.1 Inverter Programming

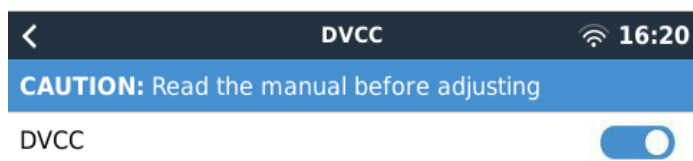
If you are using the battery as part of a [grid connected ESS system](#), please ensure that settings and programming are done by a qualified Victron technician.

The settings that are specific to this SSS LiFePO₄ battery (as well as other sizes except for the



Ah value) in the VEConfigure ESS Assistant as follows: *Select the externally managed Lithium battery option:*

8.2 Victron GX Device Configuration



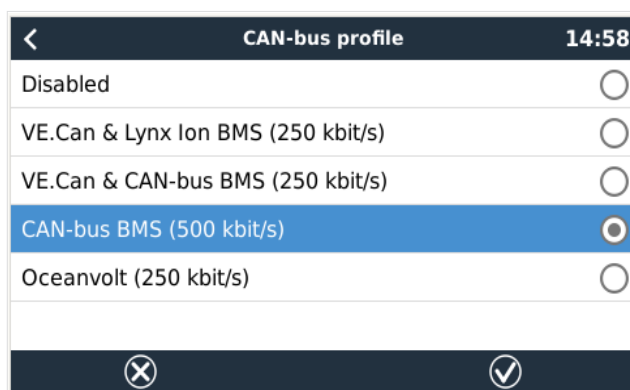
*DVCC 'ON'.
SVS 'ON'
CHARGE VOLTAGE SET TO 56.0 V



8.3 CAN Bus Wiring with GX settings

Please ensure that the CAN BUS BMS 500kbit/s is used

Navigate to: Settings -> Services -> CAN-profile



For further settings please contact the service agent

8.4 VE-Direct MPPT Settings

Please use the following VE-Direct MPPT settings:

MPPT CHARGE VOLTAGES	
Absorption voltage	56 . 0V
Float voltage	56 . 0V

Please ensure that the LiFePO₄ settings have been programmed correctly on the MPPT.



9. ADDITIONAL PROGRAMMING FOR VICTRON ENERGY SYSTEMS WITH ESS SETTINGS

Inverter settings via VE-Config.

1. General page:

- Enable battery monitor
- Set amperage of battery
- State of charge when Bulk finished 95%
- Charge efficiency 95%

2. Inverter page:

- DC input low shutdown 47 V
- DC input low restart 50.5V
- DC input low pre-alarm 48.5 V

3. Charger page

- Enable charger
- Select "Lithium batteries"
- Charge curve is "Fixed"
- Absorption voltage is 56.2 V
- Float voltage is at 56.0 V

4. Assistance page

- Select "ESS (Energy Storage System)"
- In the ESS settings, please ensure that sustain voltage is 50 V
- Cut-off voltage for discharge current of:
 - 0.005C = 49 V
 - 0.25C = 48.5 V
 - 0.7 C = 48 V
 - 2 C = 47.5V
- Inverting is allowed again when voltage rises to 2.0 V above cut-off V

Once this is done, reset the "Dynamic Current Limit" to "ON" once the ESS system settings have been changed.

The above settings should only be done by a qualified and Victron approved technician.



10. TROUBLESHOOTING AND FREQUENTLY ASKED QUESTIONS (FAQ)

The battery screen is ON and the charge/discharge mosfets also indicate that they are ON and no alarm is active on the screen but there is no power on the loads.

1. Please ensure that the battery isolator is in the "ON" position.
2. Please check the status on page 2 of the touch screen, and see if the battery is in the "NORMAL" mode. If not, then...
3. Switch the battery ON/OFF and see if the unit reboots the software.
4. Phone your supplier if it does not reboot.

Can a battery cause a fire?

When it comes to households, LiFePO₄ batteries provide an added layer of safety due to their inherent stability. However, it is essential to note that improper handling, storage or charging could still pose a risk. Any electrical devices incorrectly used could pose a risk of fire.

What do I do if the battery is not communicating with the inverter or GX device?

After connecting the correct cables, reboot the GX device and/or the inverter. If this does not solve the problem, check the communication cable with an ohm tester and confirm that the cable connection is based on the PIN layout (see page 9). If not, replace the cables as per PIN layout.

What happens if the individual battery cells become unbalanced?

Lithium batteries need to be charged to 100% state of charge in regular intervals. If the cells are unbalanced, recharge the battery and allow it to be charged to 100% for as long as possible. At this time, the cell balance should improve.

What happens when the discharge mosfet switches off (page 2 of the BMS touch screen)?

The common reason for this is that the amperage delivery has been exceeded. Reduce the load and reset the discharge mosfet to "ON". If this does not work, switch the BMS ON and OFF and let it reboot. The same will apply if the charge mosfet switches off.

When a fault SCP is indicated on the screen, what do I do?

This fault means that the BMS has gone into Short Circuit Protect (SCP) mode. There are times that a surge, potentially caused by lightning for example, goes through to the battery before the circuit breaker trips. At these times the BMS will protect the battery, and shut down. Turn the main circuit breaker OFF and reboot the BMS. If this does not restore the BMS, your service technician will need to complete a "hard reboot" on this unit.

For any additional faults, please contact your registered service technician (as per page 1 of this document).



SPECIALIZED **SOLAR** SYSTEMS QUALITY CONTROL & SIGN-OFF

PRODUCT NAME:	ABEL ENERGY 5.4 kWh	ASSEMBLER NAME:	
SERIAL NUMBER:		QUALITY CONTROLLER NAME:	

CHECKLIST			
PASS	FIT & FINISH	QUALITY CONTROLLER INSPECTION	COMMENTS
	MAIN ASSEMBLY (Paint Finish, Structure, Rivets)		
	BATTERY COMPARTMENT LID		
	CIRCUIT BREAKER DIN RAIL & SSS COVER		
	LiFePO ₄ BATTERY MOUNT SECURE		
	ALIGNMENTS		
SIGN OFF:		DATE:	
PASS	FIT & FINISH	QUALITY CONTROLLER INSPECTION	COMMENTS
	LiFePO ₄ BREAKER, SIZE, TEST		
	LiFePO ₄ VOLTAGE SENSING CABLES		
	BMS MAIN ON/OFF		
	BATTERY MAINS ON/OFF		
	TORQUE VALUE:		
	RJ45 CABLE (CAN-bus Colour Coded)		
	FUSE HOLDER - ALIGNMENT LEVEL		
SIGN OFF:		DATE:	
PASS	PROGRAMMING & COMMISSIONING Memory Setup & Connectivity	QUALITY CONTROLLER INSPECTION	COMMENTS
	BREAKER ON/OFF, OC AMP TRIP		
	BMS ON/OFF		
	BMS CONFIG UPLOAD		
	BMS UPDATE WITH PRODUCT SERIAL NUMBER		
	CELL MONITOR- CELL VOLTAGES: HIGH:.....		
	LOW:.....		
	PACK:.....		
	CELL TEMPERATURE: A: B:		
SIGN OFF:		DATE:	



PASS	PERFORMANCE - DISCHARGE & CHARGE	QUALITY CONTROLLER INSPECTION	COMMENTS
	UPS MORE - AC DISCONNECT (NON ESS/VS)		
	RESISTIVE LOAD 1700W DISCHARGE TO LVD		
	DISCHARGE SOC 80%		
	RE-CHARGE TO 100% (AC Source 35A)		
SIGN OFF:		DATE:	
PASS	SAFETY & LEGAL	QUALITY CONTROLLER INSPECTION	COMMENTS
	BREAKER TEST		
	LABELS - AC, PV DC (if applicable & align)		
	QR CODE		
SIGN OFF:		DATE:	
PASS	PACKAGING	QUALITY CONTROLLER INSPECTION	COMMENTS
	PACKAGING MATERIAL AND MOUNT		
	SHIPPING LIST		
	PRODUCT SPECIFICATION BROCHURE		
	HANGER BRACKET KIT		
	QC LABEL		
	SERIAL NUMBER TAG		
SIGN OFF:		DATE:	
FINAL SIGN-OFF AND APPROVAL			
NAME OF COMMISSIONER:			
DATE:			
SIGN OFF:			

NOTE: PLEASE RETAIN THIS BOOKLET AS PROOF OF YOUR WARRANTY

*For more information and videos,
please scan the following QR code:*

