



Lesoni 9 – iVolanivuli

Noda piko- haidro

VOSA VAKAVITI RARABA

Vakailavotaka na:

KOICA
Korea International
Cooperation Agency

Ena veitauriliga kei:




Pacific Islands
Development Forum





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Na lesoni “Noda piko-haidro” na ivakamacala taumada ni haidro. Oti na lesoni qo, o na rawata na veika qo:

- Vakamacalataka na haidro
- Vakamacalataka na ivakarau lelevu ni livaliva (V, I, P & E, AC, DC)
- Kila kece na gacagaca ni haidro
- Vakamacalataka na kedra dui yaga

- Tukuna na dui mataqali haidro
- Kila na iyaya ni vakatovotovo (test equipment) kei na kedra vakayagataki vakamaqosa
- Veivosakitaka se cava so me yavu ni noda lewā ena voli haidro se kena gacagaca
- Tukuna na bibi ni qaravi haidro

TEVELI 2: iTuvatuva ni Lesoni

Wase	Mataqali Lesoni
1. Taumada – Tou veikilai mada	Vuli kei na iVakadre 1
2. Cava na haidro?	Vuli
	IVakadre 2
	IVakadre 3
3. Yavu ni livaliva	Vuli
	IVakadre 4
4. Gacagaca ni haidro	Vuli
	IVakadre 5
5. Mataqali haidro kei na kedra levu	Vuli
	IVakadre 6
6. Qaqarauni ena haidro	Vuli
7. Voli haidro	Vuli
	IVakadre 7
8. Qaravi haidro ni vale	Vuli
	IVakadre 8
	IVakadre 9

Na ivolanivuli qo e yavutaki ena kena Salavata nei Qasenivuli (Trainers Guide). Sa vakarawarawataki na lewenivola ka vakalekalekataki, qai vakabibitaki kina na droini, yaloyalo kei na kena ivakadre me ratou veimaliwai vinaka tikoga kina na lewe ni vuli kei qasenivuli ni toso tiko na vuli. Ke o gadreva

na ikuri ni ivakamacala ni wase cava ga, mo raica na Salavata nei Qasenivuli.

Taba e waqanivola: Yavala na piko-haidro. iVurevure: Powerspouts, Niusiladi.

Moni Kila: Na Global Green Growth Institute e sega ni yalataka, se yalataka lo madaga, ni donu se taucoko na itukutuku ena ivola qo, se rawa ni veilewaitaki ke cala, ni dua e vakayagataka na vua ni itukutuku se iyaya se cakacaka e volai kina, wili kina ni beci na dodonu ni kena itaukei.

IVOLAVOSA

Ah - Amp-hour, ivakarau ni dua na amp e kui tiko me dua na aua.

Beleti (ni qaqarauni) - mataqali iyaya ni qaqarauni me tarova noda lutu nida cakacaka tiko mai vanua rewa.

iGu - Kaukaua e vu mai na iyaubula se kemiki, vb me rawa kina na cina se katakata se yavala kina na misini; na ivakarawa ni cakacaka se yavala.

iGu haidro - mataqali ivurevure ni igu tudei, vakayagataki kina na igu ni wai drodro me rawa kina na livaliva.

iGu katakata - Na igu katakata na igu e vu mai na yavavala ni molekuli. Na ka e katakata e vu mai na igu katakata.

iGu kemiki - iGu maroroi e na isema ni kemiki cokovata, mv atomi se molekuli. Na igu qo e dau sereki ni yaco na vuki vakemiki.

iGu mekeniki - igu e vu mai na kena yavala kei na kena itutu.

Kui (amp) - totolo ni nodra toso na luveniatomi ena salalivaliva.

Kui dodonu - Kui muadua, sega ni veisau pole kena volt.

Kui livaliva dri - kui livaliva dau dri qai veisautaka kena gumatua, kena volt e veiveisau pole se kena kui e veiveisau mua.

Lutu - Veiyawaki ni rewa ni icurucuru ni wai ina haidro kei na kena icurucuru i tuba mai ra. E vakarautaki vakalevu ena fiti se mita.

Megawatt - Dua na milioni na watt.

Pawa haidro - Pawa e vu mai na wai e lutu.

Serau - igu kaburaki me vodo ena ua se ka matailalai, vb serau livaliva-makeneta mv katakata se ua ni veiilovi (x-ray). Na ua livaliva-makeneta e kau igu e maliwalala. Na cila ni siga e dua na mataqali serau.

iVolakabi - iVola kabi ena dua na ka, volai kina na yacai kena itaukei, kena ivakatawa, koya a bulia, se na itukutuku tale eso.

Volt (V) - na bili ni ivurevure ni igu ni salalivaliva, e biliga na luveniatomi jajitaki (kui) ena wa ni livaliva mera lai yaga ena dua na ka, mv vakawaqa cina.

Watt - Totolo ni cakacaka ni salalivaliva, dua na joule se cakacaka rawa ena dua na sekodi.

Wh - Watt-aua - me yavala na pawa dua na watt ena dua na aua.

Teveli ni iVakarau:

1000 Watt (W)	1 Kilowatt (kW)
60 sekodi	1 miniti
60 miniti	1 aua
1Wh (Watt-hour)	1 Watt × 1 aua

1

Taumada
– Tou veikilai

IVAKADRE 1

Vakamacalataki iko vakalekaleka, qai tukuna vei iratou na lewenivuli me ratou dui vakamacalataki koya – me vaka na cava e dau cakava e veisiga ena gauna qo, cava e via vulica

ena lesoni nikua. Tukuna na lomamu baleta na ivurevure tudei. E sega na isau ni taro donu, na inaki ga ni ivakadre qo meda yalovakacegu qai vakarau meda vulica na lesoni.



2

Cava na
haidro?

2.1 Cava na igu?

Na igu na ivakarawa ni cakacaka. Na igu e levu na votukana, e dau vukivuki me yaga vei keda. Qo e so na votukani igu:

- **iGu katakata** – Nanuma toka nomu vakawaqa buka me toka kina na kuroniti. Nida volekata na buka waqa, eda vakila na kena igu.

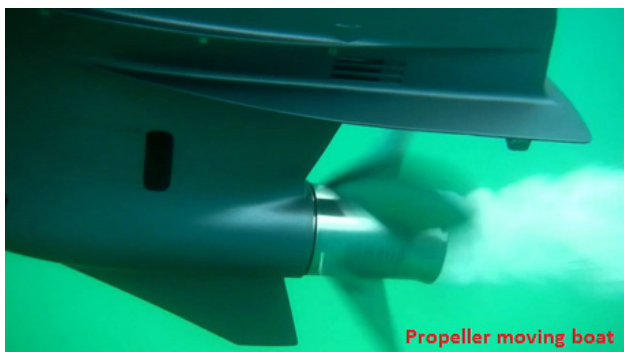
YALOYALO 1: Bue na wai ena igu katakata¹



The burning wood gives out heat energy and heats the pot. This heat helps to boil the water. The heat energy gets transferred to water. We all know how hot boiled water is.

- **iGu mekeniki** – qo na igu ni idini ni boto e cowiri kina na ivocevoce me toso kina na boto. Se na igu ni idini ni lori e vakadewai ina taya me toso kina.

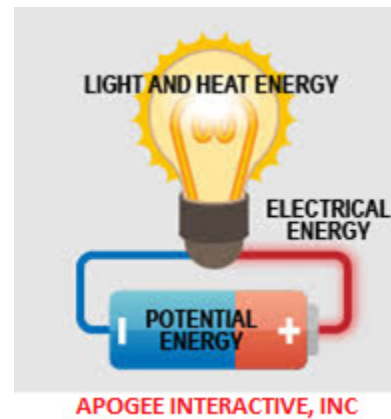
YALOYALO 2: iGu mekeniki ni ivocevoce²



Propeller moving boat

- **iGu kemiki** – na kemiki e tawa ena loma ni bateri, e maroroi kina na igu me rogo kina na retio, jajitaki na talevoni, se waqa na cina ena bogi.
- **iGu livaliva** – qo na igu e drodrova na waya me yavala kina noda iyaya livaliva.

YALOYALO 3: iGu livaliva³



APOGEE INTERACTIVE, INC

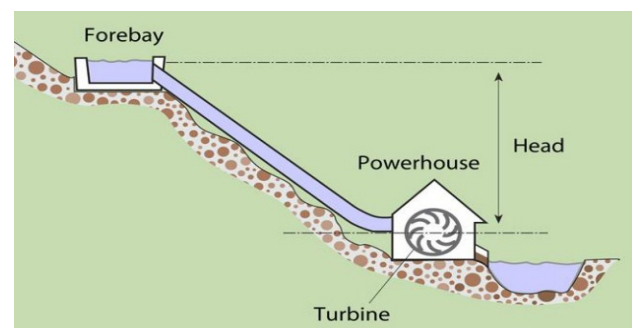
2.2 Cava na igu haidro?

Na igu haidro – na ivurevure tudei, rua na kena mataqali:

Wai baiti – baniwai se ivakaso e maroroi kina na wai drodro, qai sereki me yavalata na ivocevoce ni livaliva (turbine).

Wai drodro – vakadrodroi na wai ina paipo se salaniwai me tini ena ivocevoce ni livaliva.

YALOYALO 4: Droini matailelevu ni haidro⁴



2.3 Cava na piko-haidro?

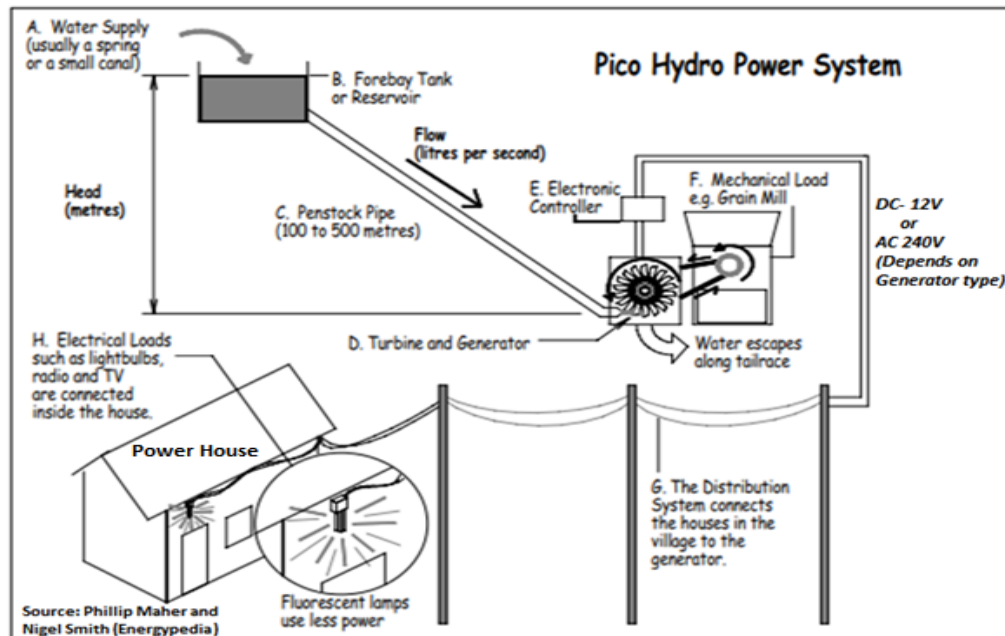
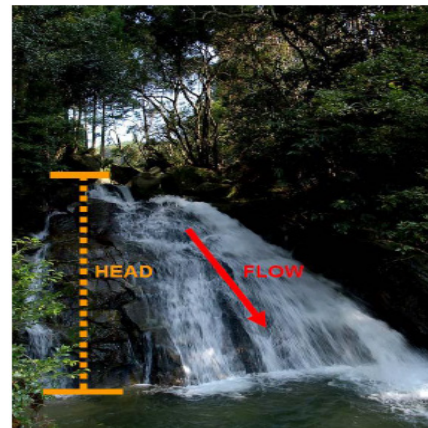
Na piko-haidro na haidro lailai, viavia vaka na sola tugalala ni igu e rawa kina e maroroi ena bateri qai vakayagataki ni gadrevi. Na piko e droinitaki ena yaloyalo 5.

¹ Ivurevure: Pikrepo, <https://p0.pikrepo.com/preview/673/890/black-cooking-pot-on-fire.jpg>, accessed on 16 June 2021.

² Ivurevure: Wonderful engineering, <https://wonderfulengineering.com/wp-content/uploads/2017/02/wby-boats-have-propellers-at-the-back-1024x576.jpg>, accessed 16 June 2021.

³ Ivurevure: APOGEE, <https://www.apogee.net/>, accessed 16 June 2021

⁴ Ivurevure: U.S Department of Energy, "Planning a Micro Hydropower System", <https://www.energy.gov/energysaver/planning-microhydropower-system>

YALOYALO 5: iTuvatuva ni piko-haidro⁵YALOYALO 6: Gacagaca ni piko-haidro⁶

Volavola:

⁵ Yavutaki ena the International Journal of Research in Engineering and Technology, " Design and Development of Pico Micro Hydro System by Using House Hold Water Supply, <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.672.5203&rep=rep1&type=pdf>

⁶ IVurevure: News Sewa, June 2021, <http://www.newssewa.com> and DocPlayer, Manual for Renewable Energy Source, <https://docplayer.net/45114164-Manual-per-burimet-e-ener-give-te-rinovueshme.html>

IVAKADRE 2

1. O nanuma ni vakalailaitaki na vakadukaduka ena baniwai ni haidro?

2. Mataqali igu cava so e rawa mai na haidro?

3. Na baniwai ni haidro e rawa ni vakacacana na veikabula?

IVAKADRE 3

1. Veivosakitaka vakalasi se o sa raica oti na haidro (me vaka ena yaloyalo 4), Dou veiwaseitaka.

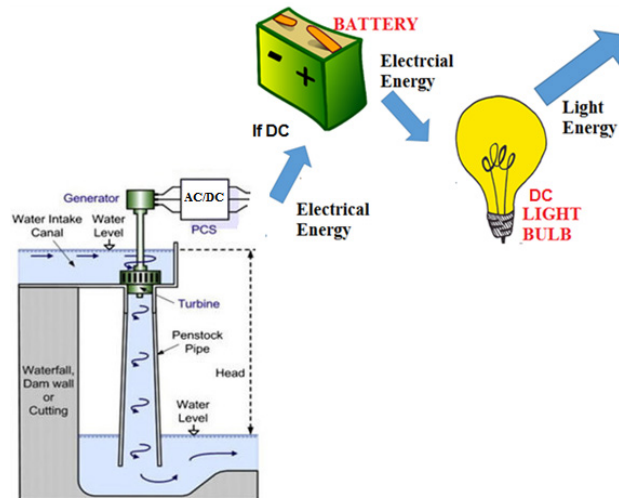
3

Yavu ni
livaliva

3.1 iGu livaliva

Na igu livaliva e dua na votukani igu. Na yaloyalo e ra e laurai kina na kena veisau.

YALOYALO 7: Veisau na igu haidro me igu livaliva qai tini ena rarama ni cina⁷



SAFETY TIP: Energy of any from whether electrical energy from a generator or from a battery is very dangerous and can cause harm if we are not careful. Always follow safety rules when working with energy.



3.2 iGu ena bateri

Na igu ena bateri e maroroi ena kemiki. Na mataqali bateri jajitaki kune wasoma na 'lead acid', vaka na bateri ni lori. Na 'lithium-ion' vaka na kena ena talevoni se tenei (laptop) sa tekivu taurivaki tiko, ca ga ni saulevu.

YALOYALO 8: Bateri jajitaki 'lead acid'⁸



3.3 Pawa

Na ivakamacala rawarawa ni pawa, na igu vakayagataki ena gauna yalataki. E vakarautaki ena Watt (W). 1000 na Watt e dua na Kilowatt (kW).

YALOYALO 9: Matanicina 4W⁹



3.4 Volt kei na kui (current)

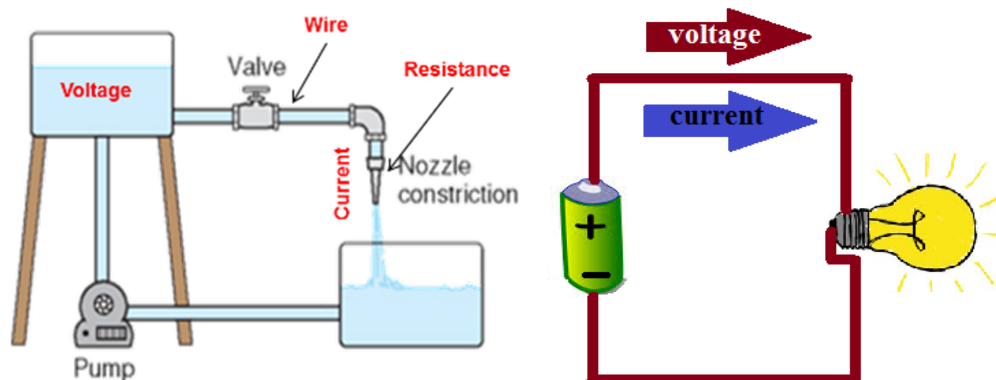
Na volt na kaukua ni livaliva, se na kena bi e vakavuna me muria na luveniatomi (electrons) na waya (salanilivaliva), e via vakā na bi ni wai ena paipo.

Na kui (current) nodra kui vata tiko na luveniatomi qo. Me vaka ni dau lutu na wai ena idre ni vuravura (gravity), e kui na livaliva ena waya ena idre se bili ni volt.

⁷ IVurevure: TDM Electricity, <http://www.tdmelec.fr/wp-content/uploads/uploadpeel/minikaplan4.jpg>, accessed 21 June 2021.

⁸ IVurevure: JICA

⁹ IVurevure: Shopee.com, Philips Led Lights 4 Watt Yellow and White Colour, <https://shopee.com.my/PHILIPS-4-WATT-LED-LIGHTyellow-and-white-i.267756065.3536838685>

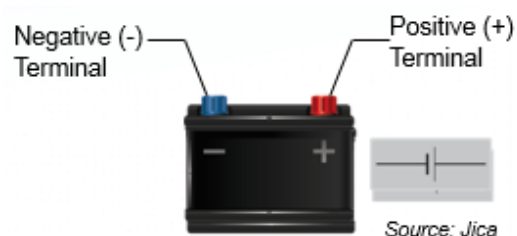
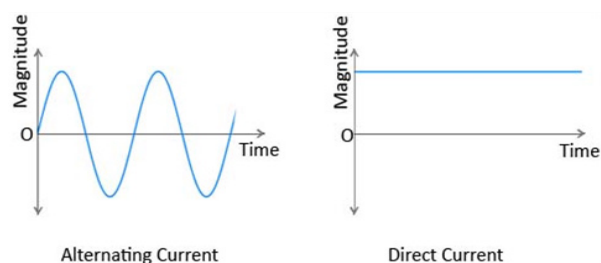
YALOYALO 10: Rau wili ruarua na volt kei na kui ena pawa – na volt e vaka na bi ni wai ena taqe¹⁰

Na ivakarau ni volt na volt, na ivakarau ni kui na Ampere se Amp. Eda dau via kila se vica na volt kei na kui e drodrova na wa. E rawa ni kainaki ni volt e vaka na titobu ni wai, ia na kui na kena kui tiko. Na wai lalai vovodea madaga eda rawa ni luvu kina, ke kaukaua na kui. E vaka kina na livaliva, veitalia ni lailai na volt – ke kaukaua na kui, eda rawa ni mate kina.

3.5 Livaliva dri, livaliva dodonu

Na kui mai na bateri e vakatokai me livaliva dodonu (direct current, DC), baleta ni dua tuga. Na livaliva dodonu e kui tuga mai uluniwai (positive) i gusuniwai (negative).

Qaqarauni: Na kui kei na volt levu e rawa nida mavoa kina se mani mate ke drodrova na yagoda. Kua na tara na waya wale, se mo cakacaka ena livaliva bula. Dau qaqarauni matua, se me dua e vakaivola kina me cakava.

YALOYALO 11: Pole ni bateri¹¹**YALOYALO 12:** Erau duidui na livaliva dri (AC) kei na kena dodonu (DC) ni duidui na kena drodro ni toso na gauna¹²

Qo na sabolo ni ivolakabi ni dip (firis) livaliva dri (AC):

YALOYALO 13: Sabolo ni ivolakabi ni dip (firis)¹³

Haier			
Deep Freezer			
Model:	DW-25L92	Refrigerant:	R600a: 52g
Inner Temperature:	-10°C - -25°C	Anti-shock Safety Classification:	I
Effective Volume:	92L	Power Connection Type:	Y
Rate Voltage:	220-240V~	Powering Cabinet:	CP/IP
Rate Frequency:	50Hz	Manufacture Date and No.:	in the Barcode
Power Input	77W		
Rate Current:	0.35A		
Climate Class:	4		
Weight:	46kg		

Haier Medical and Laboratory Products Co., Ltd.
Haier Industrial Park, Economic Technology Development Zone, Qingdao 266510, P.R. China

AC Voltage

Power Usage

Current Usage

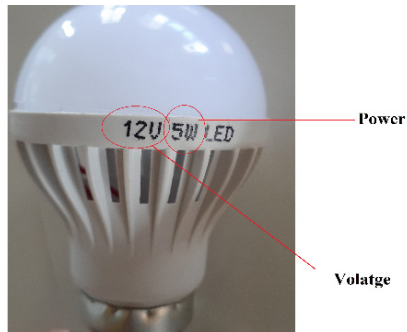
¹⁰ Yavutaki ena the Electricity Basics, Arizona State University (VOCTEC), <http://vottec.asu.edu>

¹¹ Ivurevure: JICA

¹² Yavutaki ena System Components: Charge Controllers & Inverters, Arizona State University (VOCTEC), <http://vottec.asu.edu>

Qo e dua na ivolakabi ni matanicina livaliva dodonu.

YALOYALO 14: iVolakabi ni matanicina livaliva dodonu¹⁴



Volavola:

IVAKADRE 4

O dauveituberi me solia vei iratou na lewe ni kalasi e 2 se sivia na ivolakabi ni iyaya livaliva dri (AC) me vaka na matanicina se irinicagi. E solia talega e 2 na ivolakabi ni iyaya livaliva dodonu (DC) me vaka na matanicina kei na katoniwaililiwa. Me ratou cakava qo vakaiwasewase:

- Dusia na iyaya livaliva dri kei na kena livaliva dodonu..
- Wilika na volt kei na kui ni iyaya qori.
- Tukuna se vica na pawa ratou dui vakayagataka.

YALOYALO 15: Matanicina livaliva dri 220 - 240V, 3W, 0.01A¹⁵



¹³ Ivurevure: Amazon.com, "Led bulbs", https://m.media-amazon.com/images/I/31kJoFKty+L._AC_SY100_.jpg, accessed 21 June,2021.

¹⁴ Amazon.com, "Led bulbs", https://m.media-amazon.com/images/I/31kJoFKty+L._AC_SY100_.jpg, accessed 21 June,2021

¹⁵ Amazon.com, "Led bulbs", https://m.media-amazon.com/images/I/31kJoFKty+L._AC_SY100_.jpg, accessed 21 June,2021

YALOYALO 16: Irinicagi livaliva dri, 220V, 55W, 0.25A¹⁶



YALOYALO 17: Matanicina livaliva dodonu 12V, 6W, 0.5 A¹⁷



YALOYALO 18: Dip (frisa) livaliva dodonu, 12V/24V, 55W, 4.58A/2.229 A¹⁸



1. Cava na yaga ni ivuki?

2. Cava na yaga ni bateri?

Qaqarauni: Na igu cava ga, se igu livaliva mai na jenereita se bateri, e rerevaki sara, eda rawa ni mavoa kina ke da vakawelewele. Dau muria na lawa ni qaqarauni ni o cakacaka ena igu.

¹⁶ Ivurevure: Khind.com, <https://www.khind.com.my/index.php?route=product/search&search=AC%20Fan%2C%20220V%2C%2055W%2C%200.25A%20>

¹⁷ Ivurevure: AliExpress.com, <https://www.aliexpress.com/item/1316122622.html>, accessed 25 June 2021.

¹⁸ Ivurevure: Made in China.com, "Solar Freezer", <https://m.made-in-china.com/company-commercial-energy/>, accessed 25 June 2021.

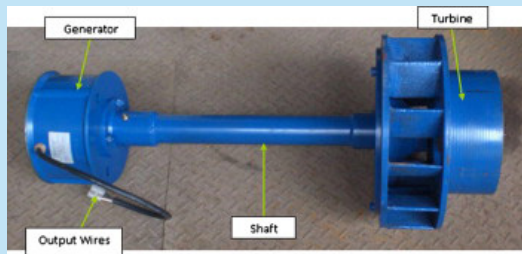
4

Gacagaca ni
piko-haidro

Na haidro e vica tiko na kena gacagaca. E rawa ni tugalala se yavala vata kei na sola. Era laurai na gacagaca ni haidro kei na kedra yaga ena teveli e ra.

Na ivakadre e ra me ubi tiko ni vakamacalataki na gacagaca yadudua.

IVAKADRE 5



iVocevoce sema kei na jenereita¹⁹

Na ivocevoce (turbine) na gacagaca e vukica na igu ni wai me igu mekeniki (cocowiriwiri), sema kei na jenereita me qaqi livaliva.



Paipo taku (PVC)²⁰

E rawa ni vakayagataki na paipo taku (PVC) me sala ni wai mai na ivakaso ina ivocevoce.



Bateri²¹

Na bateri na iyaya e maroro kina na igu livaliva ena igu kemiki, qai vukici kina na igu ya me livaliva dodonu (DC). Na bateri kune vakalevu e rawa kina e 12V na livaliva dodonu (DC).



iDoladola²²

Na itavi levu ni idoladola (charge controller) me lewā na kena jajitaki na bateri mai na jenereita. E tarova kena jajitaki sivia kei na soli livaliva vakasivia, e lewā tale beka ga na volt ni bateri me kua ni lailai se sivia. Ke sega qo, e rawa ni guce kina na bateri se lekaleka na kena bula, e rawa talega ni rerevaki vei keda.

19 Ivurevure: Researchgate.net, "Typical low head Pico hydro turbine", https://www.researchgate.net/figure/Typical-low-head-pico-hydro-turbine-courtesy-of-Hyrotec-Vietnam_fig1_257414899, accessed 25 June 2021.

20 Ivurevure: Creative Commons, Yavutaki ena Energypedia, https://energypedia.info/wiki/File:Penstock_La_Laguna.JPG

21 Ivurevure: JICA

22 Ivurevure: Solar4rvs.com, "Victron SmartSolar MPPT Charge controller", <https://www.solar4rvs.com.au/assets/full/VIC-SCC110020160R.jpg?20210204030925>, accessed 25 June 2021.



iVuki²³

Na ivuki (inverter) na iyaya livaliva se sala ni livaliva e vukica na livaliva dodonu (DC) me livaliva dri (AC).

Na ivuki e dau gadrevi kina na livaliva dodonu e dei vinaka tu (12V, 24V) e rauta mera yavala kina na iyaya livaliva.

Na vua ni ivuki e dau vakalevu me lewai me tautauvata kei na volt ni lawalevu (grid), vakalevu me 240 V AC, 50 Hz.



Wa²⁴

Na wa ni livaliva e dau sema kina na iyaya, me dewa kina na itukutuku se na igu livaliva. Na wa ni piko e dodo mai na jenereita ina bateri, ina ivuki, ina vunilivaliva, idoladola ina bateri kei na iyaya livaliva dodonu (DC).



iVakariba/isolator²⁵

Na ivakariba (circuit breaker) na gacagaca e dau cariba me kua ni ca kina na sala ni livaliva ni usabi se shot. E tarova na drodro ni livaliva ni sa kune e dua na leqa.

Na isolator e latia na iyaya se sala livaliva mai na ivurevure ni livaliva. Ni dola tu, e rawa ni sogota na livaliva e curuma se drodro mai na iyaya.



Vunilivaliva²⁶

Na vu ni livaliva (power outlet se powerpoint) na gacagaca e coba kina na wa ni iyaya me sema kei na livaliva dri (AC) e loma ni vale.

23 MorningStar, May 2021, <https://www.morningstarcorp.com/products/suresine/>

24 Ivurevure: Global Market, http://newimg.globalmarket.com/PicLib/group0/5e/73/c477defc613ecc9a0e47b82452f4_1.jpg

25 Ivurevure: Wave inverter.co, <https://waveinverter.co.nz/shop/solar/solar-connectors/pv-dc-isolator-switch-mc4/> and POSO.com, <http://poso.com.vn/wp-content/uploads/2020/04/1-2.png>

26 Ivurevure: EuroTech NZ, "PDL 600 Series Power Points", <https://www.kiwisparks.co.nz/collections/pdl-600-series-power-points/products/pdl-691>, accessed 25 June 2021.

5

Mataqali haidro
& kedra levu

5.1 Kalasi ni haidro

Na haidro e rawa ni kalasitaki me rewaira, veimama, se rewai cake. Qo e baleta na rewa ni vanua e lutu mai kina na wai.

5.2 Lelevu ni haidro

E 6 na lelevu ni haidro.

TEVELI 4: Lelevu ni haidro

Naba	Yacana	Gumatua (Livaliva e rawa)
1	Piko-haidro	Sega ni yacova na 5kW
2	Maikro-haidro (MCH)	5kW-100kW
3	Mini-haidro (MNH)	100kW – 1 MW
4	Haidro lailai	1MW – 10MW
5	Haidro veimama	10MW –100MW
6	Haidro levu	Sivia na 100MW

5.3 Piko-haidro

Na piko-haidro na haidro lailai sara (sega ni yacova na 5 kW). E sega ni gadrevi kina me levu na wai se levu kena lutu. E so e laurai ena yaloyalo 19 e ra.

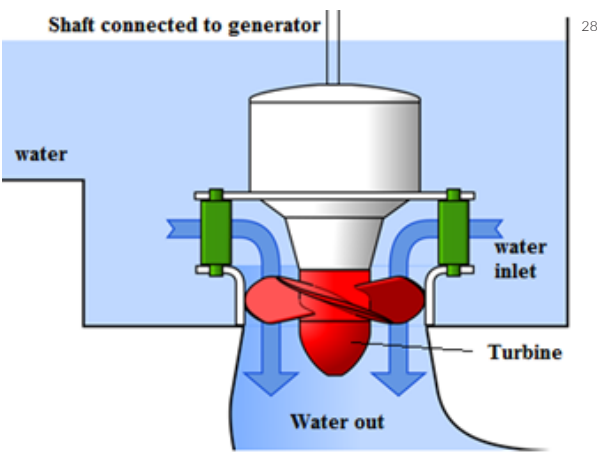
YALOYALO 19: Mataqali piko-haidro



27

TEVELI 3: Kalasi ni lutu ni haidro

Kalasi	Lutu
Rewaira	1-30m
Veimama	30-100m
Rewai cake	100m lako cake



28

5.4 Maikro-Haidro

Na maikro-haidro (5-100 kW) e via vaka na piko, kedrau duidui ga na levu ni kena ivocevoce kei na jenereita.

27 Ivurevure: Baylor University, Yavutaki ena Wikipedia, "Pico Hydro", https://en.wikipedia.org/wiki/Pico_hydro

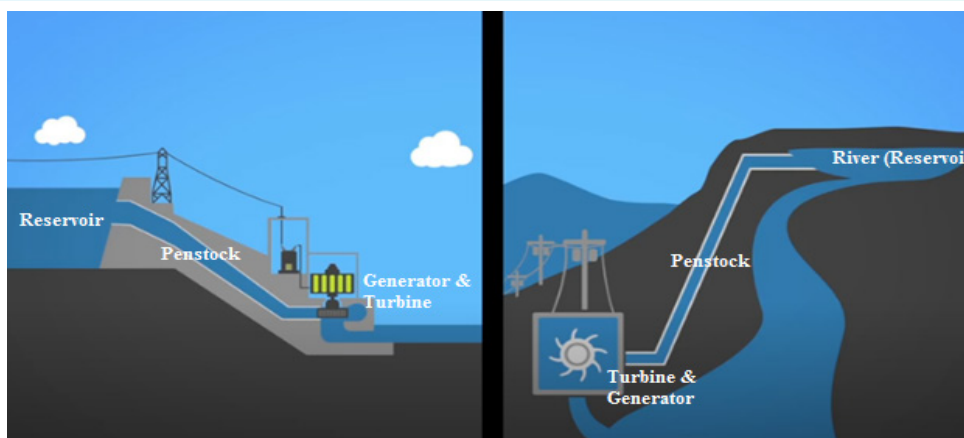
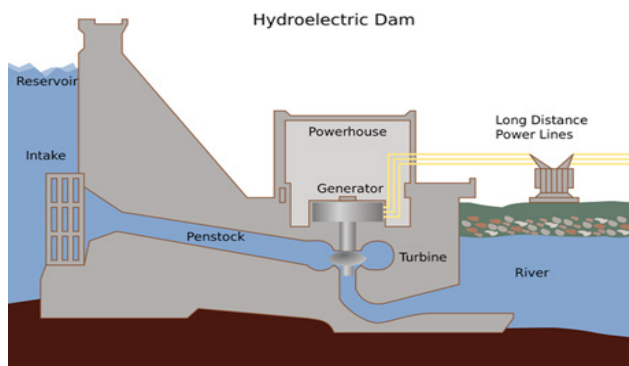
28 Ivurevure: Mechanical E- Notes, <https://mechanicalnotes.com/wp-content/uploads/2019/08/kaplan-turbine-diagram-1000x550.png>, accessed 16 June 2021.

YALOYALO 20: Maikro-haidro²⁹

5.5 Mini-haidro
YALOYALO 21: Mini-Haidro³⁰

5.6 Mini-haidro me yacova na ka lelevu

E tautauvata na icakacaka ni mini me yacova na haidro lelevu. Ia e rawa ni wase rua: ena imatau na wai drodro (run-off river) ena imawi na wai baiti (hydro dam).

YALOYALO 22: Mawi – Haidro wai baiti & imatau – wai drodro³¹

YALOYALO 23: Sabolo ni haidro levu³²

5.7 Mataqali ivocevoce

Na ivocevoce e vukica na igu ena wai ina igu yavala (kinetic energy) cocowiriwiri (rotation energy). E vakatau na mataqali ivocevoce ena lutu ni wai kei na kena levu.

²⁹ SUNECHO Hydro Turbines, June 2021, <https://www.micro-hydro-power.com/>

³⁰ Ivurevure: Pinterest.com, "Mini hydroelectric Pelton Turbine, <https://www.pinterest.com/pin/431360470538243882/>

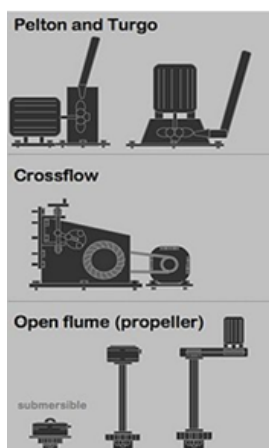
³¹ Earth & Science Space, "Hydroelectric power generation, <https://grade8science.com/7-3-1-what-existing-technologies-could-solve-the-problem-of-global-warming/> or watch YouTube video: Student Energy, "Hydropower 101", 18 May 2015, <https://www.youtube.com/watch?v=q8HmRLCgDAI>

³² Ivurevure: Wikimedia Commons, Hydroelectric Plant, September 2015, https://upload.wikimedia.org/wikipedia/commons/thumb/5/57/Hydroelectric_dam.svg/2000px-Hydroelectric_dam.svg.png

TEVELI 5: Mataqali ivocevoce vakatautaki ena wai

Mataqali ivocevoce	Lutu ni wai (m)	Drodro ni wai (lita/sek)
Propeller	1 - 5	14 - 55
Turgo	2 - 30	8 - 16
Pelton	3 - 130	0.5 - 8

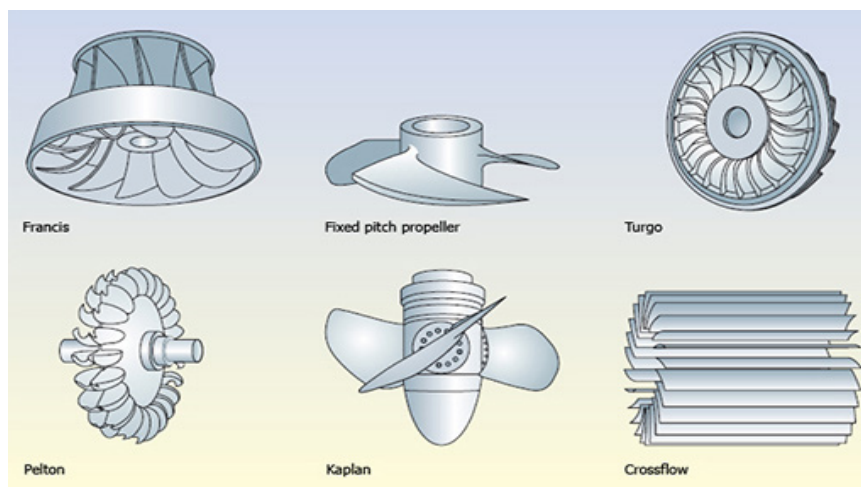
YALOYALO 24: Mataqali Ivocevoce³³



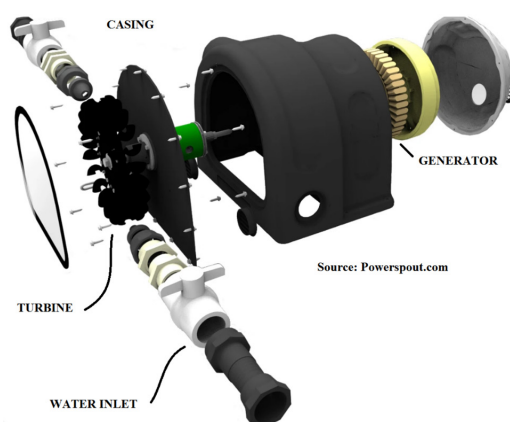
- The Pelton is a turbine used for a site that has a high head and low flow for a given output power and rotational speed
- Turgo is used at sites that have a head slightly lower than that of a Pelton, and a slightly higher flow than the Pelton for the same power output

- The cross-flow turbine is a low-speed machine that is well suited for locations with a low head but high flow

-These operate at very low heads and high flows



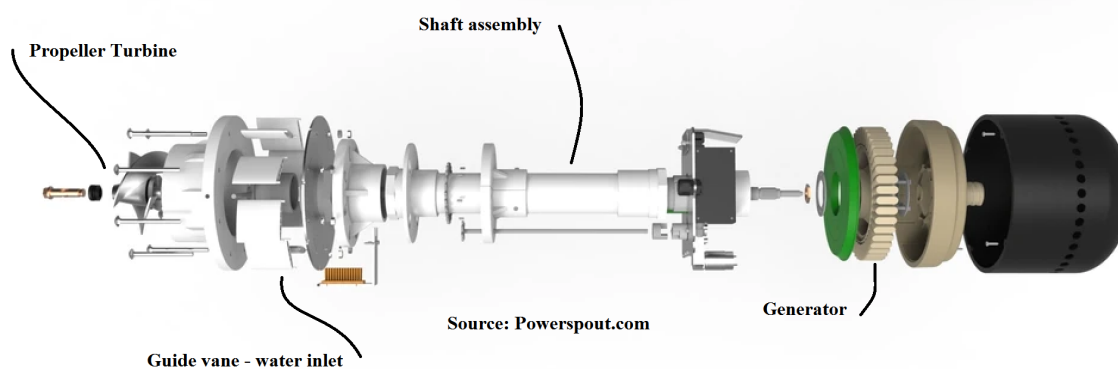
YALOYALO 25: iVocevoce Pelton kei na jenereita (laurai ni sereki)³⁴



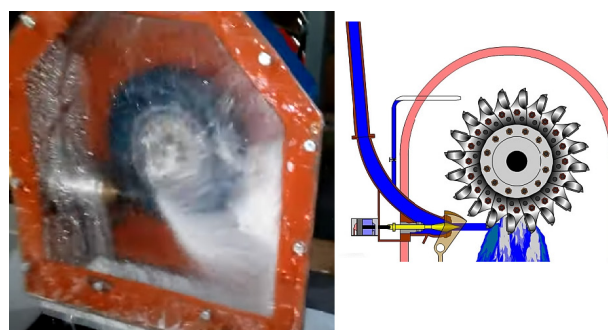
Source: Powerspout.com

³³ IVuevure: Public Research Institute, June 2021, <http://www.publicresearchinstitute.org/Pages/hydoturbines/images/TypesOfHydroTurbines.jpg>

³⁴ IVuevure: Powerspout.com, accessed 16 June 2021.

YALOYALO 26: iVocevoce Propeller & Jenereita (laurai ni sereki)³⁴

5.7.1 Lauta na wai na ivocevoce

Ena haidro, na wai e tiko na kena igu maroroi (potential energy) ni tiko mai cake, qai veisau me igu mekeniki na lauta na wai na ivocevoce qai cowiri kina, me vaka e laurai e ra ena yaloyalo 27.

YALOYALO 27: Na wai e vakacowiritaka na Ivocevoce Pelton³⁵


Volavola:

³⁵ Ivurevure: www.mekanizmalar.com also see YouTube video: mekanzimalar, "Pelton turbine", 12 October, 2013, https://www.youtube.com/watch?v=qbyL--6q7_4

IVAKADRE 6

1. Vakasamataka e dua na wai (drekeniwai, savu &s) e nomudou yasayasa. Droinitaka e dua na kena piko, me vakayagataki na wai me qaqi kina na livaliva. Vola na yaca ni gacagaca.

2. Cava so na leqa e rawa ni tubu ena haidro?

3. Cava na iwasewase lelevu e tolu ni haidro?

4. Vola e tolu na mataqali ivocevoce e dau vakayagataki vakalevu ena piko.

6

Qaqarauni
ena haidro

Qo e vica na itovo ni qaqarauni meda dau muria me taqomaki kina noda bula kei na nodra eso nida qarava tiko na haidro.

1. Me dau boko na livaliva da qai semā se moica e dua na ka. Kua sara ni via cakacaka ena salalivaliva ni se bula tiko.

YALOYALO 28: Notisi ni qaqaruni³⁶



2. Me dua na daunilivaliva vakaivola me cakava na wa ni vale. Kua sara ni tovolea mo cakava na wa ni vale vakataki iko.

YALOYALO 29: Vaqaniliga rava³⁷



3. Mo dau vakaiyaya ni tataqomaki (PPE, personal protective equipment) mv qaniliga rava, matailoilo ni tataqomaki kei na ivava kaukaua.
4. Kua ni tovolea mo ripeataka duadua na bateri. Na bateri e tu kina na kemiki rerevaki e rawa nida mavoa bibi kina.

YALOYALO 30: Notisi ni waikama³⁸



5. Kua ni tokara na bateri volekata na matadravu se e loma ni rumu ni gade – e so na bateri e dau kuvuraki kasi kama se kasi gaga, dina ni sega ni laurai.

YALOYALO 31: Notisi ni kasi gaga³⁹



6. E tabu ni maroroi na bateri e vanua qiqo se veitaravi kei na benisini se karasini, de qai lidika qai caudre. Na bateri me dau maroroi e vanua cagicagi.

YALOYALO 32: Notisi ni bateri⁴⁰



Volavola:

³⁶ Ivurevure: AviationPros, <https://www.aviationpros.com/tools-equipment/safety-equipment/article/11148860/ground-handling-safety-signs>

³⁷ Ivurevure: Safety workblog.com, <https://safetyworkblog.com/assets/understanding-the-2015-edition-of-nfpa-70e-the-arc-flash-hazard.jpg>

³⁸ MSDS online, <https://www.msdsnline.com/2014/07/22/sulfuric-acid-safety-tips-sulfuric-acid-msds-information/>

³⁹ Ivurevure: National Safety Signs, <https://nationalsafetysigns.com.au/wp-content/uploads/2020/02/D10332-Toxic-Fumes-sign.png>

⁴⁰ We Need Signs.com, "Ansi Battery Charging Safety Signs", <http://www.weneedsigns.com/home.php?cat=403>



7

Voli piko-
haidro

7.1 Voli haidro ni vale

Na haidro na ka vereverea, mo kila mada se vica na levu ni ka o vinakata.

7.2 Me tarogi vei kaya e volitaka

1. E yalataki (warranty)?

YALOYALO 33: iVolakabi ni yalayala (warranty)⁴¹



2. Mataqali ivocevoce cava? Vica na pawa ni jenereita? E livaliva dodonu (DC) se dri (AC)? Ke livaliva dri, taroga se wili kina na misini ni volt (automatic voltage regulator).

YALOYALO 34: Mataqali ivocevoce⁴²



YALOYALO 35: iDusidusi Raraba⁴³



GENERAL CHARACTERISTICS

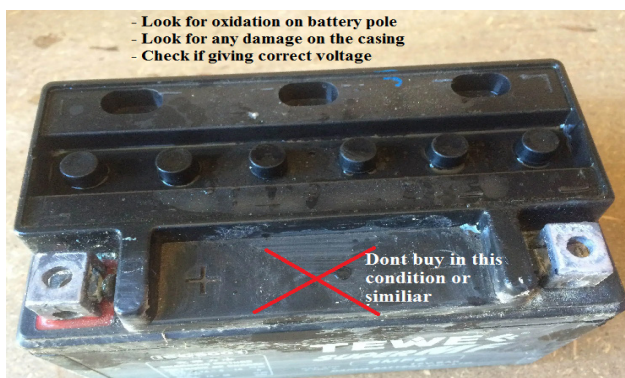
Certifications:	2006\42\CE (Machinery Directive); 2014\35\UE (LVD); 2014\30\UE (EMC)
Power range:	3 – 750 kW
Head range:	30-550m
Flow range:	2-400 l/s
Number of nozzles:	6
Flow regulation:	on/off valves by electrical drive for flow regulation
Generator:	asynchronous squirrel-cage motors, high efficiency
Generator class	
insulation/temp. rise:	F/B
Bearings of generator:	lifetime lubricated / with grease-gun
Temperature sensor	
generator windings:	N°3 PTC in series
Frequency:	50-60 Hz
Voltage:	230/400V - 277/480V, three-phase
Protection grade:	IP23 (protection grade of generator IP55)
Rotational speed sensor:	proximity 1 signal/revolution
The mechanical components in contact with water are in stainless steel	

⁴¹ Ivurevure: PNGWING, <https://www.pngwing.com/en/free-png-kfvth>

⁴² Ivurevure: Power Spout, June 2021, www.powerspout.com

⁴³ Ivurevure: Direct Industry.com, "Hydraulic turbine", <https://www.directindustry.com/prod/irem-spa/product-16995-2302864.html>, accessed 25 June 2021.

3. Dikeva de ca

 YALOYALO 36: Dikevi de ca⁴⁴


4. Baleta na bateri, mo kerei koya e volitaka me vakaraitaka na kena volt ena mita.
5. Wirica na ivocevoce se cowiri vinaka tiko. Kerei koya e volitaka me tovolea na jenereita me laurai ni soli pawa tiko.

 YALOYALO 37: Kere veivuke vei koya e volitaka⁴⁵


6. Raica se kabani rogo
7. Nio voli ivuki (inverter), tarogi koya e volitaka se vu mai kina na ua savasavā (pure sine wave).

 YALOYALO 38: iVuki⁴⁶


8. Dikeva matua na ivolakabi.

44 Ivurevure: The DIY Life, Tech & Electronics, <https://www.the-diy-life.com/wp-content/uploads/2016/05/battery-opened.jpg>, accessed 25 June 2021.

45 Amazon.com, "Electric Measuring instrument", <https://www.amazon.com/Electric-Measuring-Instrument/s?k=Electric+Measuring+Instrument>, accessed 25 June 2021.

46 Ivurevure: COCOON ecolima, "HIP-300-12 Inverter 12V-230V 300W", https://cocoona.gr/wp-content/uploads/2020/04/HIP_300_12V-scaled.jpg

YALOYALO 39: iVuki⁴⁷

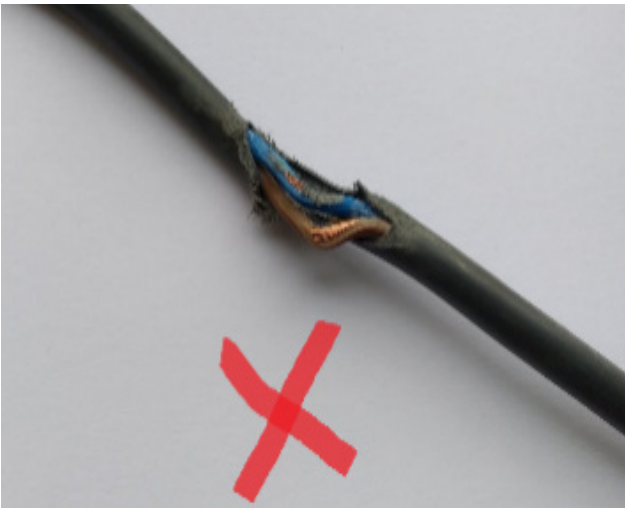
3000W INVERTER



Model	YX-3000W-S					
Continuous Power	3000W					
Peak Power	6000W					
DC Voltage	DC12V	DC24V	DC48V	DC12V	DC24V	DC48V
AC Voltage	100VAC or 110VAC or 120VAC ± 5%			220VAC or 230VAC or 240VAC ± 5%		
No Load Current Draws	1.4A	0.7A	0.3A	1.4A	0.7A	0.3A
Frequency	50HZ ± 0.5HZ or 60HZ ± 0.5HZ					
Output Waveform	Pure Sine Wave					
AC Regulation	THD<3% (Linear load)					
Output Efficiency	up to 92%					
DC Voltage Range	10-15.5V	20-31V	40-62V	10-15.5V	20-31V	40-62V
Low Voltage Alarm	10.5V±0.5V	21.5V±0.5V	43V±1V	10.5V±0.5V	21.5V±0.5V	43V±1V
Low Voltage Shut Down	10V±0.5V	20.5V±0.5V	40V±1V	10V±0.5V	20.5V±0.5V	40V±1V
Over Voltage Shut Down	15.5V±0.5V	31.5V±0.5V	62V±1V	15.5V±0.5V	31.5V±0.5V	62V±1V
Low Voltage Recovery	12.7V±0.5V	25V±0.5V	49V±1V	12.7V±0.5V	25V±0.5V	49V±1V
Over Voltage Recovery	14.7V±0.5V	29.5V±0.5V	59V±1V	14.7V±0.5V	29.5V±0.5V	59V±1V
Protection Function	Low voltage shutdown	Buzzer sounds 3 times interruptedly and fault light turns red				
	Over input voltage protection	Buzzer sounds 4 times interruptedly and fault light turns red				
	Over temperature protection	Buzzer sounds 5 times uninterruptedly and fault light turns red				
	Over load protection	Buzzer sounds 3 times uninterruptedly and fault light turns red				
	Short circuit protection	Recover automatically				
	Reverse polarity protection	Built-in fuse or Built-out fuse				
Working Temperature	-10°C--->50°C		Production Size	12V:465x220x80mm; 24V: 445x220x80mm		
Storage Temperature	-30°C--->70°C		Packing Size	45x28x14.3cm		
Warranty	12 months		N.W. / G.W. (KG)	12V: 7.3KG/9.0KG; 24V: 6.9KG/8.0KG		
Start	Bipolar soft-start		Quantity / Carton	2pcs		
Cooling Way	Intelligent cooling fan		Carton Size	56.5x28.5x32.5CM		
Certification	CE		Carton Weight	12V: 18KG; 24V:17KG		

9. Qarauna ni sega ni rerevaki na vakayagataka.

YALOYALO 40: Tacega na iubi ni waya⁴⁸



10. Dau vakacuru sitoa mo kila na itukutuku matailalai ni iyaya o via volia – kena isau, kena vinaka, kena yalataki (warranty), kena levu, kabani, nuitaki &s.

11. Tarogi kaya e volitaka se vica na isau ni nona mai vakaduria na kenadau.

47 iVurevure: Göteborgsaventyr, <https://goteborgsaventyrcenter.se/product/z59goeznno47/mexxsun-3000-watt-12-v-24-v-220-v-pure-sine-wave-inverter>

48 iVurevure: IOL, "How to fix frayed cables", <https://www.iol.co.za/technology/how-to-fix-frayed-cables-49412981>

Volavola:

IVAKADRE 7

Vakaiwasewase. Tuvana vakamaqosa na ivocevoce/jenereita, bateri, ivuki, idoladola kei na matanicina sa vakarautaki oti tu e dela ni teveli. O dauveituberi me volitaka tiko, o iko o volivoli, muria na ivakasala e cake mo vakatarogi dauveituberi baleta na iyaya volitaki.

E so na taro bibi me tarogi:

A large, white, stylized number '8' is positioned on the left side of the upper half of the page. The background is a solid blue color, which transitions into a green gradient on the right side of the page. The number '8' is composed of two thick, rounded strokes, giving it a modern, sans-serif appearance.

Qaravi haidro
ni vale

Na haidro kece e vinaka me qaravi wasoma me cici vakavinaka kina ka bula balavu.

8.1 Cava so na vu ni leqa ni haidro?

E levu tu na vu ni leqa ni haidro. E so na gauna eda raica ni sa viavia leqa tiko, so tale na gauna da kurabui sa mate tu.

8.1.1 Qaravi ivocevoce

- Raica na vulo (screen) ena icurucuru ni wai me galala na ivocevoce
- Raica de soqova na ivocevoce na soqosoqo

YALOYALO 41: Soqosoqo⁴⁹



- Raica me galala kece na qaraniwai (drain) e volekata na iivocevoce
- Qarauna me qirisitaki kece na berigi (bearing) qai sega ni yavu

8.1.2 Qaravi jenereita

- Me dau savasavā qai galala na kena salanicagi. Vakayagataka na iri livaliva (blower) me uvuca tani na kuvu ni loma ni jenereita
- Qarauna de torova na jenereita na wai
- Kua ni sereka na jenereita me taviraki na kuvu
- Dikeva na sucuna (terminal)

YALOYALO 42: iSema e sucuna⁵⁰



- Ena yaloyalo e cake, e dua na sucuna sa katakata sivia qai roka tani; ni veisau vakalailai mada na rokana, cakava. De na sega ni yaga me qaqacotaki na nati. De na yaga me musu tani na tikina ca qai sema vou tale.
- Raica na berigi (bearing) – bokoca na jenereita se sereka mai na ivocevoce qai wirica e ligamu se rogo. Ke rogo vaka e yacayaca tiko, me veisau.
- Wilika na ivoladusidusi ni jenereita qai muria na idusidusi ni kena qaravi.

Qaqarauni: KUA NI TARA NA SUCU NI JENEREITA SE GACAGACA YAVALA CAVA GA NI CICI TIKO



8.1.3 Qaravi paipo kei na salaniwai

- Me dau dikevi na paipo (penstock) de turu qai botani
- Vagalalataka kece na salaniwai

YALOYALO 43: Qarauna ni sega ni kaca na baivatu⁵¹



- Raica me drodro vinaka na wai ina ivocevoce. Kauta tani na kena itatao.
- Dikeva matua ni tau oti na uca
- Dau wereci.

49 Iurevure: Walczak, N. (2018). Operational Evaluation of a Small Hydropower Plant in the Context of Sustainable Development. Pages 7-8. <https://www.mdpi.com/2073-4441/10/9/1114/htm>

50 Iurevure: ECM, <https://www.ecmweb.com/maintenance-repair-operations/article/20890352/the-basics-of-electrical-overheating>

51 Iurevure: Wisions of Sustainability, "Demonstration of Sustainable Low Head Pico-Hydro to Deliver Enhanced Rural Energy Services to the Terai Region Of Nepal", <https://www.wisions.net/projects/demonstration-of-sustainable-low-head-pico-hydro-to-deliver-enhanced-rural->

8.1.4 Qaravi bateri

Na qaravi bateri e duidui na kena icakacaka, vakatau se mataqali bateri cava kei na idusidusi ni kabani a bulia, me vaka:

- Dikevi ka samaki na vata ni bateri kei na kena gacagaca kece.
- Vakarauteki na volt ni bateri ke dua nomu mita liga, se o raica ga ena idoladola (charge controller).
- E so na idoladola e vakamatana (display screen), e so na kena lalai era vakacina led me laurai kina na igu ni bateri.

YALOYALO 44: Na cina led e dusimaka na igu ni bateri⁵²



YALOYALO 45: iDoladola e laurai kina na volt ni bateri⁵³



- Na qaravi bateri me dau oka kina noda dikeva na sucuna de veveka se luluqa.
- Na barasi sitila me qua kina na sucuna de veveka mai. Vaqaniliga rava tuga.
- Dikeva na waya de via taluva se mavoa. Ni mavoa na waya, vaqara na kenadau me veivuke.

YALOYALO 46: Qua sucu ni bateri veveka⁵⁴



Qaqarauni: E daumaka mo vakamatailoilo ni tataqomaki kei na qaniliga rava ni o qaravi bateri. Nio qarava na bateri luvu (vakawai), mo vakaisuai, de sikavi iko na waikama. Me dua na kava ivakatubu dola rawa kei na taku wai, ke mani tasova na waikama me sova na ivakatubu i loma ni wai, ulia, qai sui sara kina na waikama me kua ni vakamai keda.

Na volt lailai (12V) e sega ni rerevaki, ia na kui levu e rawa ni kati keda. Qarauna me kua ni lutu na spana e dela ni bateri, de qai kama na ligamu, se kacabote na bateri. Qarauna!



E yaga me dua na ivolanitavi me nomu idusidusi ni o dau qarava nomu haidro. Ke o kunea na leqa – tukutuku sara vei daunilivaliva. E dua na sabolo ni ivolanitavi sa tabaki e ra, e rawa ni o maroroya me nomu.

⁵² Ivurevure: Sundaya Apple, "Sundaya Apple Regulator, Quick Start Manual", https://assets.websitefiles.com/5a2fb65f5701c800018e826f/603e4f42254a71b39b6e33a9_Sun-daya%20apple%20-%20English.pdf

⁵³ Ivurevure: Amazon, "iSunergy MPPT Solar Charge Controller", <https://www.amazon.com/iSunergy-Controller-Intelligent-Regulator-Batteries/dp/B081GSFDKC>, accessed 25 June 2021.

⁵⁴ Ivurevure: Jim Dunlop Solar

8.1.5 iVolanitavi ni qaravi haidro

TEVELI 6: iVolanitavi ni qaravi haidro ni vale vakamacawa

Naba	iTavi me qaravi e veimacawa	Oti (tikitaka)
1	Raica na salaniwai	
2	Raica na ivocevoce me cowiri vinaka, sega na soqosoqo	
3	Samaka na ivocevoce kei na jenereita	
4	Raica na sucu ni bateri kei na kena wa	
5	Raica na itutu ni haidro, vaqacacotaka ke gadrevi	
6	Raica na volt ni bateri ena idoladola – ke rawa	
7	Raica na veveka ni sucu ni bateri, quā	
8	Raica na isema ni sucuna, vaqacacotaka ke gadrevi	
9	Raica na wai ni bateri, ke drekea me tuvuci	
10	Raica na vanua e toka kina na bateri me liliwa qai cagicagi	
11	Vakadeitaka ni vinaka tu na cina kei na gacagaca kece	

Volavola:

IVAKADRE 8: IVOLANITAVI NI QARAVI HAIDRO

Vola e dua na ivola ni itavi me dau qaravi me bula balavu kina nomu piko. Vakasamataka mada se me vakayacori sara vakacava.

IVAKADRE 9

Na inaki ni ivakadre qo mera vakila na lewenikoro nodra itavi bibi na marama ena vakatulewa kei na qaravi ni iyaya vovou kei na kedra vakayagataki. Wilika na italoa qo, qai sauma na taro.

Nodra vakavu veisau na marama

O Sala kei na watina o Mario kei iratou na luvedrau e le tolu ratou tiko mai Afo, mai Malaita. Segi ni vakalivaliva na koro. O Mario e turaganikoro qai dauqoli, veimataka lailai ni bera ni cabe na siga sa tu mai waitui me rawata na ika lelevu me qai kau ina tabana ni qoli e tiko kina na vale duadua ni waicevata e yanuyanu. E so na siga e dau kauta mai vale na ika lalai me kedratou. E tolu na luvedratou, o Lilly sa yabaki 9, o Timoci yabaki 10 kei Salote yabaki 13, nodratou koronivuli e rauta ni 4 km kena yawa mai vale, ni taubaleta e viavia dua na aua. Dua nodratou iteitei levu e vale. Levu na kumala, uvi, kaveti, kei na tomata me kedratou e veisiga. Rau tiko talega e vale na itubutubu i Mario, rau sa qase toka. E turaga dau cakacaka o Mario qai levu na veimataqali cakacaka me qarava, mv botani na boto, kau waicevata, usa pasidia i veiyanyanu ena yakavi. Osooso talega o Sala na qaravi rau na itubutubu i Mario, sasamaki, qaravi iratou na gone, kei na cakacaka vakoro.

Dua na yakavi e vuli leseni tiko ena cina karasini na luvedrau yabaki 13 o Salote. Sa curuoso na iboi ni karasini ni tolu vakadua na cina karasini e waqa tiko na bogi ya. O Mario se bera ni suka mai na vale a lai gunu yaqona kina. Tagicaka vakalevu o Lili, goneyalewa yabaki 9, na iboi ni karasini ni lako vakaca vua. Rau sa veivalataka na cina o Timoci kei Salote. Sa qai tomika na cina o Lilly, veiciciyaka vaqitoqito e loma ni vale ni sa via qito. Nodratou veicemuri gona e loma ni vale qai lutu vakasauri e ligana na cina karasini, tau ena ibe qai kama sara. Kaila o Salote ena kere veivuke, ratou qai cici mai o iratou e yasa ni vale me ratou bokoboko, leqa ga ni levu na ivola nei Salote a kama. Sa qai dau rere o Lilly na vakacina karasini. Toso tiko na yakavi sa qai tukuna o Sala vei Mario nona vakasama.

Mario: Kua ni leqa – segi ni dua e kama, Se bera ni dromu na macawa au na volia nona ivola vovou. Cava o leqataka?

Sala: Au kila sa kena gauna me sa kua na cina karasini e nodatou vale.

Mario: A? O lialia – me datou qai cina cava?

Sala: Io, au sa rogoca ni rawa na livaliva mai na wai drodro. Na wai e tiko ga qo, o iko ni o turaganikoro mo tukuna vei ira na lewenikoro se ra via vakacina livaliva. Na koro i tinaqu e vakapiko-haidro, sa toso vinaka sara nodra vuli na gone, ni rawarawa na vuli leseni ena cina ramase.

Mario: Mudou, sa levu ga na ka o vinakata. O kemuni na marama oni dau.. (takoso o Sala)

Sala: Cava “o kemuni na marama”?

Mario: Mmm.

Sala: O keimami ga na marama me keimami vakavu veisau, baleta ni tarai keimami na dredre ni bula ni segi na livaliva. Au dau yadra ni se bogi meu vakawaqaca na cina karasini boi ca, qai vakasaqa. Au dau qarauna matua me maroro na vo ni ika kei na bulagi, me kua ni ca datou qai tauvimate kina. Au raica me ratou vuli leseni na gone ena rama ca ni cina. Au dau maroro ilavo me ivoli ni karasini.

Mario: Io, e donu vei au me datou vakalivaliva. Au vinakata na frisa me maroro kina na ika. E tukuna o Jone ni a voli piko, se bera ni macawa dua sa yavala tiko. Vakacava ke qai ca? Dua tale, e saulevu talega na haidro. Vakacava ke ra segi ni duavata na lewenikoro?

Sala: Isalei. Tou tovolea madaga. Veivosaki kei ira na lewenikoro, ke donu vei ira, meda maroroya vakalailai e veimacawa na ilavo ni ika, qai Siganiucu sa na rauta me voli kina na haidro. Me tou kerea na tabana ni livaliva me ratou veivuke. Kua ni leqataka kena qaravi, daru kere veivuke ga vei iratou na sa vakahaidro tu, au kila ena veivuke vakalevu talega na yasana. Au rawa ni lako ina dua na kena vuli.

Mario: Wananavu qori Sala. Au sa marau dina ni daru sa duavata kina, qai noqu itavi na raici iratou na gone kei rau noqu qase nio na lai vuli piko. Au na vosa vei ira na lewenikoro nimataka.

Oti na drama.

Vukei Sala me sauma na taro e rua qo:

- Cava so me ra qarauna o Sala, Mario kei ira na lewenikoro nira voli piko?
- Cava so me ratou cavaka o Sala kei iratou na yalewa me bula balavu kina na piko?

A large, white, stylized number '9' is positioned in the lower-left quadrant of the page. The background is a gradient of blue and green, with a vertical line separating the two colors. The number '9' is composed of a thick white stroke.

**Fikataki levu
ni haidro**

Eda sa vulica oti ni iyaya livaliva kece, se matanicina, firisa, TV se cava, e tiko na levu ni pawa (watt) e vakayagataka. Nida soqona kece qo, eda bau kila kina se vica taucoko na pawa e vinakati.

Na piko e ka lailai toka, e sega ni rawa ni cici kina e levu na iyaya, koya gona e ka bibi meda kila na vanua e yala kina.

Na levu ni pawa e rawa ni solia na piko e vakatau ena veika qo.

1. Lutu – me vaka da sa kila, na yawa ni lutu ni wai, vakarautaki ena mita (m)
2. Drodro – qo na levu ni wai e rawa ni drodrova na ivocevoce, vakarautaki ena mita kiubiki ena veisekodi (m^3/s). E dua na mita kiubiki na wai ena veisekodi e tautauvata kei na 1,000 na lita na wai ena veisekodi.
3. iDre ni vuravura (gravity) – Qo e dua tuga, e 9.81m/s (mita / sekodi)
4. Mana ni ivocevoce kei na iyaya livaliva. Ena viavia donu me 50% na kena mana taucoko (0.50)

E rawa nida vakayagataka na fika qo meda fikataka vakacaca kina na levu ni pawa ena rawa ena haidro, o keda ga na lewenikoro ke dua beka e veivuke. Me taurivaki na isosoqoni e ra:

$$5. \text{ Pawa (kW) = Lutu (m) x Drodro (m}^3/\text{s) x idre ni vuravura(m/s) x Mana}$$

Na lutu e rawa ni kilai ena sovea, me dua ga na ivakarau balavu (tape measure) kei na levolo.

Na drodro ni wai ena vakatau ena vula kei na siga. E vinaka meda vakarautaka wasoma ena duidui vula, me qai macala kina na drodro lailai duadua, kei na pawa lailai duadua e rawa mai kina.

E vica tiko na iwalewale ni vakarautaki drodro ni wai, wili kina noda vakayagataka na vokete kei na paipo, tolona/totolo, kei na drodro ni masima. Qo e sega ni lewe ni nodatou vuli qo, ia e yaga meda bau kila tu na lewenikoro, qai rawa ni veivuke kina na tabana ni livaliva se tabana ni veikabula.

iVakadre:

Dua na vanua ni haidro e 2m na kena lutu, kena drodro e 5l/s (vaka me tawa na vokete ena veisekodi), vica na pawa ena rawa ke vakayagataka kece na wai?

iSau:

Na drodro e vakarautaki ena lita/sekodi, vinakati me veisau me mita kiubiki/sekodi, me wase 1000: $5/1000 = 0.005\text{m}^3/\text{s}$

$$\text{Pawa (kW) = Lutu (2m) x Drodro (0.005 m}^3/\text{s) x 9.81 m/s x 0.5}$$

$$\text{Pawa (Kilowatt) = 0.04905 kW}$$

$$\text{Pawa (Watt) = 0.04905kW x 1000 = 49 Watts}$$

Taro: E vica na matanicina ya 5-watt e rawa ni waqa kina?

$$\text{iSaur} = 49 / 5 = 9.8, 9 \text{ matanicina}$$

Ke vakarautaki na lutu me 4 mita, cava na gumatua ni haidro ena watt?

$$\text{Pawa (kW) = Lutu (4m) x Drodro (0.005 m}^3/\text{s) x 9.81 m/s x 0.5}$$

$$\text{Pawa (Kilowatt) = 0.0981 kW}$$

$$\text{Pawa (Watt) = 0.0981kW x 1000 = 98 Watt}$$

E ka bibi meda kila ni vinakati na drodro levu qai dei kei na lutu levu me bau dua kina na haidro levu.







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