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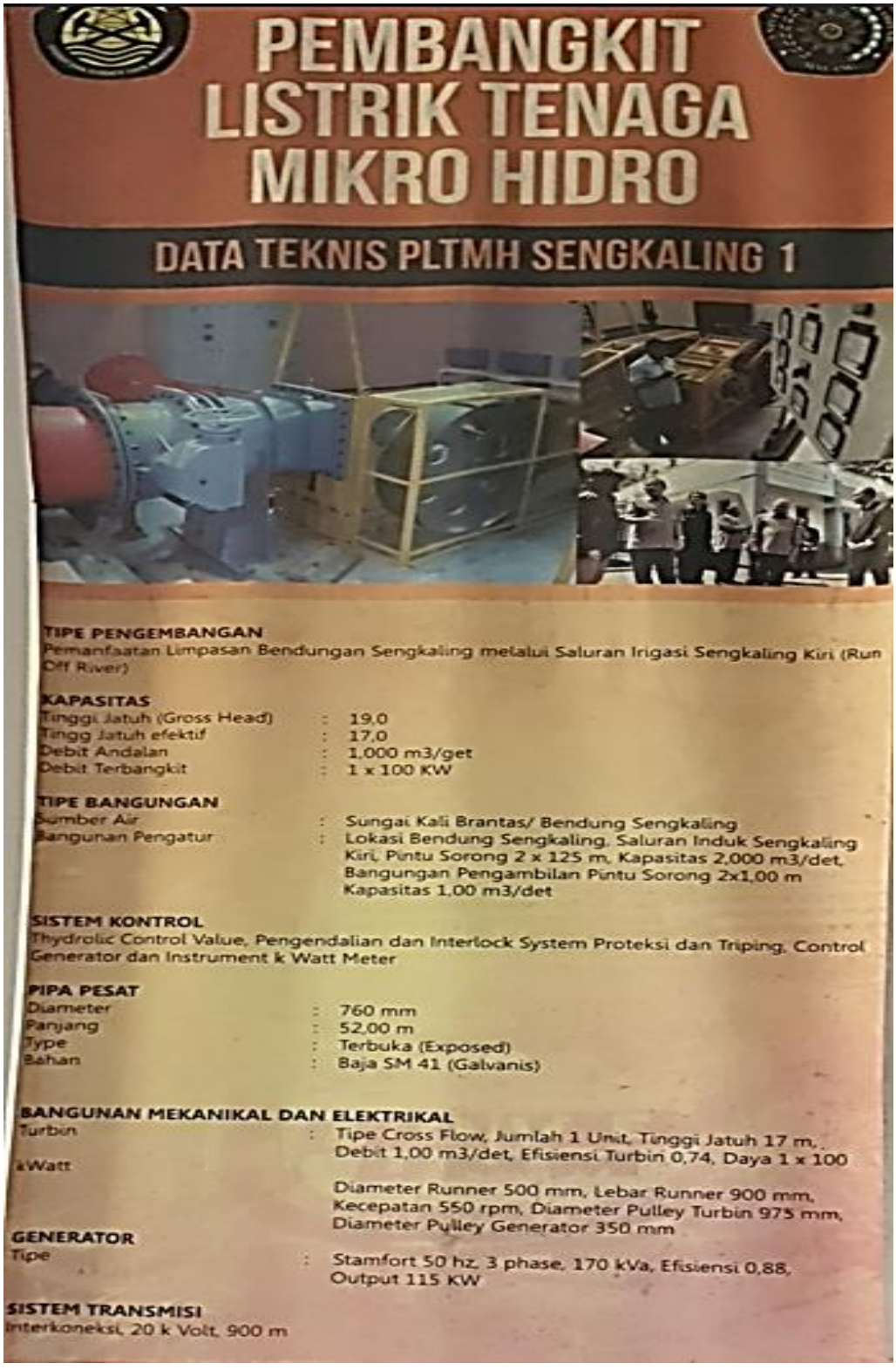
LAMPIRAN

Lampiran 1 Data teknis PLTMH sengkaling 1



PEMBANGKIT LISTRIK TENAGA MIKRO HIDRO

DATA TEKNIS PLTMH SENGKALING 1

TIPE PENGEMBANGAN
Pemanfaatan Limpasan Bendungan Sengkaling melalui Saluran Irigasi Sengkaling Kiri (Run Off River)

KAPASITAS

Tinggi Jatuh (Gross Head)	:	19,0
Tingg Jatuh efektif	:	17,0
Debit Andalan	:	1,000 m3/get
Debit Terbangkit	:	1 x 100 KW

TIPE BANGUNGAN

Sumber Air	:	Sungai Kali Brantas/ Bendung Sengkaling
Bangunan Pengatur	:	Lokasi Bendung Sengkaling, Saluran Induk Sengkaling Kiri, Pintu Sorong 2 x 125 m, Kapasitas 2,000 m3/det, Bangungan Pengambilan Pintu Sorong 2x1,00 m Kapasitas 1,00 m3/det

SISTEM KONTROL
Thydrolic Control Value, Pengendalian dan Interlock System Proteksi dan Triping, Control Generator dan Instrument k Watt Meter

PIPA PESAT

Diameter	:	760 mm
Panjang	:	52,00 m
Type	:	Terbuka (Exposed)
Bahan	:	Baja SM 41 (Galvanis)

BANGUNAN MEKANIKAL DAN ELEKTRIKAL

Turbin	:	Tipe Cross Flow, Jumlah 1 Unit, Tinggi Jatuh 17 m, Debit 1,00 m3/det, Efisiensi Turbin 0,74, Daya 1 x 100
kWatt		Diameter Runner 500 mm, Lebar Runner 900 mm, Kecepatan 550 rpm, Diameter Pulley Turbin 975 mm, Diameter Pulley Generator 350 mm

GENERATOR

Tipe	:	Stamfort 50 hz, 3 phase, 170 kVa, Efisiensi 0,88, Output 115 KW

SISTEM TRANSMISI
Interkoneksi, 20 k Volt, 900 m

Lampiran 2 Detail spesifikasi generator

UCI274F

STAMFORD

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H						
PROTECTION	IP23						
RATED POWER FACTOR	0.8						
STATOR WINDING	DOUBLE LAYER CONCENTRIC						
WINDING PITCH	TWO THIRDS						
WINDING LEADS	12						
STATOR WDG. RESISTANCE	0.024 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED						
ROTOR WDG. RESISTANCE	1.52 Ohms at 22°C						
EXCITER STATOR RESISTANCE	20 Ohms at 22°C						
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C						
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others						
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%						
MAXIMUM OVERSPEED	2250 Rev/Min						
BEARING DRIVE END	BALL. 6315-2RS (ISO)						
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)						
	1 BEARING				2 BEARING		
WEIGHT COMP. GENERATOR	530 kg				545 kg		
WEIGHT WOUND STATOR	200 kg				200 kg		
WEIGHT WOUND ROTOR	188.67 kg				177.71 kg		
WR² INERTIA	1.555 kgm^2				1.5044 kgm^2		
SHIPPING WEIGHTS in a crate	563 kg				577 kg		
PACKING CRATE SIZE	123 x 67 x 103(cm)				123 x 67 x 103(cm)		
	50 Hz				60 Hz		
TELEPHONE INTERFERENCE	THF<2%				TIF<50		
COOLING AIR	0.514 m³/sec 1090 cfm				0.617 m³/sec 1308 cfm		
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	160	160	160	N/A	181.3	190	190	206.3
Xd DIR. AXIS SYNCHRONOUS	2.24	2.02	1.88	-	2.53	2.37	2.17	2.16
X'd DIR. AXIS TRANSIENT	0.19	0.17	0.16	-	0.21	0.20	0.18	0.18
X"d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.11	-	0.14	0.13	0.12	0.12
Xq QUAD. AXIS REACTANCE	1.38	1.25	1.16	-	1.53	1.43	1.31	1.31
X"q QUAD. AXIS SUBTRANSIENT	0.17	0.15	0.14	-	0.20	0.19	0.17	0.17
X_L LEAKAGE REACTANCE	0.07	0.06	0.06	-	0.09	0.08	0.08	0.08
X_2 NEGATIVE SEQUENCE	0.14	0.13	0.12	-	0.16	0.15	0.14	0.14
X_0 ZERO SEQUENCE	0.08	0.08	0.07	-	0.10	0.09	0.09	0.09
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.035 s							
T"d SUB-TRANSTIME CONST.	0.011 s							
T'do O.C. FIELD TIME CONST.	0.9 s							
Ta ARMATURE TIME CONST.	0.009 s							
SHORT CIRCUIT RATIO	1/Xd							

Lampiran 3 Instruksi perintah MATLAB

```
MATLAB Command History

fuzzy
A=Pdump
B=Wref
xlswrite('A',data,'A1:B50001')
xlswrite('data',A,'A1:B50001')
xlswrite('data1',Pdump,'A1:B50001')
xlswrite('Pdump',data1,'A1:B50001')
xlswrite('volt',Data_Tegangan_Out_Gen,'A1:D5000)
xlxwrite('data2'Pbat,'A1:B50001')
xlswrite('A',data2,'A1:B50001')
xlswrite('A',data1,'A1:B50001')
xlswrite('A',Pbat,'A1:B50001')
xlswrite('data3',t.values{2,1},'A1:C50001')
xlswrite('data4',t.values{3,1},'A1:C50001')
A=batt.signals(1).values
xlswrite('data',A,'A1:A15000')
B=batt.signals(2).values
xlswrite('data',B,'A1:A15000')
C=batt.signals(3).values
xlswrite('data',C,'A1:A15000')
A=batt.signals(1).values
xlswrite('data',A,'A1:A15000')
B=batt.signals(2).values
xlswrite('data',B,'A1:A15000')
C=batt.signals(3).values
xlswrite('data',C,'A1:A15000')
X=charge.signals.values
```

```
xlswrite('data',X,'A1:A15000')
plot(A)
plot(B)
plot(C)
plot(X)

anfisedit
Wref=Wref.signals.values
xlswrite('data',Wref,'A1:A15000')
P=Pdump.signals.values
xlswrite('data',P,'A1:A15000')

nnstart
Wref=Wref.signal.value
Wref=Wref.signals.values
xlswrite('data',Wref,'A1:A15000')
D=max(Wref)
E=min(Wref)
F=((Wref-E)/(D-E))
P=Pdump.signals.values
D=max(P)
E=min(P)
F=((P-E)/(D-E))
xlswrite('data',F,'A1:A15000')
A=Pdump.signals.values
B=max(A)
C=min(A)
D=((A-C)/B-C))
D=((A-C)/(B-C))
xlswrite('data',D,'A1:A15000')
```

```
W=Wref.signals.values

X=max(W)

Y=min(W)

Z=((W-Y))/(X-Y))

Z=((W-Y)/(X-Y))

xlswrite('data',Z,'A1:A15000')


stepinfo(out.batt.signals(2).values)

stepinfo(out.batt.signals(3).values)
```

Lampiran 4 Editor fuzzy error pengisian baterai

```
[System]
Name='BMS'
Type='sugeno'
Version=2.0
NumInputs=1
NumOutputs=2
NumRules=2
AndMethod='prod'
OrMethod='probor'
ImpMethod='prod'
AggMethod='sum'
DefuzzMethod='wtaver'

[Input1]
Name='Error'
Range=[-600000000 600000000]
NumMFs=2
MF1='lowError':'trapmf',[-600000000 -600000000 -300000000 0]
MF2='highError':'trapmf',[0 300000000 600000000 600000000]

[Output1]
Name='BatteryCharge'
Range=[0 1]
NumMFs=2
MF1='Charging':'constant',[1]
MF2='Discharge':'constant',[0]

[Output2]
Name='BatteryDischarge'
Range=[0 1]
NumMFs=2
MF1='Charging':'constant',[1]
MF2='Discharge':'constant',[0]

[Rules]
1, 1 2 (1) : 1
2, 2 1 (1) : 1
```

Lampiran 5 Editor program ANFIS

```
[System]
Name='ANFIS'
Type='sugeno'
Version=2.0
NumInputs=1
NumOutputs=1
NumRules=4
AndMethod='prod'
OrMethod='probor'
ImpMethod='prod'
AggMethod='sum'
DefuzzMethod='wtaver'

[Input1]
Name='input1'
Range=[-1.64865154625494 1.17053123254021]
NumMFs=4
MF1='in1mf1':'gaussmf',[0.651701770307082 -1.60570236792748]
MF2='in1mf2':'gaussmf',[0.598410327724773 -0.849092849972897]
MF3='in1mf3':'gaussmf',[0.593266722824259 0.337258977643037]
MF4='in1mf4':'gaussmf',[0.615804913965003 1.12724763714686]

[Output1]
Name='output'
Range=[-10272.9912842406 6508.04290875202]
NumMFs=4
MF1='out1mf1':'constant',[-13492.6168334174]
MF2='out1mf2':'constant',[-2029.21534314224]
MF3='out1mf3':'constant',[-1028.15836546059]
MF4='out1mf4':'constant',[9312.25915650646]

[Rules]
1, 1 (1) : 1
2, 2 (1) : 1
3, 3 (1) : 1
4, 4 (1) : 1
```

Lampiran 6 Hasil training ANN

Training Results

Training finished: Met validation criterion

Training Progress

Unit	Initial Value	Stopped Value	Target Value
Epoch	0	914	1000
Elapsed Time	-	00:00:11	-
Performance	0.659	1.38e-06	0
Gradient	1.92	3.26e-06	1e-07
Mu	0.001	1e-10	1e+10
Validation Checks	0	6	6

Train a neural network to map predictors to continuous responses.

Data

Predictors: input - [5000x1 double]

Responses: target - [5000x1 double]

input: double array of 5000 observations with 1 features.

target: double array of 5000 observations with 1 features.

Algorithm

Data division: Random

Training algorithm: Levenberg-Marquardt

Performance: Mean squared error

Training Results

Training start time: 05-Apr-2024 06:26:05

Layer size: 10

	Observations	MSE	R
Training	3500	1.3957e-06	1.0000
Validation	750	1.5970e-06	1.0000
Test	750	1.6093e-06	1.0000

Lampiran 7 Data beban PLTMH sengkaling 1

Waktu Pencatatan	Arus Ballast			Arus Konsumen			Tegangan			HZ
	R	S	T	R	S	T	R	S	T	
07:00	25,6	23,7	36,7	23,2	26,3	30,7	225,6	227	228,7	50
08:00	31,4	35	31,8	21,9	15,7	20,7	225,7	227,9	228,3	50
09:00	46,9	48,7	43,4	30,7	17,3	30,6	225,9	226,7	228,5	50
10:00	48,8	49,1	47,2	27,7	19,5	30,4	225,5	223,6	226,8	50
11:00	56,3	58,8	57,2	25,6	21,6	32,1	225,9	224,1	226,5	50
12:00	55,7	56,2	56,2	20,4	17,6	29,8	226,1	224,9	225,6	50
13:00	47,1	48,4	44,9	23,2	19,3	32,6	226,3	225,1	227,0	50
14:00	36,4	44,2	36,7	25,7	19,1	28,2	225,6	227,5	227,1	50
15:00	33,7	40,9	32,6	37,2	30,9	33,7	225,3	226,1	227,5	50
16:00	27,6	32,6	28,7	40,7	33,6	33	226,2	226,3	227,8	50
17:00	31,2	37,7	33,4	42,2	38,3	37,3	226,7	226,5	227,0	50
18:00	33,6	37,1	33,1	43,1	35,7	38,2	226,1	225,4	226,7	50
19:00	35,3	38,0	37,5	45,3	37,3	39,4	226,8	228,0	228,1	50
20:00	36,7	39,9	39,2	41	29,9	35,6	228,8	227,2	228,2	50
21:00	39,5	42,6	40,3	43,1	35,9	33,8	227,4	226,1	228,7	50
22:00	37,1	38,8	35,4	38,3	32,5	30,7	226,4	226,9	228,9	50
23:00	39,8	39,1	38,3	33,2	30,5	29,5	225,9	226,9	228,5	50
00:00	41,3	40,2	36,5	29,4	27,6	27,2	226,5	226,5	227,7	50
01:00	46,1	43,6	42,3	32,1	27,2	27,8	227,4	226,1	228,1	50
02:00	35,4	34,4	33,2	32,6	27,4	25,5	226,1	225,2	227,4	50
03:00	43,1	41,1	39,6	30,3	27,7	27,8	227,8	226,7	228,6	50
04:00	47,7	49,9	41,7	23,2	26,8	23,6	225,5	228,9	228,8	50
05:00	49,5	50,3	43,9	19,2	22,3	21,6	225,1	228,1	228,0	50
06:00	51,1	52	48,5	17,9	21,6	20,5	226,4	226,7	227,9	50

Lampiran 8 Hasil data simulasi PI

Parameter Respons	8,4KW (07:00)	6,1KW (08:00)	8,2KW (09:00)	8,1KW (10:00)	8,2KW (11:00)	7,1KW (12:00)	7,8KW (13:00)	7,6KW (14:00)	10,6KW (15:00)	11,2KW (16:00)	12,3KW (17:00)	12,2KW (18:00)	12,8KW (19:00)	11,2KW (20:00)	11,8KW (21:00)	10,6KW (22:00)	9,8KW (23:00)	8,8KW (00:00)	9,1KW (01:00)	8,9KW (02:00)	9,0KW (03:00)	7,7KW (04:00)	6,6KW (05:00)	6,3KW (06:00)	115KW	128KW	Rata-rata 24 Jam
Respon Arus Baterai																											
Settling Min (A)	25,05	25,05	-335,28	25,04	-335,28	25,06	-335,28	25,04	25,04	-335,28	-335,28	-335,28	25,05	-335,28	25,06	25,04	-335,28	-335,28	25,04	25,04	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-170,13
SettlingMax (A)	260,94	260,94	260,94	260,94	260,94	260,94	260,94	260,94	260,46	260,32	260,33	260,32	260,32	260,32	260,32	260,46	260,94	260,94	260,94	260,94	260,94	260,94	260,94	260,94	204,67	189,78	260,74
Overshoot (%)	42,01	10,56	939,85	11,33	939,85	11,36	935,05	22,96	26,36	934,14	938,62	886,16	9,74	934,14	31,11	26,36	934,07	934,44	15,49	10,00	938,87	939,28	938,77	937,86	706,98	648,21	514,52
Undershoot (%)	182,47	142,06	1336,10	143,05	1336,10	143,08	1329,90	157,99	162,66	1332,00	1337,60	1270,20	141,35	1332,00	168,87	162,66	1328,70	1329,20	148,39	141,35	1334,90	1335,40	1334,70	1333,60	1322,00	1321,90	790,18
Peak (A)	-335,28	-335,28	-335,29	-335,28	-335,29	-335,28	335,28	-335,28	-335,28	-335,28	-335,29	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-335,28	-307,34
Current Battery (A)	107,10	109,60	107,40	108,20	107,40	108,50	107,20	107,30	105,10	104,90	105,00	104,70	105,00	104,90	104,90	105,10	105,30	106,30	106,40	107,20	106,60	107,80	108,80	109,00	28,97	28,48	106,65
RiseTime (s)	2242,90	2823,60	0,00	2798,80	0,00	2798,00	0,00	0,00	2449,80	0,00	0,00	0,00	0,00	0,00	2374,60	2449,80	0,00	0,00	2680,50	2842,00	0,00	0,00	0,00	0,00	0,00	0,00	977,50
Peak Time (s)	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00
Respon Tegangan Baterai																											
Settling Min (V)	23,76	23,73	23,76	23,74	23,76	23,75	23,75	23,75	23,77	23,77	23,77	23,77	23,77	23,77	23,75	23,77	23,77	23,76	23,76	23,75	23,75	23,74	23,73	23,73	24,68	24,92	23,76
SettlingMax (V)	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43
Overshoot (%)	13,53	15,21	10,28	14,99	10,28	15,01	9,97	14,19	14,01	10,01	10,27	10,31	15,04	10,01	13,84	14,01	9,87	9,91	14,48	15,09	10,20	10,24	10,25	10,20	7,59	7,57	12,13
Undershoot (%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Peak (V)	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43	27,43
Voltage Battery (V)	24,53	24,50	24,53	27,43	24,53	24,51	24,52	24,53	24,55	24,55	24,56	24,56	24,56	24,55	24,56	24,55	24,55	24,54	24,54	24,53	24,54	24,52	24,51	24,51	25,46	25,47	24,66
RiseTime (s)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Peak Time (s)	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00	102,00
Perbandingan Hasil Keluaran Pemakaian ELC																											
Konsumen (KW)	8,40	6,10	8,20	8,10	8,20	7,10	7,80	7,60	10,60	11,20	12,30	12,20	12,80	11,20	11,80	10,60	9,80	8,80	9,10	8,90	9,00	7,70	6,60	6,30	115,00	128,00	9,18
Baterai (KW)	97,89	100,30	97,70	98,29	97,70	99,25	97,36	98,67	95,86	94,31	94,04	94,42	93,87	94,31	94,73	95,86	95,45	96,50	97,25	97,56	96,90	98,24	99,04	99,18	3,35	2,07	96,86
Total Load (KW)	106,80	106,60	107,60	106,60	107,60	106,50	107,20	106,60	106,80	107,50	107,30	107,00	106,90	107,50	106,90	106,80	107,30	107,30	106,60	106,70	107,40	107,40	107,70	107,40	109,90	120,30	107,08
Frekuensi (HZ)	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,97	49,96	49,97	49,96	49,97	49,97	49,97	49,90	49,95	49,97
Efisiensi (%)	99,52	99,81	98,42	99,80	98,42	99,86	98,10	99,69	99,68	98,15	99,11	99,64	99,78	98,15	99,65	99,68	98,09	98,14	99,77	99,78	98,60	98,64	98,09	98,21	107,69	108,12	99,03

Lampiran 9 Hasil data simulasi ANFIS

Parameter Respons	8,4KW (07:00)	6,1KW (08:00)	8,2KW (09:00)	8,1KW (10:00)	8,2KW (11:00)	7,1KW (12:00)	7,8KW (13:00)	7,6KW (14:00)	10,6KW (15:00)	11,2KW (16:00)	12,3KW (17:00)	12,2KW (18:00)	12,8KW (19:00)	11,2KW (20:00)	11,8KW (21:00)	10,6KW (22:00)	9,8KW (23:00)	8,8KW (00:00)	9,1KW (01:00)	8,9KW (02:00)	9,0KW (03:00)	7,7KW (04:00)	6,6KW (05:00)	6,3KW (06:00)	115 KW	128KW	Rata-Rata 24 Jam
Respon Arus Baterai																											
Settling Min (A)	25,01	25,02	25,00	25,05	25,00	25,05	25,04	25,04	25,02	25,05	25,05	25,04	25,02	25,05	25,05	25,02	25,01	25,05	25,05	25,03	25,07	25,04	25,01	25,03	25,36	25,36	25,03
SettlingMax (A)	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	256,56	250,87	264,83
Overshoot (%)	958,98	949,83	959,30	951,80	959,30	952,49	953,40	956,97	17,73	954,50	954,44	952,14	958,49	954,50	950,43	17,73	954,27	952,22	954,45	20,39	953,50	951,31	958,45	954,06	911,51	889,08	837,53
Undershoot (%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Peak (A)	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	264,83	256,56	250,87	264,83
Current Battery (A)	108,60	109,50	109,30	109,00	109,30	108,40	109,00	109,70	106,20	105,90	105,10	104,80	105,30	105,90	104,80	106,20	107,10	106,90	107,50	107,80	107,40	109,20	109,80	110,00	30,11	29,59	107,61
RiseTime (s)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1299,40	0,00	0,00	0,00	0,00	0,00	0,00	1299,40	0,00	0,00	0,00	1236,20	0,00	0,00	0,00	0,00	0,00	0,00	159,79
Peak Time (s)	5480,00	5478,00	5480,00	5480,00	5480,00	5479,00	5480,00	5480,00	5482,00	5482,00	5482,00	5482,00	5484,00	5482,00	5482,00	5482,00	5481,00	5481,00	5481,00	5481,00	5481,00	5480,00	5479,00	5479,00	3007,00	2599,00	5480,75
Respon Tegangan Baterai																											
Settling Min (V)	23,75	23,73	23,75	23,75	23,75	23,74	23,75	23,74	23,76	23,75	23,75	23,75	23,76	23,75	23,75	23,76	23,76	23,75	23,75	23,75	23,75	23,75	23,74	23,74	24,46	24,51	23,75
SettlingMax (V)	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69
Overshoot (%)	3,50	3,02	3,53	3,45	3,53	3,10	3,16	3,42	7,18	3,16	3,15	3,01	3,39	3,16	2,91	7,18	3,20	3,05	3,22	7,22	3,14	3,07	3,49	3,26	0,77	0,76	3,73
Undershoot (%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Peak (V)	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69
Voltage Battery (V)	24,52	24,50	24,51	24,51	24,51	24,51	24,50	24,50	24,54	24,54	24,55	24,55	24,55	24,54	24,55	24,54	24,53	24,53	24,52	24,52	24,52	24,50	24,50	24,49	25,45	25,46	24,52
RiseTime (s)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Peak Time (s)	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Perbandingan Hasil Keluaran Pemakaian ELC																											
Konsumen (KW)	8,40	6,10	8,20	8,10	8,20	7,10	7,80	7,60	10,60	11,20	12,30	12,20	12,80	11,20	11,80	10,60	9,80	8,80	9,10	8,90	9,00	7,70	6,60	6,30	115,00	128,00	9,18
Baterai (KW)	97,90	98,74	98,00	98,32	98,00	98,45	97,91	98,62	95,96	94,88	93,79	93,67	93,62	94,88	93,60	95,96	96,09	96,97	97,21	97,52	96,97	97,65	99,66	99,59	3,56	2,02	96,83
Total Load (KW)	107,10	107,00	107,10	107,00	107,10	107,20	107,80	107,00	106,70	107,60	107,90	107,40	107,30	107,60	107,30	106,70	107,80	107,20	107,40	106,70	107,30	107,30	107,20	107,30	109,90	120,00	107,25
Frekuensi (HZ)	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,95	49,95	49,95	49,96	49,95	49,95	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,92	49,94	49,96
Efisiensi (%)	99,25	97,98	99,16	99,46	99,16	98,46	98,06	99,27	99,87	98,59	98,32	98,58	99,18	98,59	98,23	99,87	98,23	98,67	98,99	99,74	98,76	98,18	99,12	98,69	107,88	108,35	98,85

Lampiran 10 Hasil data simulasi ANN

Parameter Respons	8,4KW (07:00)	6,1KW (08:00)	8,2KW (09:00)	8,1KW (10:00)	8,2KW (11:00)	7,1KW (12:00)	7,8KW (13:00)	7,6KW (14:00)	10,6KW (15:00)	11,2KW (16:00)	12,3KW (17:00)	12,2KW (18:00)	12,8KW (19:00)	11,2KW (20:00)	11,8KW (21:00)	10,6KW (22:00)	9,8KW (23:00)	8,8KW (00:00)	9,1KW (01:00)	8,9KW (02:00)	9,0KW (03:00)	7,7KW (04:00)	6,6KW (05:00)	6,3KW (06:00)	115KW	128KW	Rata-rata 24 jam
Respon Arus Baterai																											
Settling Min (A)	25,06	25,02	25,04	25,07	25,04	25,04	24,99	25,01	25,03	25,05	25,07	25,08	25,07	25,05	25,04	25,03	25,05	25,05	25,05	25,05	25,05	25,03	25,07	25,01	25,3676	25,36	25,04
SettlingMax (A)	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	257,9524	254,30	264,85
Overshoot (%)	905,60	19,39	949,66	20,43	949,66	957,10	959,75	464,02	146,45	953,66	950,25	943,88	47,48	953,66	21,46	146,45	955,32	953,06	950,53	14,09	82,17	958,32	20,74	952,81	916,8594	902,60	594,83
Undershoot (%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0	0,00	0,00
Peak (A)	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	264,85	257,9524	254,30	264,85
Current Battery (A)	108,00	110,40	107,70	107,60	107,70	109,40	109,00	109,00	106,10	105,60	104,50	105,30	104,60	105,60	104,80	106,10	106,80	107,20	106,50	107,90	107,90	109,10	109,00	109,90	30,23	29,68	107,32
RiseTime (s)	0,00	1198,80	0,00	1175,20	0,00	0,00	0,00	67,14	329,45	0,00	0,00	0,00	780,51	0,00	1152,90	329,45	0,00	0,00	0,00	1336,90	539,97	0,00	1168,50	0,00	0	0,00	336,62
Peak Time (s)	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	5421,00	3069	2748,00	5421,00
Respon Tegangan Baterai																											
Settling Min (V)	23,76	23,74	23,76	23,76	23,76	23,75	23,75	23,75	23,76	23,77	23,76	23,77	23,77	23,77	23,78	23,76	23,76	23,76	23,76	23,76	23,76	23,75	23,75	23,75	24,4418	24,48	23,76
SettlingMax (V)	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,6894	25,69	25,69
Overshoot (%)	3,48	7,29	2,95	7,03	2,95	3,46	3,58	3,95	4,61	3,11	2,88	3,24	6,12	3,11	7,06	4,61	3,25	3,11	2,95	7,48	5,86	3,49	7,04	3,20	0,7609	0,76	4,41
Undershoot (%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0	0,00	0,00
Peak (V)	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,69	25,6894	25,69	25,69
Voltage Battery (V)	24,52	24,49	24,52	24,82	24,52	24,50	24,51	24,51	24,54	24,55	24,56	24,55	24,84	24,55	24,56	24,54	24,53	24,53	24,53	24,52	24,52	24,51	24,50	24,49	25,45	25,46	24,55
RiseTime (s)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0	0,00	0,00
Peak Time (s)	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1	1,00	1,00
Perbandingan Hasil Keluaran Pemakaian ELC																											
Konsumen (KW)	8,40	6,10	8,20	8,10	8,20	7,10	7,80	7,60	10,60	11,20	12,30	12,20	12,80	11,20	11,80	10,60	9,80	8,80	9,10	8,90	9,00	7,70	6,60	6,30	115,00	128,00	9,18
Baterai (KW)	98,05	100,30	96,90	98,34	96,90	99,10	98,43	98,83	95,24	95,05	93,38	94,51	93,82	95,05	94,81	95,24	96,56	97,00	96,55	97,63	97,69	98,54	99,80	99,41	3,37	2,10	96,96
Total Load (KW)	106,90	106,60	107,20	106,70	107,20	107,00	107,00	106,70	107,10	107,70	107,50	107,20	107,10	107,70	106,80	107,10	107,10	107,30	107,30	106,70	106,90	107,00	106,60	107,30	109,90	120,10	107,07
Frekuensi (HZ)	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,96	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,9	49,95	49,97
Efisiensi (%)	99,58	99,81	98,04	99,76	98,04	99,25	99,28	99,75	98,82	98,65	98,31	99,54	99,55	98,65	99,82	98,82	99,31	98,60	98,46	99,84	99,80	99,29	99,81	98,52	107,71	108,32	99,14

Lampiran 11 Rincian investasi

Rincian Investasi Awal PLTMH				
Rincian Pembiayaan	**Harga Satuan**	**Satuan**	**Jumlah**	**Total**
Pekerjaan bangunan sipil	Rp 140.169.935,69	set	1	Rp 140.169.935,69
Turbin Micro Hydro Cross Flow + Generator+ ELC (Complete)	Rp 15.000.000,00	kW	100	Rp 1.500.000.000,00
Pipa Pesat + Gate	Rp 4.500.000,00	Meter	52	Rp 234.000.000,00
Electric Motor TECO 1 HP (gate)	Rp 2.336.999,00	set	1	Rp 2.336.999,00
Biaya pengiriman	Rp 5.000.000,00	Kali	1	Rp 5.000.000,00
Biaya pemasangan turbin dan generator	Rp 20.000.000,00	Set	1	Rp 20.000.000,00
Biaya instalasi jaringan listrik	Rp 18.732.000,00	Kubikal	1	Rp 18.732.000,00
Trafo Distribusi 20 kV	Rp 75.000.000,00	set	1	Rp 75.000.000,00
Biaya Lain-Lain	Rp 5.000.000,00	set	1	Rp 5.000.000,00
PPN	Rp 2.000.238.934,69	%	10	Rp 200.023.893,47
Total				**Rp 2.200.262.828,16**

Rincian Investasi Awal PLTMH dengan Kontrol Baru				
Rincian Pembiayaan	**Harga Satuan**	**Satuan**	**Jumlah**	**Total**
Pekerjaan bangunan sipil	Rp 140.169.935,69	set	1	Rp 140.169.935,69
Turbin Micro Hydro Cross Flow + Generator	Rp 13.500.000,00	kW	100	Rp 1.350.000.000,00
ELC ANFIS + Baterai	Rp 6.196.636,00	Set	1	Rp 6.196.636,00
Pipa Pesat	Rp 4.500.000,00	Meter	52	Rp 234.000.000,00
Biaya pengiriman	Rp 5.000.000,00	Kali	1	Rp 5.000.000,00
Biaya pemasangan turbin dan generator	Rp 2.000.000,00	Set	1	Rp 2.000.000,00
Biaya instalasi jaringan listrik	Rp 18.732.000,00	Kubikal	1	Rp 18.732.000,00
Trafo Distribusi 20 kV	Rp 75.000.000,00	set	1	Rp 75.000.000,00
Biaya Lain-Lain	Rp 5.000.000,00	set	1	Rp 5.000.000,00
PPN	Rp 1.836.098.571,69	%	10	Rp 183.609.857,17
Total				**Rp 2.019.708.428,86**

Lampiran 12 Rincian biaya operasional dan pemeliharaan PLTMH Sengkaling 1

Rincian Biaya Operasional dan Pemeliharaan PLTMH Sengkaling 1 (2007)					
Rincian Pembiayaan	**Rate**	**Satuan**	**Jumlah**	**Biaya**	
Operasional					
Operator Tetap (shift)	Rp 1.205.100,00	Orang	2	Rp	2.410.200,00
Operator Perjanjian Khusus (shift) 2 Orang 24 hari per bulan	Rp 40.000,00	Jam	48	Rp	1.920.000,00
Keamanan & Kebersihan	Rp 500.000,00	Orang	2	Rp	1.000.000,00
Pelumas	Rp 35.000,00	Liter	15	Rp	525.000,00
Biaya cadangan jika terjadi kerusakan mendadak	Rp 500.000,00		1	Rp	500.000,00
Total Per Bulan				**Rp**	**6.355.200,00**
Total per Tahun				**Rp**	**76.262.400,00**
Pemeliharaan					
Rincian Pembiayaan	**Periode**	**Periode**		**Biaya**	
Grease bearing	Rp 1.000.000,00	1 Bulan		Rp	12.000.000,00
Pengurasan Sedimen	Rp 2.500.000,00	3 Bulan		Rp	10.000.000,00
Pemeliharaan Jaringan Distribusi	Rp 1.200.000,00	1 Tahun		Rp	1.200.000,00
Pemeliharaan bangunan sipil rumah pembangkit	Rp 1.080.000,00	1 Tahun		Rp	1.080.000,00
Pemeliharaan Turbin dan Pipa pesat	Rp 2.000.000,00	3 Bulan		Rp	8.000.000,00
Total per Tahun				**Rp**	**108.542.400,00**
Overhoule					
Turbin Micro Hydro Cross Flow + Generator+ ELC (Complete)	10 Tahun			Rp	50.000.000,00
Penggantian Generator				Rp	82.116.970,00
Pipa Pesat + Gate				Rp	4.500.000,00
Electric Motor TECO 1 HP (gate)				Rp	2.336.999,00
Dummy Load				Rp	1.880.000,00
Biaya Teknisi				Rp	20.000.000,00
Total				**Rp**	**160.833.969,00**

Sumber : Data operasional dan pemeliharaan PLTMH Sengkaling 1 per Tahun 2007

Rincian Biaya Operasional dan Pemeliharaan PLTMH dengan Kontrol Baterai				
Rincian Pembiayaan	**Rate**	**Satuan**	**Jumlah**	**Biaya**
Operasional				
Operator Tetap (shift)	Rp 1.205.100,00	Orang	2	Rp 2.410.200,00
Operator Perjanjian Khusus (shift) 2 Orang 24 hari per bulan	Rp 40.000,00	Jam	48	Rp 1.920.000,00
Keamanan & Kebersihan	Rp 500.000,00	Orang	2	Rp 1.000.000,00
Pelumas	Rp 35.000,00	Liter	15	Rp 525.000,00
Biaya cadangan jika terjadi kerusakan mendadak	Rp 500.000,00	Kali	1	Rp 500.000,00
Total Per Bulan				**Rp 6.355.200,00**
Total per Tahun				**Rp 76.262.400,00**
Pemeliharaan				
Rincian Pembiayaan	**Periode**	**Periode**		**Biaya**
Grease bearing	Rp 1.000.000,00	1 Bulan		Rp 12.000.000,00
Pengurasan Sedimen	Rp 2.500.000,00	3 Bulan		Rp 10.000.000,00
Pemeliharaan Jaringan Distribusi	Rp 1.200.000,00	1 Tahun		Rp 1.200.000,00
Pemeliharaan bangunan sipil rumah pembangkit	Rp 1.080.000,00	1 Tahun		Rp 1.080.000,00
Pemeliharaan Turbin dan Pipa pesat	Rp 2.000.000,00	3 Bulan		Rp 8.000.000,00
Total per Tahun				**Rp 108.542.400,00**
Overhoule				
Turbin Micro Hydro Cross Flow + Generator+ ELC (Complete)	10 Tahun			Rp 50.000.000,00
Penggantian Generator				Rp 82.116.970,00
Pipa Pesat + Gate				Rp 4.500.000,00
Penggantian Baterai Lifepo4				Rp 4.500.000,00
Biaya Teknisi				Rp 20.000.000,00
Total				**Rp 161.116.970,00**

Lampiran 13 Rincian harga kontrol baru dan pipa pesat

Rincian Harga Kontrol Baru					
Rincian Pembiayaan	**Harga Satuan**	**Satuan**	**Jumlah**	**Total**	
Arduino Mega 2560 R3	Rp 250.000,00	Set	1	Rp	250.000,00
Arduino Uno	Rp 50.000,00	Set	1	Rp	50.000,00
three phase control rectifier	Rp 105.000,00	Set	1	Rp	105.000,00
Bridge Rectifier	Rp 96.000,00	Set	2	Rp	192.000,00
Sensor Kecepatan	Rp 7.900,00	Set	1	Rp	7.900,00
Sensor Arus	Rp 18.000,00	Set	1	Rp	18.000,00
Sensor Tegangan	Rp 14.500,00	Set	1	Rp	14.500,00
Module Komparator Histeresis	Rp 34.236,00	set	1	Rp	34.236,00
Baterai Lifepo4	Rp 2.250.000,00	Set	2	Rp	4.500.000,00
Rangkaian LPF Orde 2	Rp 25.000,00	set	1	Rp	25.000,00
Relay, MCB, Kabel Kontrol	Rp 1.000.000,00	Set	1	Rp	1.000.000,00
Total				**Rp**	**6.196.636,00**

Harga per meter pipa pesat

Diameter Rencana (m)	Diameter Pakai (m)	Tebal (m)	Harga Per Meter (IDR)
0,227	0,3	0,0031	1.027.300
0,454	0,6	0,0018	3.610.900
0,557	0,6	0,0027	3.610.900
0,747	0,8	0,0024	4.885.200
0,893	1	0,0036	6.034.400
0,916	1	0,0035	6.034.400

Sumber : Microsoft Word - 7. 541 (researchgate.net)

Lampiran 14 Harga satuan generator PLTMH

Atribut kunci

Spesifikasi industri inti

Tegangan	230/400
Dinilai saat ini	180-288A
Frekuensi	50HZ/60HZ

Atribut lainnya

Garansi	1 year
Tempat asal	China
Nama merek	Stamford
Nomor model	UC274ES,UCI274F,UCI274G,UCI274H
Kecepatan	1500rpm/1800rpm
Berat	400kg
Insulation	Class H
Protection	IP23
Power factor	0.8
Phase	single Phase/3 Phase
Voltage	400
Certificate	ISO9001, CE
Warranty	1 year or 1000 hours
Product Name	stamford alternator
Frequency	50HZ/60HZ

Pengemasan dan pengiriman

Rincian Kemasan	Film plastik sebagai pacakge standar untuk set generator
Pelabuhan	Xiamen port
jual Unit:	item tunggal
ukuran paket tunggal:	150X75X90 cm
tunggal berat kotor:	400.000 kg

Kemampuan pasokan

Kemampuan pasokan	1000 Set/set per Month

Tampilkan lebih sedikit

Waktu tunggu

Kuantitas (Set)	1 - 100	> 100
Estimasi Waktu (hari)	30	Untuk Dinegosiasikan

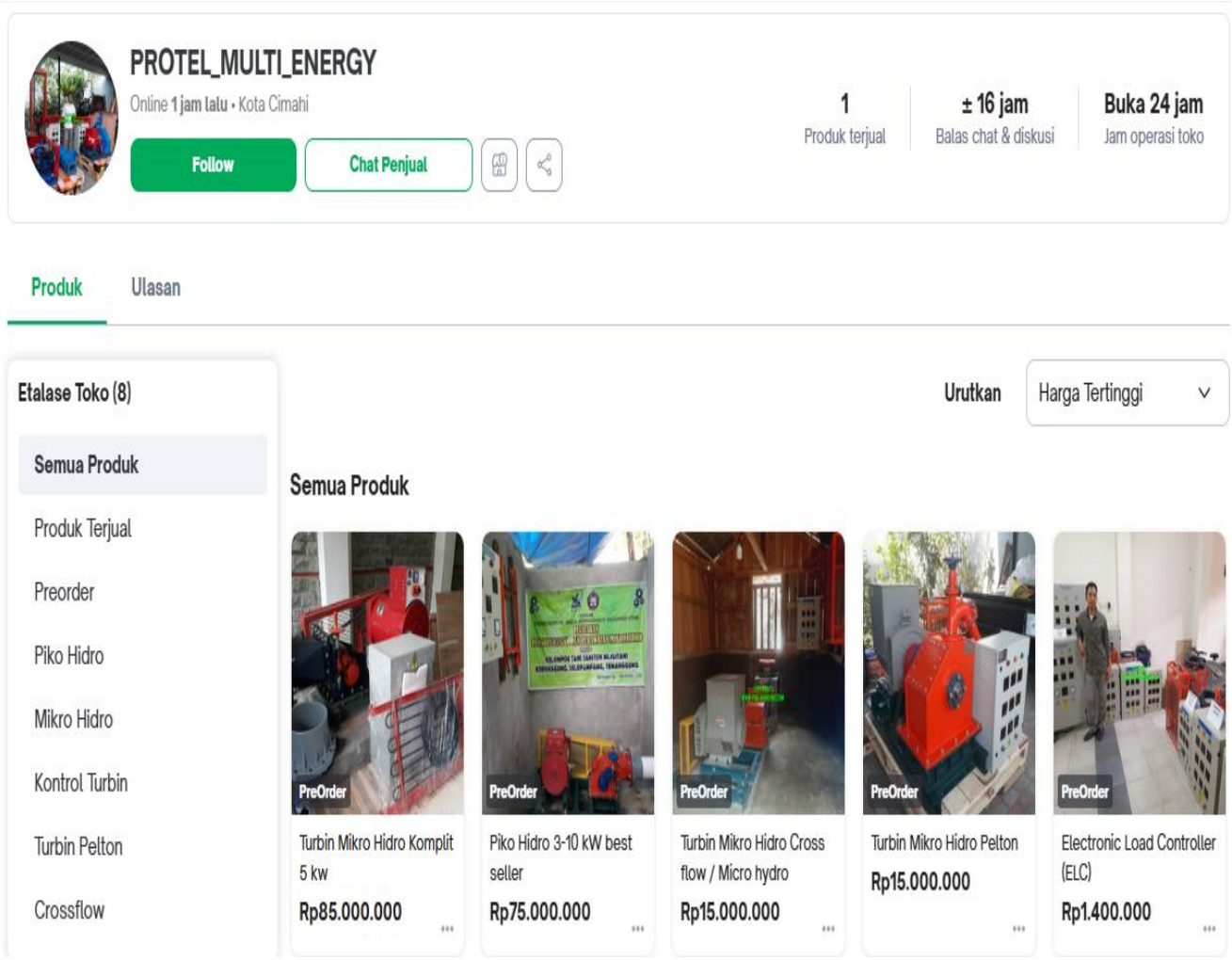
Sampel

Kuantitas pesanan maksimum: 1 Set

Harga sampel: **Rp 82.116.970/Set**

Sumber : Daftar Harga Alternator Kenapa Rpm Rendah 220v-400v 50hz 102000w - Buy Stamford Alternator Price List,Alternator 220v-400v 50hz 102000w,Low Rpm Stamford Alternator 220v-400v 50hz Product on Alibaba.com

Lampiran 15 Harga paket PLTMH



Lampiran 16 Harga komponen kontrol baru

Arduino Mega 2560 R3 + ESP8266 Wifi + Micro USB Cable | IoT - CH340G

Terjual 250+ • 4.9 (80 rating) • Diskusi (6)

Rp250.000

Pilih ukuran: CH340G

CH340G

Detail | Info Penting

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **Com o Microcontroller**

Features :
- Full integration on one board: Mega R3 ATmega2560 and WiFi ESP8266 with memory 32Mb (megabyte)
- All of the modules can work together or each separately. And everyone has their own pinout headers
- The convenient solution for the development of new projects requiring Uno and WiFi
- Via USB you can update sketches and firmvare for ATmega2560 and for ESP8266. For this on board have the USB-serial converter CH340G
- Use this board is very simple
- The board has DIP-switch, to connect the modules
- For example, to: USB and ATmeg2560, USB and ESP8266, ATmega2560 and ESP8266

Other Arduino Product Category:
link: https://www.tokopedia.com/supreme/etalase/com-o-arduinc
Lihat Lebih Sedikit

Speed Sensor Kecepatan Counter Hitung Opto Interupter Arduino Coupler

Terjual 60+ • 4.9 (12 rating) • Diskusi (3)

Rp7.900

Detail | Info Penting

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **Modul Sensor**

Speed Sensor Module Counter Module Motor Test Module Slotted Optocoupler Module

Sensor kecepatan yang banyak digunakan pada pendeteksi kecepatan motor, RPM, pengukur putaran, Tachometer, pembatas kecepatan dll.

Ini adalah jenis sensor celah opto-coupler yang akan menghasilkan sinyal output High TTL ketika sebuah objek terdeteksi pada celah.

Sensor Arus ACS712 5A Ac Dc Hall Current ACS 712 Module For Arduino

Terjual 15 • 5 (1 rating)

Rp18.000

Detail | Info Penting

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **Sensor and Tranducer**

Deskripsi Produk
Current Sensor Chip: ACS712ELC-05B;
5V power supply with on-board power indicator;
Range for this module is 5A, corresponding to the analog output 185mV / A;
No test current, the output voltage is VCC / 2;

Sensor Tegangan Voltage Module DC 0-25v for arduino

Terjual 3 • 5 (1 rating) • Diskusi (1)

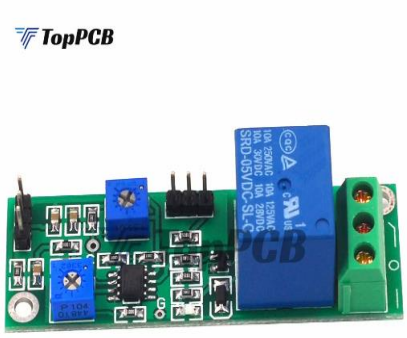
Rp14.500

Detail | Info Penting

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **MODUL MODUL**

DR ELEKTRONIK DEPOK
Online
Follow
4.9 rata-rata ulasan | ± 6 jam pesanan diproses

Pengiriman
Dikirim dari **Kota Depok**
Ongkir Reguler 8 rb - 10 rb
Estimasi tiba 27 - 30 Apr



Rp34,236 ~~Rp62,237~~

Ekstra Diskon 3%

5V Histeresis Modul Komparator Beralih Dual Output Jitter Kompa

5.0 3 Ulasan | 11 solc

Bridge Rectifier 3 Tiga Dioda Fase Phase 50A Amp 1200V Aluminium - 50A 1200V

Terjual 100+ • 4.9 (61 rating) • Diskusi (5)

Rp96.000

~~Rp100.000~~

Pilih ukuran: 50A 1200V

50A 1200V | 50A 1000V

Detail | Info Penting

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **Electronic Module**

1Pcs 50A 1200V Aluminium Metal Case 3 Tiga Fasa Dioda Jembatan Penyearah 50Amp 2.4*1.4*1.6inch Bridge Rectifier

Arduino Uno R3 Original + USB Cable - Arduino SM

Terjual 100+ • 4.9 (32 rating) • Diskusi (2)

Rp50.000

Pilih warna: Arduino SMD

Arduino DIP | Arduino SMD

Detail | Spesifikasi

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **Semua Etalase**

Deskripsi:
Arduino Uno R3 Versi SMD dan Versi DIP yang menggunakan chip Atmel ATMega. Produk ini sudah di test dan berfungsi dengan baik.

TERBARU Kit Inverter DC 12V/24V to AC 220v

Rp105.000

Detail

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **Semua Etalase**

harga membawa kwalitas

Kit Inverter DC 12V/24V to AC 220v

* tegangan Input bisa memakai Aki 12V / 24V
* Perlu tambahan travo CT 12V untuk aki 12V
* Perlu tambahan travo CT 24V untuk aki 24V
* Komponen berkualitas

NB : sblm beli konfirmasi untuk ketersediaan stok barang

Lampiran 17 Harga satuan baterai lithium

Battery lifepo4 24V 100AH dengan BMS 100A - tanpa BMS

Terjual 25 • ★ 4.9 (19 rating) • Diskusi (3)

Rp2.250.000

Pilih kelengkapan: Tanpa BMS

tanpa BMS | Plus BMS

Detail

Kondisi: Bekas

Min. Pemesanan: 1 Buah

Etalase: **BATTERY**

Battery lifepo4 ex huawei produksi 2023

include BMS 100A

Lampiran 18 Rincian paket PLTMH

Turbin Mikro Hidro Cross flow / Micro hydro

Detail Produk | Ulasan | Diskusi | Rekomendasi





HARGA ESTIMASI PER KW KOMPLIT!

Turbin Mikro Hidro Turbin Crossflow D235 daya s.d 100 kW. Cocok unt uk listrik satu kampung atau kecamatan. Daya 30kW dapat menerangi s.d 250 rumah. Unit sangat kompak mudah dalam pemasangan dan o perasional. listrik yang dihasilkan standard PLN dan stabil dilengkapi si sem kontrol otomatis yang menjaga tegangan dan frekuensi stabil tan pa harus buka tutup turbin. Listrik murah biaya operasional dan peraw atan hampir NOL.

Spesifikasi :
1. Tipe turbin : Crossflow, runner dia. 235mm, lebar 100-1200 mm
2. Head : 5-50 m
3. Debit : 40-1000 ltr/dtk
4. Generator : Sinkron Brushless AVR, 3P,230/400V,50Hz,1500rpm
5. Control : Electronic Load Control (ELC) + ballast load
6. Pipa : 10 - 24 inch (tergantung debit dan head)
7. Berat : +-450kg

Paket komplit tinggal pasang ke pipa dan sambung ke kabel jaringan (plug and play).
paket komplit terdiri dari :
1. Turbin dan aksesoris (baseframe, adaptor pipa)
2. Transmisi mekanik (puley,belt/coupling dan pengaman)
3. Generator dan baseframe/landasan
4. Kontrol panel ELC, Ballast load dan kabel2 sambungan

Ongkos kirim disesuaikan Lokasi (luar jawa 2-5jtn).
Unit dibuat sesuai dengan data lokasi, jadi tidak ready stok karena seti ap lokasi pasti berbeda.
waktu pembuatan kurang lebih 30 hari.
Untuk tanya tanya mohon sampaikan data HEAD dan DEBIT lokasi. kun jungi website pme-
bandung.com untuk info lebih jelas. hubungi atau wa di nol8139 555 6 300

HARGA PAKET KOMPLIT BERKISAR 10-15jtKW
Produk Kami STANDARD International. sudah diekspor dan beroperasi di lebih dari 30 Negara Seluruh Dunia.

Lampiran 19 Harga satuan motor TECO

TECO 1 HP 0,75 KW 3 Phase 4 Pole B3 Elektro Motor/dinamo/Motor Induksi

2 orang menyukai barang ini

Rp2.336.999

Detail | Info Penting

Kondisi: Baru
Min. Pemesanan: 1 Buah
Etalase: **2 ELECTRIC MOTOR INDUKSI 3PHASE 380V**

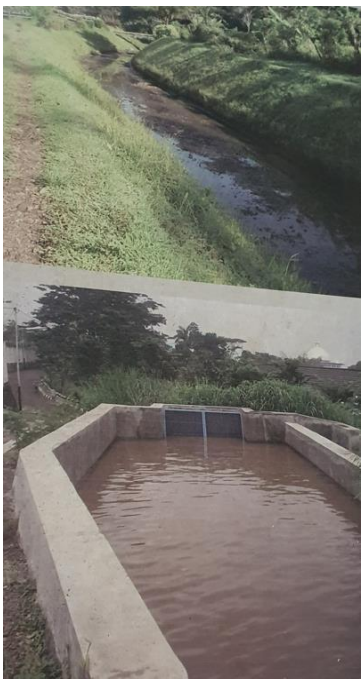
Merek : TECO
TYPE : AESV1S - 80M-4
POWER : 1hp / 0.75kw / 1pk
RPM : 1425 (4POLE / 4P)
VOLT : 220/380V / 3PHASE
MODEL : FOOT MOUNTED (B3)
DIAMETER AS : 19mm
GULUNGAN : TEMBAGA...

Lampiran 20 Kontrol PLTMH sengkaling 1

Lampiran 21 Dummy (ballast) udara dan air

Lampiran 22 Tampilan keseluruhan sistem PLTMH sengkaling 1

Lampiran 23 Proses aliran air dari sungai brantas



Terimakasih