

TECHNICAL DATA

MQ-2 GAS SENSOR

FEATURES

Wide detecting scope
Stable and long life

Fast response and High sensitivity
Simple drive circuit

APPLICATION

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, i-butane, propane, methane ,alcohol, Hydrogen, smoke.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
V _c	Circuit voltage	5V±0.1	AC OR DC
V _H	Heating voltage	5V±0.1	ACOR DC
R _L	Load resistance	can adjust	
R _H	Heater resistance	33 Ω ± 5%	Room Tem
P _H	Heating consumption	less than 800mw	

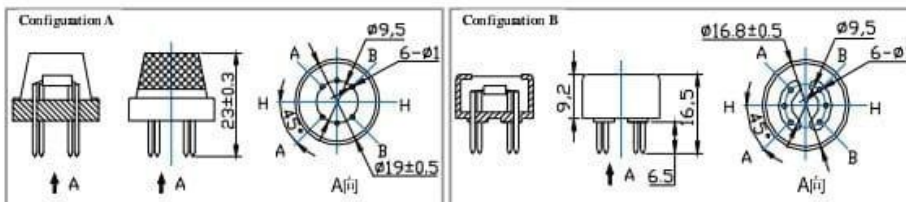
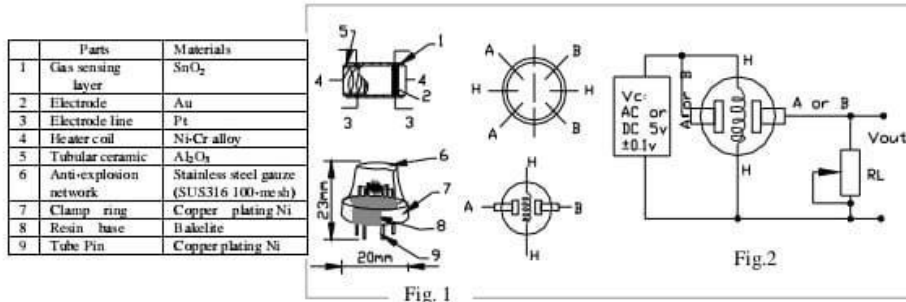
B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
T _{ao}	Using Tem	-20℃-50℃	
T _{as}	Storage Tem	-20℃-70℃	
R _H	Related humidity	less than 95%Rh	
O ₂	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Remarks
R _s	Sensing Resistance	3K Ω -30K Ω (1000ppm iso-butane)	Detecting concentration scope: 200ppm-5000ppm LPG and propane 300ppm-5000ppm butane 5000ppm-20000ppm methane 300ppm-5000ppm H ₂ 100ppm-2000ppm Alcohol
α (3000/1000) isobutane	Concentration Slope rate	≤0.6	
Standard Detecting Condition	Temp: 20℃ ±2℃ Humidity: 65% ±5%	V _c :5V±0.1 V _H : 5V±0.1	
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit



Structure and configuration of MQ-2 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro Al₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a

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crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-2 have 6 pin .4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

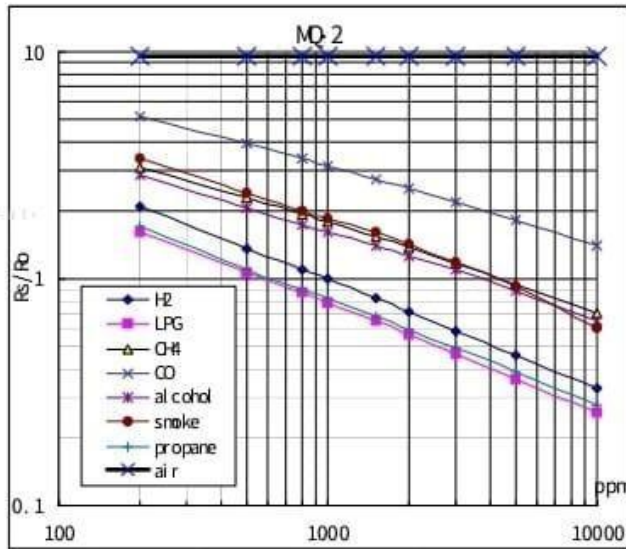


Fig.2 sensitivity characteristics of the MQ-2

Fig.3 is shows the typical sensitivity characteristics of the MQ-2 for several gases. in their: Temp: 20°C, Humidity: 65%, O₂ concentration 21%, RL=5kΩ

R₀: sensor resistance at 1000ppm of H₂ in the clean air.
R_s:sensor resistance at various concentrations of gases.

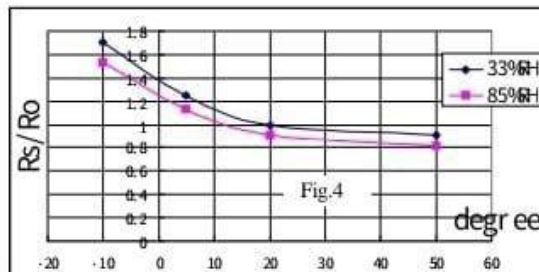


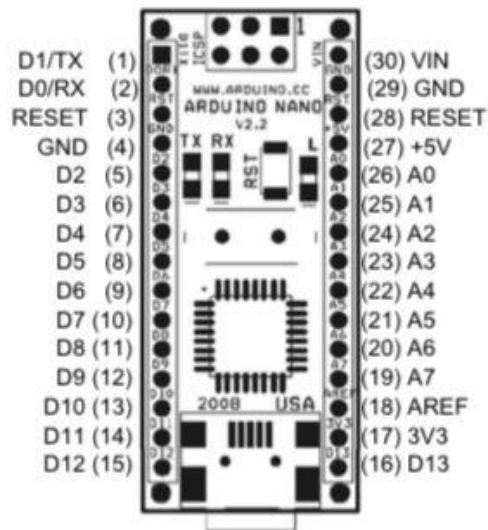
Fig.4 is shows the typical dependence of the MQ-2 on temperature and humidity. R₀: sensor resistance at 1000ppm of H₂ in air at 33%RH and 20 degree.
R_s: sensor resistance at 1000ppm of H₂ at different temperatures and humidities.

SENSITIVITY ADJUSTMENT

Resistance value of MQ-2 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm liquified petroleum gas<LPG>,or 1000ppm iso-butane<i-C₄H₁₀>concentration in air and use value of Load resistance that (R_L) about 20 KΩ (5KΩ to 47 KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

Arduino Nano Pin Layout

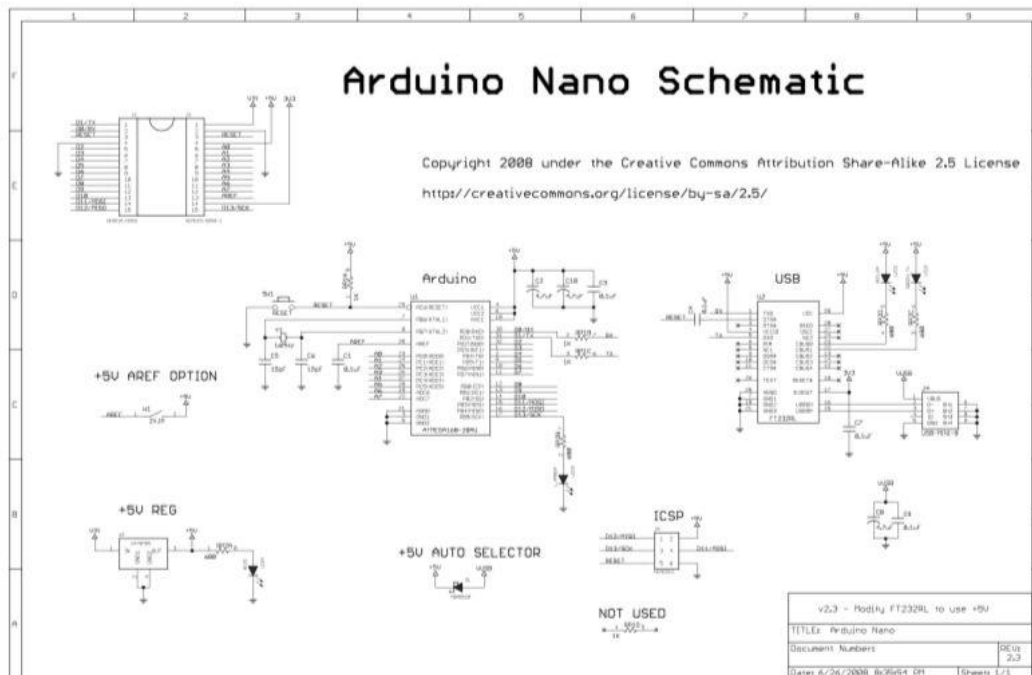


Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output (from FTDI)
18	AREF	Input	ADC reference
19-26	A7-A0	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

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Arduino Nano Bill of Material

Item Number	Qty.	Ref. Dest.	Description	Mfg. P/N	MFG	Vendor P/N	Vendor
1	5	C1,C3,C4,C7,C9	Capacitor, 0.1uF 50V 10% Ceramic X7R 0805	C0805C104K5RACTU	Kemet	80-C0805C104K5R	Mouser
2	3	C2,C8,C10	Capacitor, 4.7uF 10V 10% Tantalum Case A	T491A475K010AT	Kemet	80-T491A475K010	Mouser
3	2	C5,C6	Capacitor, 18pF 50V 5% Ceramic NOP/COG 0805	C0805C180J5GACTU	Kemet	80-C0805C180J5G	Mouser
4	1	D1	Diode, Schottky 0.5A 20V	MBR0520LT1G	ONsemi	863-MBR0520LT1G	Mouser
5	1	J1,J2	Headers, 36PS 1 Row	68000-136HLF	FCI	649-68000-136HLF	Mouser
6	1	J4	Connector, Mini-B Recept Rt. Angle	67503-1020	Molex	538-67503-1020	Mouser
7	1	J5	Headers, 72PS 2 Rows	67996-272HLF	FCI	649-67996-272HLF	Mouser
8	1	LD1	LED, Super Bright RED 100mcd 640nm 120degree 0805	APT20125RCPRV	Kingbright	604-APT20125RCPRV	Mouser
9	1	LD2	LED, Super Bright GREEN 50mcd 570nm 110degree 0805	APHCM2012CGCK-F01	Kingbright	604-APHCM2012CGCK	Mouser
10	1	LD3	LED, Super Bright ORANGE 160mcd 601nm 110degree 0805	APHCM2012SECK-F01	Kingbright	04-APHCM2012SECK	Mouser
11	1	LD4	LED, Super Bright BLUE 80mcd 470nm 110degree 0805	LTST-C170TBKT	Lite-On Inc	160-1579-1-ND	Digikey
12	1	R1	Resistor Pack, 1K +/-5% 62.5mW ARES SMD	YC164-JR-071KL	Yageo	YC164J-1.0KCT-ND	Digikey
13	1	R2	Resistor Pack, 680 +/-5% 62.5mW ARES SMD	YC164-JR-07680RL	Yageo	YC164J-680CT-ND	Digikey
14	1	SW1	Switch, Momentary Tact SPST 150gf 3.0x2.5mm	B3U-1000P	Omron	SW1020CT-ND	Digikey
15	1	U1	IC, Microcontroller RISC 16kB Flash, 0.5kB EEPROM, 23 I/O Pins	ATmega168-20AU	Atmel	556-ATMEGA168-20AU	Mouser
16	1	U2	IC, USB to SERIAL UART 28 Pins SSOP	FT232RL	FTDI	895-FT232RL	Mouser
17	1	U3	IC, Voltage regulator 5V, 500mA SOT-223	UA78M05CDCYRG3	TI	595-UA78M05CDCYRG3	Mouser
18	1	Y1	Crystal, 16MHz +/-20ppm HC-49/US Low Profile	ABL-16.000MHZ-B2	Abracon	815-ABL-16-B2	Mouser





Name: **Relay Module 2-Channel**
Code: **MR009-004.1**



This *Relay Module 2-Channel* is a module designed to allow you to control two relays in a very simple and intuitive manner. Being compatible with Arduino, the most immediate way to use it is to connect it to an Arduino board using flexible jumpers.

Exploiting the characteristics of the relays mounted on the module and through the use of two Arduino digital I/O pins, it is possible to control motors, inductive loads and other devices; this product is therefore fundamental in domotics projects or, more in general, in robotics projects.

The module is equipped with optocouplers on *IN1* and *IN2* lines in such a way that it ensures the galvanic insulation between the relay load and the control board which drives this module.

CONNECTIONS

Pin	Function
IN1	TTL digital input
IN2	TTL digital input
GND	Ground
+5V	Power (+5V)
NO1	Normally open contact
COM1	Common contact
NC1	Normally closed contact

Lampiran 7

Microbot – Relay Module 2-Channel

NO2	Normally open contact
COM2	Common contact
NC2	Normally closed contact

Tab.1 – Connections

CHARACTERISTICS

Pin	Function
Supply voltage	+5V
Supply current	144mA typ. (150mA max.)
Current on pin IN	14mA typ.
Rated load	7A 250VAC
Operating temperature	-30°C / +70°C
Operate time max.	10ms Max.
Release time max.	5ms Max.
Insulation resistance	100Mohm Min.
Mechanical Life Expectancy	10,000,000 operations
Electrical Life Expectancy	10,000 operations
Dimensions	1.7" x 1.3" (43.2 x 33.0 mm)
Weight	0.92oz (26.2g)

Tab.2 - Characteristics



1 dari 3

Datasheet

I2C 1602 Serial LCD Module



Product features:

The I2C 1602 LCD module is a 2 line by 16 character display interfaced to an I2C daughter board. The I2C interface only requires 2 data connections, +5 VDC and GND to operate

For in depth information on I2C interface and history, visit: <http://www.wikipedia/wiki/i2c>

Specifications:

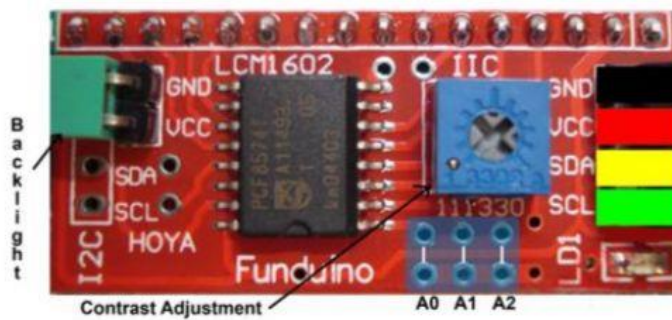
I2C Address Range	2 lines by 16 character 0x20 to 0x27 (Default=0x27, addressable)
Operating Voltage	5 Vdc
Backlight	White
Contrast	Adjustable by potentiometer on I2c interface
Size	80mm x 36mm x 20 mm
Viewable area	66mm x 16mm

Power:

The device is powered by a single 5Vdc connection.

Lampiran 9

Pinout Diagram:



Pin/Control Descriptions:

Pin #	Name	Type	Description
1	GND	Power	Supply & Logic ground
2	VCC	Power	Digital I/O or RX (serial receive)
3	SDA	I/O	Serial Data line
4	SCL	CLK	Serial Clock line
A0	A0	Jumper	Optional address selection A0 - see below
A1	A1	Jumper	Optional address selection A1 - see below
A2	A2	Jumper	Optional address selection A2 - see below
Backlight		Jumper	Jumpered - enable backlight, Open - disable backlight
Contrast		Pot	Adjust for best viewing

Addressing:

A0	A1	A2	Address
Open	Open	Open	0x27
Jumper	Open	Open	0x26
Open	Jumper	Open	0x25
Jumper	Jumper	Open	0x24
Open	Open	Jumper	0x23
Jumper	Open	Jumper	0x22
Open	Jumper	Jumper	0x21
Jumper	Jumper	Jumper	0x20

Software:

Download the required LCD Arduino™ library for this device from:

<http://www.circuitattic.com/downloads/category/3-sample-code.html?download=9%3Aanother-i2c-library-easier-to-use>

Replace current liquid crystal library found in the Arduino library directory with the above
(Note: If you use the examples included with the library, be sure to change address to 0x27)

Simple example using library above.

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#if defined(ARDUINO) && ARDUINO >= 100
#define printByte(args) write(args);
#else
#define printByte(args) print(args,BYTE);
#endif
LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a
//chars and 2 line display
void setup()
{
    lcd.init(); // initialize the lcd
    lcd.backlight();
    lcd.clear();
    delay(100);
    for(int i = 0; i < 3; i++)
    {
        lcd.backlight();
        delay(250);
        lcd.noBacklight();
        delay(250);
    }
    lcd.backlight();
}

void loop()
{
    int x=0;
    lcd.clear();
    lcd.setCursor(2,0); //Start at character 0 on line 0
    lcd.print("Hello World");
    lcd.setCursor(0,1); //Start at character 0 on line 1
    lcd.print(" opencircuit.nl");
    delay(3000); //Wait 3 seconds
    lcd.clear();
    lcd.setCursor(0,0); //Start at character 0 on line 0
    lcd.print("Cursor Blink");
    lcd.blink();
    delay(2000);
    lcd.setCursor(0,0);
    lcd.print("Cursor noBlink");
    lcd.noBlink();
    delay(2000);
}
```

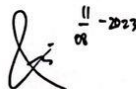


Pembimbing Laporan Akhir memberikan rekomendasi kepada,

Nama : Rlan Tanjung
NIM : 062030310975
Jurusan/Program Studi : Teknik Elektro/ DIII Teknik Listrik
Judul Laporan Akhir : Rancang Bangun Alat Pendeteksi
Kebocoran Gas *Liquefied Petroleum Gas*
(LPG) Menggunakan Sensor MQ- 2 Berbasis
Mikrokontroler Arduino

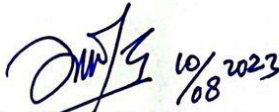
Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Laporan Akhir (LA) pada Tahun Akademik 2023.

Pembimbing I,


(Indah Susanti, ST., M.T)
NIP. 198809132014042002

Palembang, 10 Agustus 2023

Pembimbing II,


(Andri Suyadi, S.ST., M.T)
NIP. 196510091990031002

No. Dok. : F-PBM-16

Tgl. Berlaku : 13 Desember 2010

No. Rev. : 00

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	Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id	
KESEPAKATAN BIMBINGAN LAPORAN AKHIR (LA)		

Kami yang bertanda tangan di bawah ini,

Pihak Pertama

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Program Studi : DIII Teknik Listrik

Pihak Kedua

Nama : Andri Suryadi, S.ST., M.T
NIP : 196510091990031002
Jurusan : Teknik Elektro
Program Studi : DIII Teknik Listrik

Pada hari ini *kamis* tanggal *10 agustus* telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari *Senin* pukul *10:00*, tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Pihak Pertama,



Rian Tanjung
NIM. 062030310975

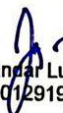
Palembang, Mei 2023

Pihak Kedua,



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Mengetahui,
Ketua Jurusan



Ir. Iskandar Lutfi, M.T
NIP. 196501291991031002










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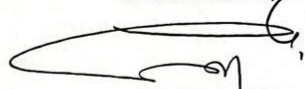
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	LEMBAR BIMBINGAN LAPORAN AKHIR	

Nama : Rian Tanjung
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 Jurusan/Program Studi : Teknik Elektro / DIII Teknik Listrik
 Judul Laporan Akhir : Rancang Bangun Alat Pendeteksi Kebocoran Gas Liquefied Petroleum Gas (LPG) Menggunakan Sensor MQ-2 Berbasis Mikrokontroler Aduino
 Pembimbing I/II *) : Indah Susanti S.T.,M.T

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	24/ Mei 2023	Pengajuan judul proposal LA.	
2.	5/6 2023	Persewaan judul LA.	
3.	7/6 2023	* Bab 1, perbaiki latar belakang, batasan masalah.	
4.	12/6 2023	* Bab 2, perbaiki metode, penulisan kut. sumber. * Bab 1, rcc.	
5.	14/6 2023	* Bab 2 rcc. * Bab 3, perbaiki judul sub. flowchart.	
6.	15/6 2023	* Bab 3 rcc, * Bab 4, perbaiki tabel hasil, ditambahkan poin-poin.	
7.	19/6 2023	* Bab 4 rcc. * Bab 5, ditambahkan kesimpulan kesimpulan 1.	
8.	14/7 2023	* Diton bahasan daftar pustaka daftar!	
9.	11/8 2023	AEC Cidang.	
10.			
11.			
12.			

Palembang, Juni 2023

Ketua Jurusan/KPS,



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NIP. 197509242008121001

Catatan:

*) melingkari angka yang sesuai.

Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.

Lembar bimbingan LA ini harus dilampirkan dalam Laporan Akhir.

 Dipindai dengan CamScanner









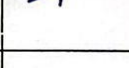
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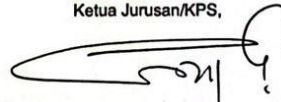
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 Pembimbing I/II *) : Andri Suyadi, S.ST., M.T

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	19/06 2023	Konsultasi Judul LA	
2.	24/06 2023	ACC Judul LA	
3.	25/06 2023	Proposal LA	
4.	18/07 2023	BAB I : Latar Belakang	
5.	19/07 2023	BAB II TATA TUIS DI	
6.	07/08 2023	BAB III Revisi	
7.	08/08 2023	BAB III, Perhitungan, Tabel	
8.	9/08 2023	BAB IV Revisi	
9.	10/08 2023	ACC / UJIAN SUDAH LA	
10.			
11.			
12.			

Palembang, Juni 2023

Ketua Jurusan/KPS,



Anton Firmansyah, S.T., M.T.
NIP. 197509242008121001

Catatan:

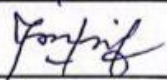


*) melingkari angka yang sesuai.
 Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.
 Lembar pembimbingan LA ini harus ditampilkan dalam Laporan Akhir.

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	PELAKSANAAN REVISI LAPORAN AKHIR	


Mahasiswa berikut,

Nama : Rian Tanjung
 NIM : 062030310975
 Jurusan/Program Studi : Teknik Elektro / Teknik Listrik
 Judul Laporan Akhir : Rancang Bangun Alat Pendeteksi Kebocoran Gas Liquefied Petroleum Gas (LPG)
 Menggunakan Sensor MQ-2 Berbasis Mikrokontroler Aduino

Telah melaksanakan revisi terhadap Laporan Akhir yang diujikan pada hari tanggal bulan tahun Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No.	Komentar	Nama Dosen Penguji *)	Tanggal	Tanda Tangan
1.	Tidak ada Revisi	B. Ginting	3/8 2023	
2.	Tidak Ada Revisi	Indah Susanti		
3.	telah di revisi	Yessi Marniati	19/9 2023	

Palembang,
 Ketua Penguji **),


 (Indah Susanti, S.T., M.T
 NIP. 198609172014042002.....)

Catatan:

- *) Dosen penguji yang memberikan revisi saat ujian laporan akhir.
 **) Dosen penguji yang ditugaskan sebagai Ketua Penguji saat ujian LA. Lembaran pelaksanaan revisi ini harus dilampirkan dalam Laporan Akhir.

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Tgl. Berlaku : 13 Desember 2010

No. Rev. : 00

	KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI	 
	POLITEKNIK NEGERI SRIWIJAYA Jalan Srijaya Negara, Palembang 30139 Telp. 0711-353414 Fax. 0711-355918 Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id	
KESEPAKATAN BIMBINGAN LAPORAN AKHIR (LA)		

Kami yang bertanda tangan di bawah ini,

Pihak Pertama

Nama : Rian Tanjung
NIM : 062030310975
Jurusan : Teknik Elektro
Program Studi : DIII Teknik Listrik

Pihak Kedua

Nama : Indah Susanti, ST., M.T
NIP : 198809132014042002
Jurusan : Teknik Elektro
Program Studi : DIII Teknik Listrik

Pada hari ini Senin tanggal 15 Mei 2023 telah sepakat untuk melakukan konsultasi bimbingan Laporan Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari Senin pukul 12:00, tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Pihak Pertama,



Rian Tanjung
NIM. 062030310975

Palembang, Mei 2023

Pihak Kedua,



Indah Susanti, ST., M.T
NIP. 198809132014042002

Mengetahui,
Ketua Jurusan



Ir. Iskandar Lutfi, M.T
NIP. 196501291991031002