

## DAFTAR GAMBAR

2. 1 Termometer Gun	14
2. 2 Sensor Suhu DS18B20 <i>Waterproof</i>	16
2. 3 Heater Plate	18
2. 4 Board Arduino Mega 2650	20
2. 5 LCD TFT Nextion 3,2 <i>Inch</i>	22
2. 6 Diagram Blok Sistem Kendali PID	24
2. 7 Driver VNH2SP30	27
2. 8 Modul Relay 1 Channel	29
2. 9 Fan DC 12 V	30
2. 10 Elemen Peltier TEC1-12706	32
2. 11 Power Supply 12V/10A	34
3. 1 Diagram Blok	35
3. 2 Diagram Alir Program	37
3. 3 Diagram Mekanis Tampak Depan	39
3. 4 Diagram Mekanis Tampak Belakang	39
4. 1 Rancangan Modul Alat	49
4. 2 Pengukuran <i>error</i> terhadap kalibrator	54
4. 3 Pengukuran <i>error</i> terhadap modul	58
4. 4 Respon Sistem PID Setting Suhu 35°C	60
4. 5 Respon Sistem PID Setting Suhu 36 °C	61
4. 6 Respon Sistem PID Setting Suhu 37 °C	62
4. 7 Respon Sistem PID Setting Suhu 38 °C	63

4. 8 Respon Sistem PID <i>Setting</i> Suhu 39°C	64
4. 9 Respon Sistem PID <i>Setting</i> Suhu 40 °C	65
4. 10 Respon Sistem PID <i>Setting</i> Suhu 41 °C	66
4. 11 Respon Sistem PID <i>Setting</i> Suhu 42 °C	67
4. 12 Hasil <i>setting</i> KP pada 6 pengaturan berbeda	70
4. 13 Hasil <i>setting</i> KI pada 6 pengaturan berbeda	72
4. 14 Hasil <i>setting</i> KD pada 8 pengaturan berbeda	74
5. 1 Rangkaian Keseluruhan Alat	76