

## DAFTAR ISI

<b>HALAMAN JUDUL</b> .....	<b>i</b>
<b>LEMBAR PERNYATAAN</b> .....	<b>ii</b>
<b>LEMBAR PENGESAHAN</b> .....	<b>iii</b>
<b>ABSTRAK</b> .....	<b>iv</b>
<b>KATA PENGANTAR</b> .....	<b>v</b>
<b>DAFTAR ISI</b> .....	<b>vii</b>
<b>DAFTAR TABEL</b> .....	<b>xi</b>
<b>DAFTAR GAMBAR</b> .....	<b>xii</b>
<b>BAB I PENDAHULUAN</b>	
1.1 Latar Belakang .....	1
1.2 Rumusan Masalah .....	2
1.3 Tujuan Penelitian .....	2
1.4 Batasan Masalah .....	2
1.5 Sistematika Penulisan .....	3
<b>BAB II LANDASAN TEORI</b>	
2.1 Studi Literatur .....	5
2.2 Lampu LED .....	6
2.2.1 Pengertian Lampu LED .....	6
2.2.2 Cara Kerja Lampu LED .....	7
2.2.3 Keunggulan Lampu LED .....	7
2.2.4 Kekurangan Lampu LED .....	8
2.3 Harmonisa .....	9
2.3.1 Pengertian Harmonisa .....	9
2.3.2 Sumber Harmonisa .....	11
2.3.2.1 Beban Linier .....	12
2.3.2.2 Beban Non Linier .....	12

2.3.3	Dampak Harmonisa .....	13
2.3.4	Batasan Nilai Harmonisa .....	14
2.3.4.1	Batasan Distorsi Harmonisa Tegangan .....	14
2.3.4.2	Batasan Distorsi Harmonisa Arus .....	15
2.3.5	Pengukuran dan Penilaian (Assesment) Harmonisa .....	17
2.3.5.1	Pengukuran Harmonisa Tegangan .....	17
2.3.5.2	Pengukuran Harmonisa Arus .....	18
2.3.5.3	Durasi Pengukuran Harmonisa .....	19
2.3.5.4	Peralatan Pengukuran Harmonisa .....	19
2.3.5.5	Jenis Peralatan Pengukuran Harmonisa .....	19
2.3.6	Penilaian (Assesment) Harmonisa .....	20
2.3.6.1	Kewajiban Pihak Pelanggan .....	20
2.3.6.2	Kewajiban PLN/Pihak Utilitas .....	20
2.4	Mitigasi Pengaruh Harmonisa .....	20
2.4.1	AC-Line Reactor dan DC-Link Chokes .....	20
2.4.1.1	AC-Line Reactor .....	21
2.4.1.2	DC-Link Chokes .....	22
2.4.2	Passive Filter .....	23
2.4.3	Active Harmonic Filter .....	23
2.5	Active Harmonic Filter .....	24
2.5.1	Pengertian Active Harmonic Filter .....	24
2.5.2	Perhitungan Kebutuhan Active Harmonic Filter .....	25
2.5.3	Persyaratan Active Harmonic Filter .....	26
2.5.4	Standar Referensi .....	26
2.5.5	Standar Active Filter Harmonic .....	26
2.5.6	Kompensasi pada Daya Reaktif .....	27
2.5.7	Persyaratan Active Filter Harmonic .....	28
2.5.7.1	Konstruksi dan Panel .....	28
2.5.7.2	Kemampuan Operasional .....	28
2.5.7.3	Human Machine Interface (HMI) .....	29
2.5.7.4	Komunikasi .....	29
2.5.7.5	Current transformers (CT).....	30

2.5.7.6	Kondisi Layanan .....	30
2.5.7.7	Kondisi Penyimpanan .....	31
2.5.7.8	Jaminan Kualitas .....	31

### **BAB III METODOLOGI PENELITIAN**

3.1	Objek Penelitian .....	32
3.2	Diagram Flowchart .....	33
3.3	Pengumpulan Data .....	34
3.3.1	Gambar Mapping lokasi Panel Special Lighting .....	34
3.3.2	Gambar single diagram sistem Elektrikal .....	35
3.3.3	Gambar wiring diagram sistem Panel Special Lighting .....	36
3.3.4	Koordinasi penambahan lampu special lighting area Façade .....	37
3.4	Persiapan Peralatan Pengukuran .....	37
3.4.1	Power Quality Energy Analyzers Portable .....	37
3.4.2	Power Meter Panel .....	39
3.5	Pengukuran Power Quality .....	44
3.5.1	Jangka waktu Pengukuran .....	44
3.5.2	Hasil Pengukuran .....	45
3.6	Perhitungan Kapasitas active harmonic filter .....	46
3.7	Pemilihan lokasi pemasangan active filter harmonic .....	46
3.8	Implementasi active filter harmonic .....	48
3.9	Pengujian ulang power quality .....	52
3.10	Batasan THDI sesuai Standard .....	54

### **BAB IV HASIL DAN PEMBAHASAN**

4.1	Analisa Pengukuran Power Quality .....	55
4.1.1	Analisa Pengukuran Individual Harmonic Distraction Current (IHDI) .....	55
4.1.1.1	Nilai Hasmonisa lampu LED .....	57
4.1.2	Analisa Pengukuran Total Harmonic Distraction Current (THDI) .....	57

4.1.2.1	Analisa Pengukuran Arus Fundamental .....	57
4.1.2.2	Analisa Pengukuran THDI .....	60
4.2	Perhitungan Kapasitas active harmonic filter .....	61
4.2.1	Perhitungan Beban Existing Special Lighting .....	62
4.2.2	Perhitungan Beban Additional Special Lighting .....	63
4.2.3	Kebutuhan Kompensasi Harmonic .....	64
4.3	Analisa Pengujian ulang power quality .....	65
4.3.1	Pengujian Arus Fundamental .....	65
4.3.2	Pengujian THDI (Total Harmonic Distraction Current) .....	66
4.4	Batasan THDI sesuai Standard .....	69
<b>BAB V KESIMPULAN DAN SARAN</b>		
5.1	Kesimpulan .....	70
5.2	Saran .....	71
<b>DAFTAR PUSTAKA</b> .....		<b>72</b>
<b>LAMPIRAN</b> .....		<b>74</b>