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LAMPIRAN

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Lampiran 1 Dokumentasi Human Mechine Interface (HMI)

Gambar lampiran keadaan awal sistem ATS dimana PLC belum di Run.



Gambar lampiran keadaan Stanby sistem ATS dimana sumber utama dan sumber cadangan dalam keadaan belum menyuplai (indikator emergency ON.)



Gambar lampiran keadaan sistem ATS dimana sumber utama dalam keadaan menyuplai beban.



Gambar lampiran keadaan sistem ATS dimana sumber cadangan dalam keadaan

menyuplai beban.

Lampiran 2 Dokumentasi Prototype Automatic Transfer Switch (ATS)



Gambar lampiran pengontrolan *Automatic Transfer Switch* (ATS) dalam keadaan menyuplai beban 3 phase berupa lampu.



Gambar lampiran *Programmable Logic Control* (PLC) berupa input dan output yang dapat disesuaikan baik dalam bentuk digital maupun analog.

PLC Siemens Simatic S7-300 CPU314C-2DP



The figures show the following

CPU elements:

(1) Status and error displays

(2) Slot for the Micro Memory Card (MMC), incl. the ejector

- (3) Connections of the integrated I/O.
- (4) Power supply connection
- (5) 1st interface X2 (PtP or DP)
- (6) 1 interface X1 (MPI)
- (7) Mode selector switch



- The figure shows the following
- integrated I/Os:
- (1) Analog I/Os
- (2) each with 8 digital inputs
- (3) each with 8 digital outputs
- (4) Front connectors (front doors are open)

HMI Siemens TP700 Comfort

Technical information

8.7 Dimension drawings

8.7.8 Dimension drawings of the TP700 Comfort

The following figures show the dimension drawings of the Comfort V1/V1.1 devices.







All dimensions in mm.

Kontaktor Siemens LC1D09 BN

Product data sheet Characteristics

LC1D09BNE

TeSys D Green IEC contactor, 9 A, 3 P, 5 HP at 480 VAC, nonreversing, 24-60 VAC/VDC coil

Product availability : Stock - Normally stocked in distribution facility

Green Premium

user applications



Price* : 41.00 USD

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Range	TeSys	
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Product or component type	Contactor	- Fo
Device short name	LC1D	4
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[le] rated operational current	9 A 140 °F (60 °C)) <= 440 V AC-3 power circuit 25 A 140 °F (60 °C)) <= 440 V AC-1 power circuit	pe ne
Motor power kW	2.2 kW 220230 V AC 50 Hz AC-3) 4 kW 380400 V AC 50 Hz AC-3) 4 kW 415 V AC 50 Hz AC-3) 4 kW 440 V AC 50 Hz AC-3) 5.5 kW 500 V AC 50 Hz AC-3) 5.5 kW 660690 V AC 50 Hz AC-3)	ubstitutie br and is not
Motor power HP (UL / CSA)	0.33 hp 115 V AC 60 Hz 1 phase 1 hp 230/240 V AC 60 Hz 1 phase 2 hp 200/208 V AC 60 Hz 3 phase 2 hp 230/240 V AC 60 Hz 3 phase 5 hp 460/480 V AC 60 Hz 3 phase 7.5 hp 575/600 V AC 60 Hz 3 phase	n is not intended as a s
[Uc] control circuit voltage	2460 V AC 50/60 Hz 2460 V DC	mentatio
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Auxiliary contact composition	1 NO + 1 NC	Ę.

"Petunjuk Penggunaan Kontrol Automatic Transfer Switch (ATS) Berbasis

Programmable Logic Control (PLC) Siemens Simatic S7-300"



Muh Amri Arfah D411 16 006

LABORATORIUM DISTRIBUSI SISTEM TENAGA DAN INSTALASI LISTRIK DEPARTEMEN TEKNIK ELEKTRO FAKULTAS TEKNIK UNIVERSITAS HASANUDDIN 2021

Petunjuk Penggunaan Kontrol Automatic Transfer Switch (ATS) Berbasis

Programmable Logic Control (PLC) Siemens Simatic S7-300

Sistem Kontrol Automatic Transfer Switch Berbasis *Programmable Logic Control* (PLC) Siemens Simatic S7-300 CPU 314 yang berfungsi sebagai pengontrol, dan *protoype* pendukung yang berfungsi sebagai pemberi sinyal output. Adapun Langkah-langkah pengoperasian sistem kontrol *Automatic Transfer Switch* (ATS) adalah sebagai berikut:

A. Pembuatan program diagram ladder

1. Buka software TIA Portal V14



2. Selanjutnya akan muncul tampilan awal dari software TIA Portal V14, pada menu start tekan create new project dan isi *project name*, *path* (lokasi penymipanan), *author*, dan *comment* jika diperlukan. Apabila program telah dibuat sebelumnya, cukup tekan *open existing project* dan buka program yang telah dibuat.



 Pada menu *devices & networks*, tekan *add new device* untuk memilih tipe PLC dan CPU yang digunakan. Pada sistem ini menggunakan PLC Siemens Simatic S7-300 dengan CPU 314C-2 PN/DP.



4. Selanjutnya mengatur alamat input dan output agar mempermudah dalam proses pembuatan diagram ladder. Untuk alamat digital I/O diubah menjadi 0 sedangkan alamat analog I/O diubah menjadi 10.

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5. Pembuatan PLC tags. PLC tags berisi daftar input, output, dan memory yang digunakan dalam program. Daftar ini terdiri dari nama, tipe data, dan alamat program.

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6. Pembuatan ladder diagram

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Adapun ladder diagram ladder diagram Kontrol *Automatic Transfer Switch* (ATS) yaitu:





B. Mendonwload Program ke PLC

Sebelum mendownload progam PLC, terlebih dahulu kita hubungkan komputer ke PLC dengan menggunakan kabel ethernet. Setelah komputer dan PLC terhubung, kita dapat melakukan proses download pada software TIA Portal V14.

1. Tekan tombol download, kemudian akan muncul jendela seperti pada gambar. Pilih *type of* PG/PC *interface* dan PG/PC *interface* seperti pada gambar dan tekan *start search* untuk mencari perangkat.

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3. Setelah muncul jendela *load priview*, tekan *load* dan program akan terdownload ke perangkat PLC.

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Untuk menampilkan proses yang sedang berlangsung pada program diagram ladder, dapat dilihat dengan menekan *Go Online* kemudian aktfkan tombol monitoring. Untuk mematikannya cukup menekan tombol *Go Ofline*.

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C. Rangkaian Perangkat Keras (Hardware)

1. Rangkaian Sistem



2. Rangkaian Kontrol



3. Gambar Automatic Transfer Switch (ATS)



D. Cara kerja Automatic Transfer Switch (ATS)

Sistem pengontrolan Automatic Transfer Switch (ATS) berbasis Programmable Logic Control (PLC) bekerja dengan memindahkan catu daya berupa switch listrik dari sumber utama (PLN) menuju sumber listrik cadangan. Pada sistem ini terdapat dua buah tombol yang dioperasikan menggunakan Human Mechine Interface (HMI) yang berfungsi untuk mengatur peralihan catu daya sistem ATS. Tombol "Start" berfungsi untuk menjalankan sistem ATS yang mengartikan sumber listrik utama dalam keadaan ON dan tombol "STOP" berfungsi untuk memberhentikan suplai listrik utama yang mengartikan sumber listrik utama mengalami gangguan dan secara otomatis akan di suplai oleh sumber listrik cadangan.

Pengontrolan sistem ATS pada *prototype* penelitian ini. Memiliki sistem kerja dengan mengaktifkan sumber utama PLN (MCB PLN ON) dalam keadaan *standby* tetapi belum menyuplai ke beban sehingga relay indikator PLN ON. Selanjutnya sumber cadangan diaktifkan (LCB ON) dalam keadaan *standby* tetapi belum menyuplai ke beban sehingga relay indikator sumber cadangan ON. monitoring dari sistem ATS dilakukan menggunakan *Human Mechine Interface* (HMI) dengan keadaan kedua sumber utama PLN dan sumber cadangan dalam kondisi standby.

Pada keadaan standby ketika PLC di *Run* indikator Emergency dalam keadaan ON (channel %Q1.2) aktif selama sumber utama dalam keadaan OFF.

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Keadaan pertama Pada saat tombol "Start" pada HMI ditekan (channel %M0.0) akan aktif, indikator sumber listrik utama PLN pada HMI yang semula berwarna kuning berubah menjadi warna hijau (channel %Q1.4) aktif, sehingga ATS dalam keadaan sumber utama menyuplai beban 3 phase lampu.

Keadaan kedua setelah beberapa saat sumber utama ON untuk pengetesan Ketika simulasi dilakukan ketika diasumsikan sumber utama mengalami gangguan maka (channel %M1.4) akan aktif, sehingga mengakibatkan latch (channel %Q1.0) aktif, sehingga indikator sumber PLN pada HMI dalam keadaan OFF, dan mengakibatkan delay selama 30 detik sebelum Genset ON sehingga mengakibatkan indikator Emergency dalam keadaan ON (channel %Q1.2) aktif,

Keadaan ketiga setelah delay waktu tercapai Genset dalam keadaan aktif sehingga menyuplai beban 3 phase lampu dan indikator sumber listrik cadangan (Genset) pada HMI yang semula berwarna kuning berubah menjadi warna hijau (channel %Q1.1) aktif dan indikator Emergency dalam keadaan ON.

Terakhir ketika tombol "Start" ditekan kembali maka sumber listrik utama ON sehingga catu daya akan menyuplai Kembali ke sumber utama secara otomatis. Proses ini akan terus berjalan dengan mengatur "Start" dan "Stop" sumber utama PLN.