

PLC



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(Programmable

Logic

Controller)

# What is PLC



- ❧ **Programmable Logic Controller**
- ❧ **Special computer device used to control any industrial process**
- ❧ **PLC implements logic control functions by means of a program.**



# Need for PLC



- ❧ **Before PLCs the only way to control machinery was through the use of relays**
- ❧ **To control a motor , relays are used**
- ❧ **To control a machinery , a large no. of relays are used**
- ❧ **If any one relay have issues, the whole system would not work**
- ❧ **To overcome these problems PLCs were introduced**

# HISTORY



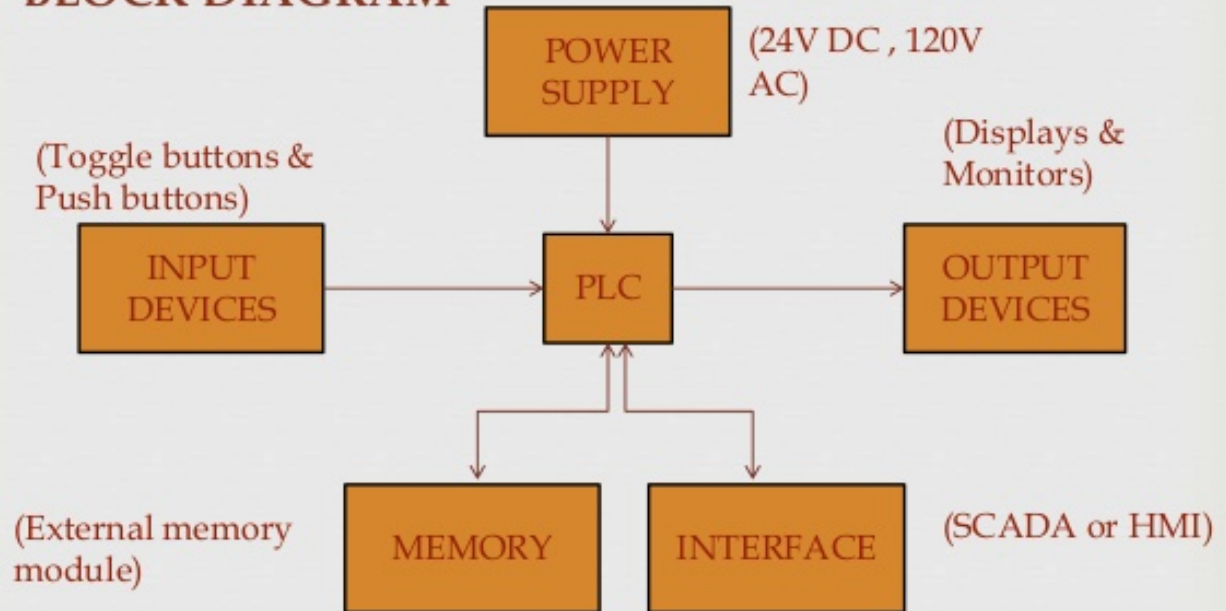
- ❧ **PLC was introduced in late 1960s**
- ❧ **Dick Morley – Father of the PLC**
- ❧ **MODICON (MODuler DIGital CONTroller) was the first PLC**



# PLC Architecture



## BLOCK DIAGRAM



# Types of PLC



## ❧ **COMPACT**

- ❧ Compact PLCs are those in which no. of input and output are defined by manufacturer side.

## ❧ **MODULER**

- ❧ PLCs in which no. of inputs and outputs can be expanded according to requirement.
- ❧ Further classified as Bus & Rack type.
- ❧ For ex – siemens 200 , siemens 300

# Types of Communication



<b>Serial communication</b>	<b>Parallel communication</b>
Bit by bit data transmission	Whole data transmission
Simple in structure	Complex in structure
Transmission rate is low	Transmission rate is high
Used in short distance communication	Used in long distance communication

# Identifiers



DATA FILE	IDENTIFIER
INPUT	I
OUTPUT	O
STATUS	S2
BINARY	B3
TIMER	T4
COUNTER	C5
REGISTOR	R6
INTEGER	N7



# Languages in PLC



- ❧ **Ladder logic (LD)**
- ❧ **Function block diagram (FBD)**
- ❧ **Statement list (ST)**
- ❧ **Instruction list (IL)**
- ❧ **Structure list (STL)**

# Micrologix 1000



- ❧ **Communication software – RS links classic**
- ❧ **Programming software – RS Logix 500**
- ❧ **Protocol used – Full duplex**
- ❧ **Cable used – PM(02)**
- ❧ **Baud rate – 9.6 KB/sec**



# Symbols used in PLC



## ☞ FOR INPUT

- ☞ --[]-- {EXAMIN IF CLOSED}
- ☞ --[/]-- {EXAMINE IF OPEN }

## ☞ FOR OUTPUT

- ☞ --()-- Output{OTE}
- ☞ --(L)-- Output latch{OTL}
- ☞ --(U)-- Output unlatch{OTU}

# Timers



- ❧ **It provide time delays**
- ❧ **They need continuous power supply**
- ❧ **Addressing of timers**
  - ❧ Identifier : Timer number
- ❧ **Bits of timer**
  - ❧ Enable (EN) bit
  - ❧ Done (DN) bit
  - ❧ Timer time (TT)bit
- ❧ **Micrologix 1000 has its own 40 timers**

# Types of Timers



## ☞ **Timer On Delay (TON)**

☞ Counts time base when the instruction is true

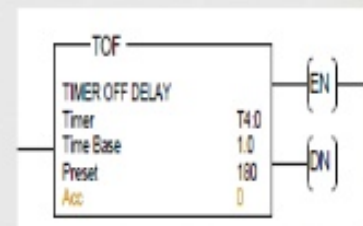
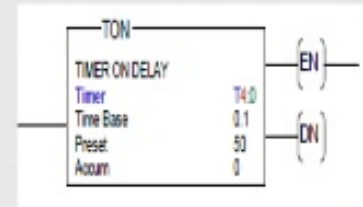
## ☞ **Timer Of Delay (TOF)**

☞ Counts time base when the instruction is false

## ☞ **Retentive Timer (RTO)**

☞ It provide ON time delay

☞ It retain its last value



# Counters



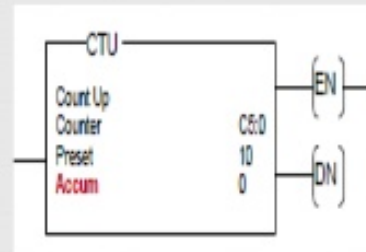
- ❧ **Counters doesn't need continuous power supply**
- ❧ **Counters depends on pulse/count/click**
- ❧ **Addressing of counters**
  - ❧ **Identifier : Counter number**
- ❧ **BITS OF COUNTER**
  - ❧ **Counter up (CU)/ Counter down (CD) bit**
  - ❧ **Overflow (OV)/ Underflow (UN) bit**
  - ❧ **Done (DN) bit**

# Types of Counters



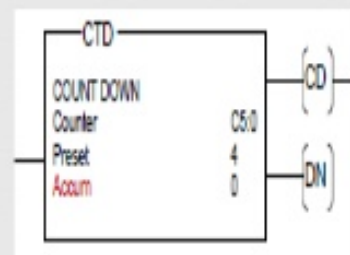
## ☞ Counter up (CTU)

- ☞ It performs up counting
- ☞ Counting range - 0 to +32767



## ☞ Counter down (CTD)

- ☞ It performs down counting
- ☞ Counting range - 0 to -32768



# Advantages



- ❧ **Reliable**
- ❧ **Communication ability**
- ❧ **Accuracy**
- ❧ **Speed of operation**
- ❧ **Easy to operate**



# Disadvantages



- ❧ **Initial cost is high**
- ❧ **PLC devices part or software of one manufacturer can't be used in communication with parts of another manufacturer**
- ❧ **Limited designs , Fixed circuits**

# Applications



- ❧ **Car park control**
- ❧ **Train control station**
- ❧ **Conveyer system**
- ❧ **Robot manufacturing and control**
- ❧ **Traffic lights**