CHAPTER I

CONTROL SYSTEMS

Word control often we hear in everyday discussion. Word control here can be interpreted "arranging", and if we narrow again meaning usage of word control in electrics technique is an equipments group or equipments used to arrange function machine to specify the machine behaviour is matching with the one which wanted. System having ability to start, arranging and riffing process to get output matching with the one which wanted to be to be referred as "Control Systems". And in general a control systems to represent an corps equipments of electric / electronic, equipments of mechanic, or equipments of other electrics which used to guarantee stability, smooth transition and also accuration a process.

Every control systems have three fundamental element, that is: input, process, and output. In general input come from transducer. This Transducer is an appliance able to change physical amount become electrics sinyal. Some example of tranducer among others can in the form of: push bottom, mini circuit breaker, termostat, straingages, etc. This Tranducer deliver information concerning measured amount. Process in this control systems can in the form of network control by using equipments of stringed up control electricsly. And there is also using equipments of control with programe system which can innovated or more popular referred by the name of PLC (Programmable Logic Controller).

At control with programe system of which can innovated, control program kept in a memory unit and enable or can change program which have been written previously, that is by programe repeat is matching with the one which wanted. Duty from part of process is to process data coming from input and then as its result in the form of respon (output).

Sign coming from part of this process in the form of electrics sign which is then weared to activate equipments of output like: motor, solenoid, lamp, spillway, etc. By using equipments of this output can earn to change electrics amount into physical amount.
A. Open Loop Control

Control systems of Loop open to represent a process in system of which input variable will have an in with yielded output. Picture following diagram block menunjukan of system of loop open, which possible can assist you in comprehending the control systems. If us see from diagram block, at control systems of loop open here no given information to equipments of control coming from equipments of output (controlled variable), ignorable so that correctly what is wanted output as according to desire or not. Especially in the event of trouble from outside able to influence output. Therefore at this system will happened big enough mistake because of corrective inexistence.

*Picture 1. Diagram block Open Loop Control*
B. Closed Loop Control

Control of Loop closed is a process of which controlled variable is continually censored then compared to reference amount. As for controlled variable can in the form of result of measurement like for example measurement of temperature, dampness, mechanic position, speed of rotation, etc. Then result of baited by mentioned measurement of inversion to comparator. This comparator can in the form of equipments of mechanic, electrics / electronic, or pneumatik. At this comparator appliance between reference amount with censor sinyal coming from controlled to be variable to be compared to, and as its result mistake sign. This error sign its result can be negative or positive, mathematically this mistake sign like use under equation.

\[
\text{Error} = \text{result of variable measurement} - \text{set point.}
\]

![Diagram block Closed Loop Control](image)

**Picture 2. Diagram block Closed Loop Control.**

If us see diagram block picture, hence at block equipments of control can in the form of equipments of which can work mechanicly, electrics / electronic, and or pneumatik, which this block accept mistake sinyal and yield sign output which later passed to part of process improve mistake until result of / product really matching with the one which wanted or mistake an equal to zero. That way control systems mechanism closed, and the mechanism work continuously have (continuation).
CHAPTER II
WHAT IS PLC

A. Meaning of PLC

PLC (PROGRAMMABLE LOGIC CONTROLLER) is an equipments of created control from result of solidarity between technology of computer "solid-state" and is "traditional of controller sequence" manual control. Peculiarly PLC is purpose special that is special designed computer to operate a certain problem related to controller or problem work process or machine in the industry.

According To NEMA (National Electrical Manufacturers Association) giving congeniality of PLC that is "an equipments of electrics operating digital by using memory programmable to be is depository of internal instructions in the place of activity of equipments having specific function, examples: logic, sequence, timer, counter, and aritmatichs, to control of process or machines, passing input module of output analogously is - digital".

Basically PLC have function to replace of relay - mechanic and timer, but caused by excellence of equipments of microprocessor developing is hardware than PLC, hence PLC can operations of aritmatik, converting analogous data to digital or from digital to analogue, comparing data and can finish the problem of control having the character of complex.

PLC operate by checking input from a process utilize to know its status later; then this sign input is processed pursuant to programe logic instruction which have in memory. Interface (interface) attached in conducive PLC of Connective PLC directly to or actuator of transducer not requiring relay.

To correspond to situation of its job, hence PLC designed to be able to operate on dusty industrial environment and high pollution level, with change of temperature 0oC until 60oC and dampness of relative between 0% until 95%. Because by using PLC many advantage which is very influence production process in company.
As for advantage by using PLC is:

1. *Cheaper of expense compared to control system using many relay (manual control).*
2. *Easier in programing and earn to easily altered its system network.*
3. *More peaceful is, practical, and rely on from network of control manual.*
4. *Having principle like computer.*
5. *Easier in tracing network trouble of control made.*

### B. Principle of PLC

Principle work from PLC in general is to accept sign analogous of equipments of external input which in the form of: saklar, push bottom, overload, censor, etc. sign this Analogous by input module will be altered to become sign-digital.

At system to be controlled to have sign or pulsa in every and input of output, good in the form of sign analogous and also digital sign. This digital sign will be processed by unit of product especial is "Central Processing Unit (CPU)" as according to comand of program which have been specified or program at memory. Here after CPU will take decision - decision which later will be carried over by module of Output still in the form of sign digital.

![Picture 3. Principles of PLC.](image-url)
Module of Output will change digital sign become analogous sign. This sign analogous move relay - or relay of kontaktor, representing equipments of external output. Equipments of this external output which later will move machine controlled system or process. From picture above visible that system to be controlled to be to be accepted by input of devices in the form of analogous sign later on delivered to PLC to be altered in the form of digital sign. After processed by PLC to released in the form of analogous sign device output.

C. Hardware PLC

Hardware basically which owned by a PLC is same with hardware which owned by Personal Computer (PC). However owning difference in division of unit. In hardware this PLC have three bodywork, that is
1. Part Of Input of Output (I/O)
2. Processor
Part of - the shares have duty and function of in each operation of PLC.

D. Other supporter system

Besides is hardware, PLC also have peripheral of its supporter of him which is important also in its operation system. Peripheral or this supporter system represent external shares of PLC attributing to network and or program interconections exist in PLC. Besides also have part of Unit Ration Energy or of Power Supply to animate for the system of operational of PLC.

Thereby can be concluded that PLC almost have equality with Personal Computer in the case of peripheral - peripheral exist in him. So that make we ism have to be more about computer first (its operation) before us become programmer of PLC which in fact.