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FACULTY OF TECHNOLOGY

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IITS2203-5 Fieldbuses and Internet (I-IT-4N)

Laboratory Report 1: Profibus DP & Auma motor valve

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Vaasa, Finland.

Print the final device configuration and application program and paste it into the report.

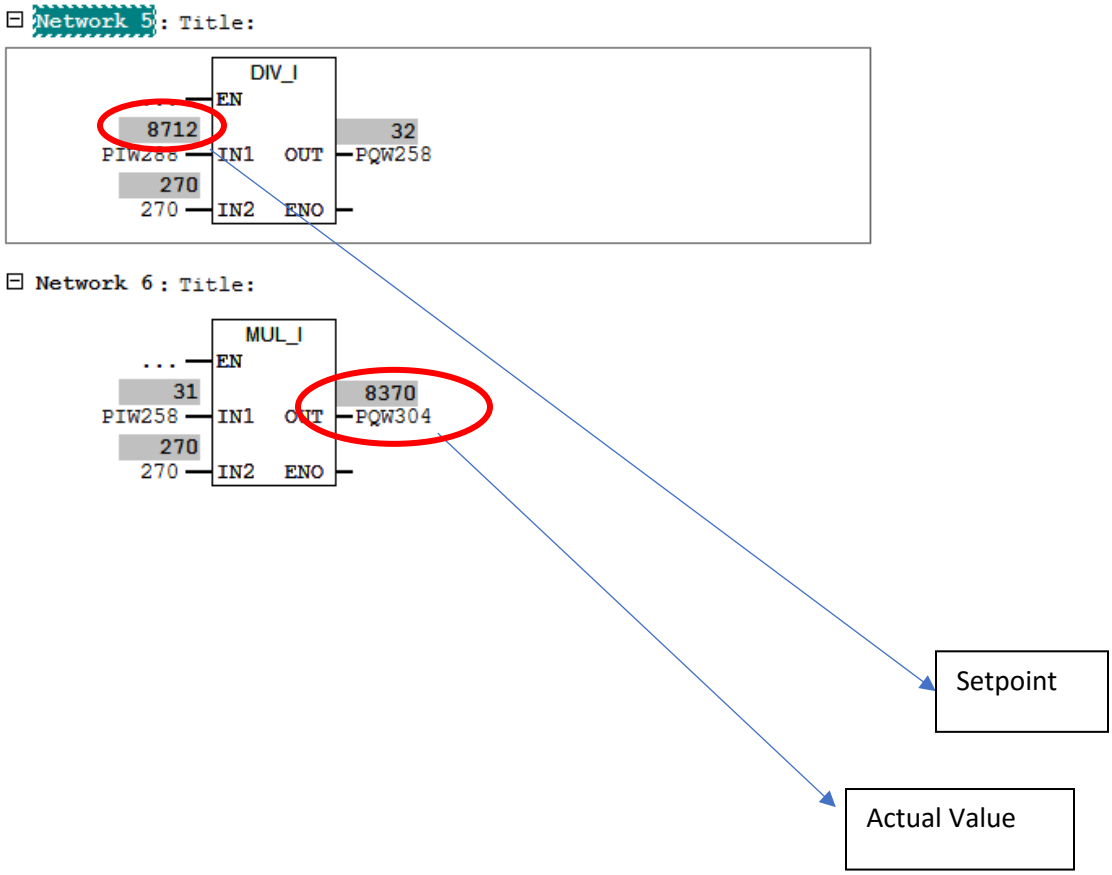


FIGURE 1: Function Code diagram of the experiment.

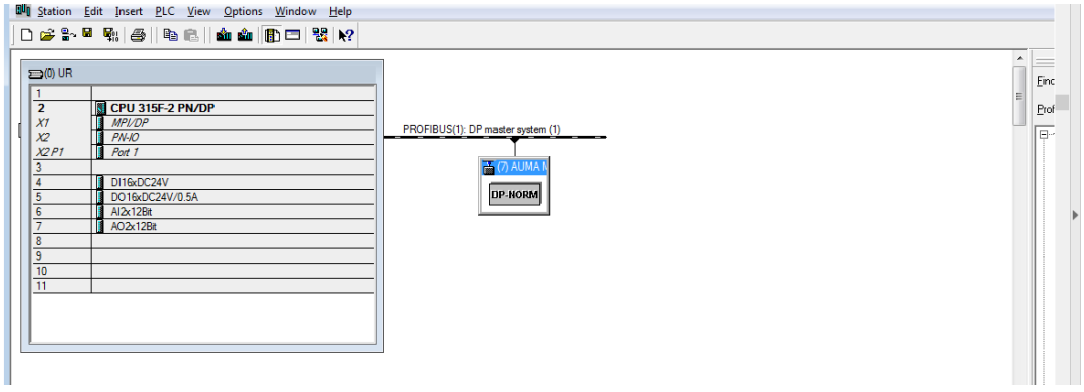


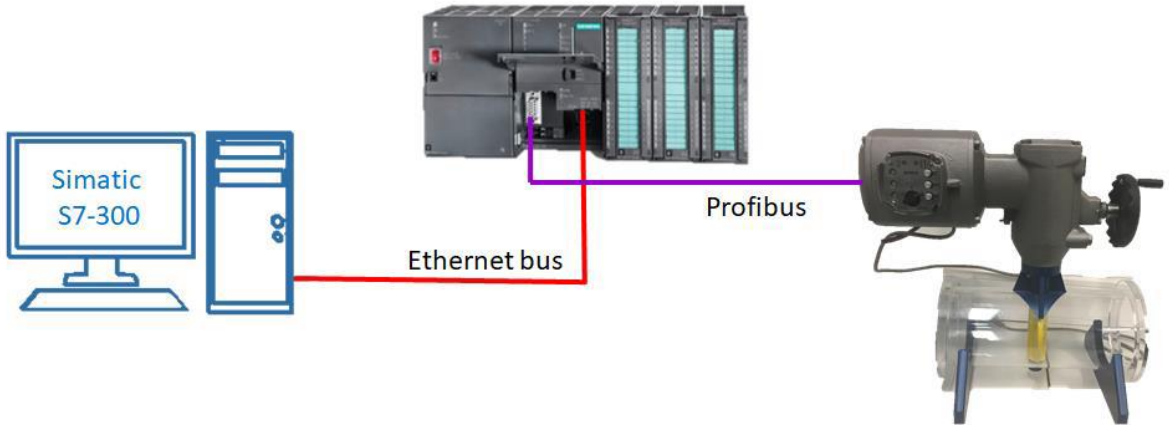
Figure 2: Application Window of Lab1 experiment. Showing Auma Valve connected to a PLC through PROFIBUS -DP.

Write a short summary about this project and also answer the following questions in your report:

The lab report was carried out with the following objectives:

a. Learn about applying Profibus DP.
b. Learn about the driving principles of the motor unit.
c. Learn about using PLC s7-300.

I connected the following:



The idea was to connect a PLC to an AUMA electric motor valve using the PROFIBUS-DP

Appropriate hardware configurations such as setting Rack, PLC version, I/O modules, were made.

In addition, network and device addresses were set.

Setting up the drive for Auma motor valve was carried out.

The PLC application was written to remotely control the valve. Appropriate parameters such as: Analog setpoint for the valve position were given via analog input card channel 1 (PIW288). Scaling 0….1000 ~0 ….100% was done.

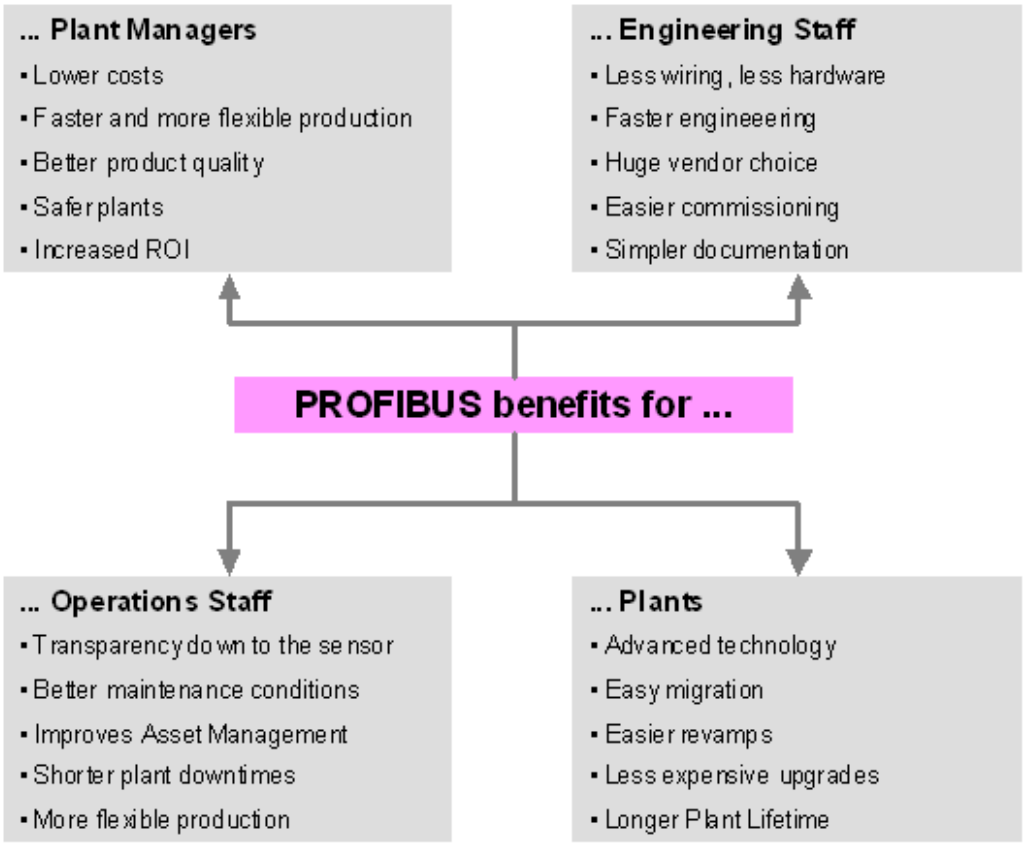
Indicating the position of the valve via analog output channel (PQW304) was done too.

Finally, the program was run, and measurement were taken (Reading status of the valve and indicate the status bits via binary output was made) as shown in the figure 1 above.

4.1. What are the benefits of using the Profibus in industrial automation?

- Cost Savings in Hardware and Assembly
- Less hardware components (I/O, terminal blocks, barriers).
- Easier, quicker and less expensive installation
- Cost Savings in Engineering

- Easier configuration (only one tool for all devices).
- Easier preventive maintenance
- Easier and much faster system start-up
- Greater Manufacturing Flexibility
- Improved functionality increases plant productivity.
- Improved availability and reduced down time.
- Accurate and reliable diagnostic data
- Reliable digital transmission technology.
- Deterministic (since parallel wiring will be replaced)
- Flexible.
- Interoperable (multi-vendor use)
- Reliable and safe.
- Easy to use.
- Solution for all your automation needs.



4.2. What types of the Profibuses?

There are three variations of PROFIBUS in use today; the most commonly used PROFIBUS DP, and the lesser used, application specific, PROFIBUS PA:

- **PROFIBUS FMS** (**Field bus Message Specification**)

✓ It was tailored for demanding communication tasks, was specified. Subsequently in 1993, the specification for the simpler and thus considerably faster protocol.

- **PROFIBUS DP** (**Decentralized Peripherals**)

✓ It is used to operate sensors and actuators via a centralized controller in production (factory) automation applications. The many standard diagnostic options, in particular, are focused on here.

- **PROFIBUS PA** (**Process Automation**)

✓ It is used to monitor measuring equipment via a process control system in process automation applications. This variant is designed for use in explosion/hazardous areas

4.3. Consider applications the Profibuses in automation applications.

a. Profibus-DP can be used for fast cyclic data transfer between PC/PLCs and decentralized I/Os.

b. The DP-Master Class 1 as a central controller, can be used to exchange information between distributed stations (DP slaves) in a specified report cycle. Typical devices include Programmable logic controllers, Computerized numeric control (CNC) or robotic controls (RC).

c. DP-Master Class 2 are devices for programming, configuring and diagnostics. They are used to create the configuration of the DP system during start-up.

d. DP-Slaves. They are peripheral devices (sensor and actuators) that read in input and outputs to the peripheral.

e. Mono or Multimaster systems can be implemented with PROFIBUS -DP.

PROFIBUS CPs can be used to exchange data between two SIMATIC PLCs.

f. PROFIBUS-PA devices include pressure, temperature, flow, mass flow and level transmitter, valves and interfaces.

Other applications include: Encoders Profile, Laboratory instruments, Variable-Speed Drive Profile, Operator Control and Process Monitoring Profile (HMI), Applications such as using

HART protocol (**Highway Addressable Remote Transducer**) and wireless with PROFIBUS, and process automation devices via PROFIBUS PA and Functional Safety (PROFIsafe).

4.4. What is PLC? and why it is needed?

A programmable logic controller (PLC), or programmable controller is an industrial digital computer which has been ruggedised and adapted for the control of manufacturing processes, such as assembly lines, or robotic devices, or any activity that requires high reliability control and ease of programming and process fault diagnosis.

1. PLC electronics are more robust and can withstand harsh environmental conditions, the reason why we chose Siemens PLC in solar tracking automation.
2. It is easy to program.
3. It has integrated communications which is good for large scale control problems.
4. The PLC has a better processor power & memory, can handle more current in the I/O ports, the ports are optocoupled, it is more robust, it is closed architecture, it comes with industrial certificates, safety features etc.