

Development of monitoring system for a safety grade PLC

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1. Introduction

The purpose of this paper is to develop a monitoring system for PLC. The monitoring system receives, checks and stores all data generated by the PLC such as self-diagnosis, analog and digital data from the PLC, and confirms the status of the received data.

In this paper, we develop a monitoring system to help data analysis by monitoring and storing PLC data when developing and testing to users or developers. The development and testing of the monitoring system is based on POSAFE-Q, a nuclear safety grade PLC.

2. Design Methods

In this section explains the concept of monitoring systems and the architecture of the hardware.

2.1. POSAFE-Q

POSAFE-Q is consisting of a processor, communication, analog input / output, digital input / output, and pulse module. It also features a variety of self-diagnostic features to meet the requirements of nuclear power plants.

2.2. Communication of monitoring system

The hardware of the monitoring system uses a Windows 10 or later tablet PC or desktop. The PC communicates with POSAFE-Q using the serial port (RS-232C) as shown in Figure 1.

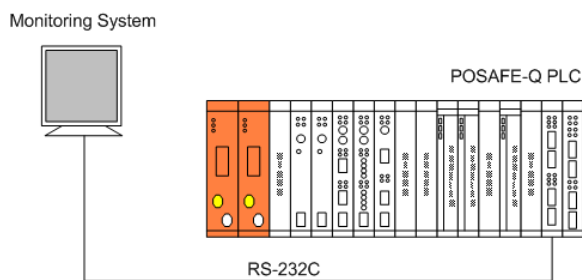


Fig. 1. Communication of monitoring system to NHDL-1Q module

2.3. Communication Module(NHDL-1Q) in POSAFE-Q

NHDL-1Q module is a communication module to support serial communication among POSAFE-Q communication systems. This module is used for access

and control, data collection and management between units capable of serial communication. NHDL-1Q module receives the data selected by the user from the Processor Module and sends it to the monitoring system through the UART.(Fig. 2.)

In this paper, NHDL-1Q module is used to connect to the monitoring system, control and collect data.

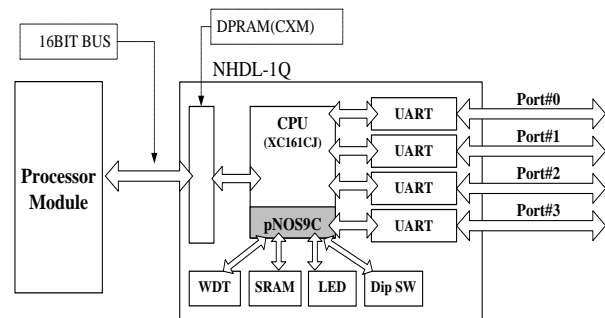


Fig. 2. NHDL-1Q Communication Module Sequence

3. Development and Application of Monitoring System

The monitoring system receives POSAFE-Q's data and analog data from POSAFE-Q's NHDL-1Q module and checks the state of the received data.

3.1. Transmission program

The monitoring system can receive POSAFE-Q's data and check it.

POSAFE-Q's data transmission program is created through the POSAFE-Q engineering tool pSET-II. The data selected by the user is stored in the register assigned to NHDL-1Q, and the data is transmitted using the communication function block. (Fig. 3.).

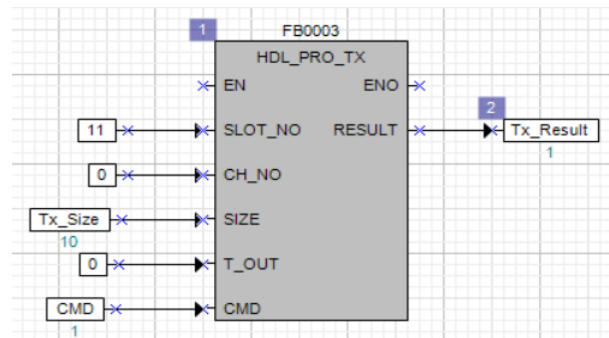


Fig. 3. NHDL-1Q Communication Function Block in pSET-II Program

3.2. Receiving program

The receiving program sets up Port, Baud rate, and Data Size to perform serial communication with POSAFE-Q. The receiving program can check and store the received data, protocol information of the data and the received time. (Fig. 4.)

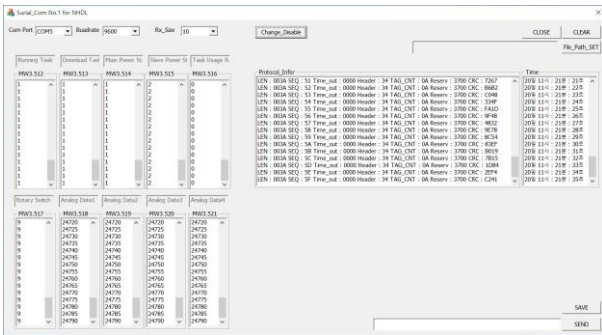


Fig. 4. Monitoring system program UI.

3.3. Configure and test monitoring system

The monitoring system consisted of PC with Windows 10 OS and POSAFE-Q. The test result were checked for the received data and protocol information of received data. (Fig. 5.)

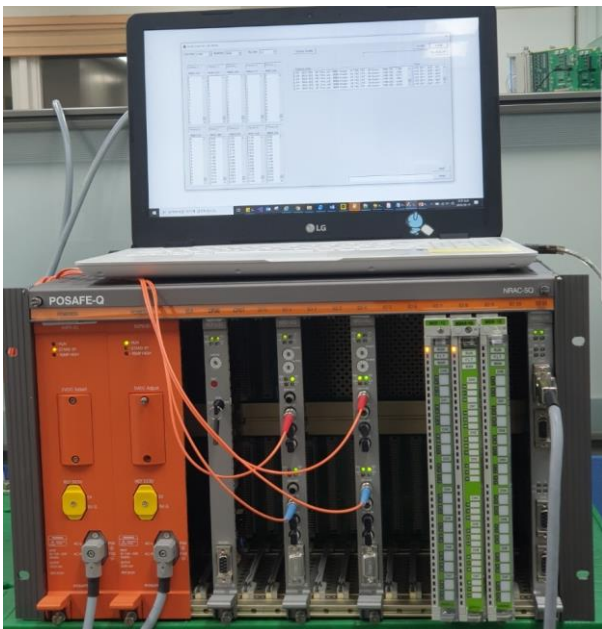


Fig. 5. Equipment Setting for Using the Monitoring System

4. Conclusions

The monitoring system was developed using RS-232C communication. As a result of the test, a monitoring system has been developed to receive, verify

and store all data generated by the PLC such as self-diagnosis, analog and digital data from the PLC, and to check the protocol information of the received data.

REFERENCES

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