

Hall A SoLID Magnet Alarms and Email Notifier

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Load, voltage, and cryogenic variables, such as temperature, pressure, liquid levels, and vacuum are critical to be monitored and ensure safe operations of the magnet. For monitoring of these variables, an alarm handler system was required to notify expert users when a critical variable is out of set limits.

Since the entire controls and monitoring system for the Solenoid is based on an Allen Bradley PLC controller, the alarm handler system was developed and implemented in FactoryTalk View Site Edition software. An Alarm and Event server was created on the PHYCAD58 computer, which is already the Human Machine Interface (HMI) server. The Alarm and Event server was configured with severity alarm range levels of Urgent, High, Medium and Low.

Three testing variables, or PLC tags, were created to simulate the signal readback from the sensors read by the PLC and test the digital and analog alarms available by the Alarm and Event server. A Boolean PLC tag was created to test a digital alarm and two Real PLC tags were created to test a deviation alarm and a level alarm. For the three types of alarms, the alarm name, conditions, limits, severity, alarm message, and status tags were set. Alarm tags for each alarm in the server were created, which can be used in the HMI application to provide a detailed alarm and event status. Figure 1 shows the alarms configured for the test.

Initially, for the email configurations, I created an email server by using free software named hMailServer Administrator, which allowed the setting of a Simple Mail Transfer Protocol (SMTP) user ID and a random email account to test the sending and receiving of the emails. The account was implemented to set the FactoryTalk View ME Email Sender Control panel and send email to the expert users.

Once I tested all email-sending conditions with the test accounts, I used JLab's SMTP account (smtp.jlab.org) to send the emails.

- **Completed development of alarm handler system for SoLID magnet**
- **Configured and wrote code to send email notification of an alarm to expert users**
- **Developed HMI screen to provide details of present alarms and control email sending status**

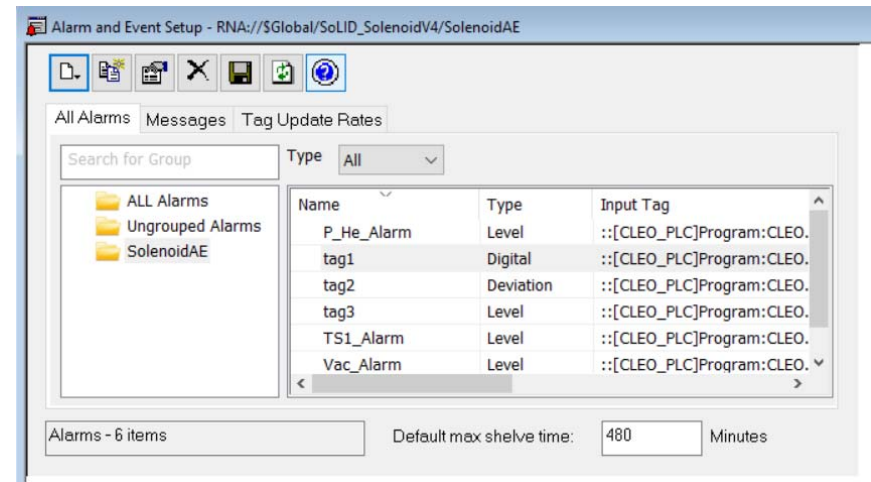


FIG. 1. Solenoid Testing Alarm and Event Setup

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I wrote a PLC routine to control sending and receiving an email when an alarm is present. The routine gets the Boolean bit from Alarm and Event Server, recognizing that an alarm is present, sets the necessary time to build the message, and sends only one email per each alarm event. I tested the code and no issues were found.

I had issues in creating a specific text message describing the alarm variable for the email to be sent based on the alarm present. I solved this issue by using HMI tags of string types and by writing code that executes only when the alarm is present, meaning that the monitored variable is out of its limits. I implemented the code within the events option available in FactoryTalk View software.

For the test of the three types of alarms, I generated a testing HMI screens with all necessary controls and indicators to simulate the trip of the alarms and the automatic email notification. For the magnets' low current test, I generated an HMI screen named *Solenoid Alarms and Email Controls*, Fig. 2. The screen shows details of the tripped alarms such as condition, limits, severity, and a detailed message. I also set the screen to allow acknowledgement of the present alarms. In the lower section of the screen, there are details of the email sent such as message text sent, email status indicators, user email to deliver the email, and a button to manually send an email, which will be useful during debugging.

Once the list of signals that need to be alarmed is provided, I plan to implement them into the Alarm and Events server with limits, alarm type, and the email notification message text.

I completed the development and testing of the alarm handler system to monitor and notify the expert users during the low current test of the system.

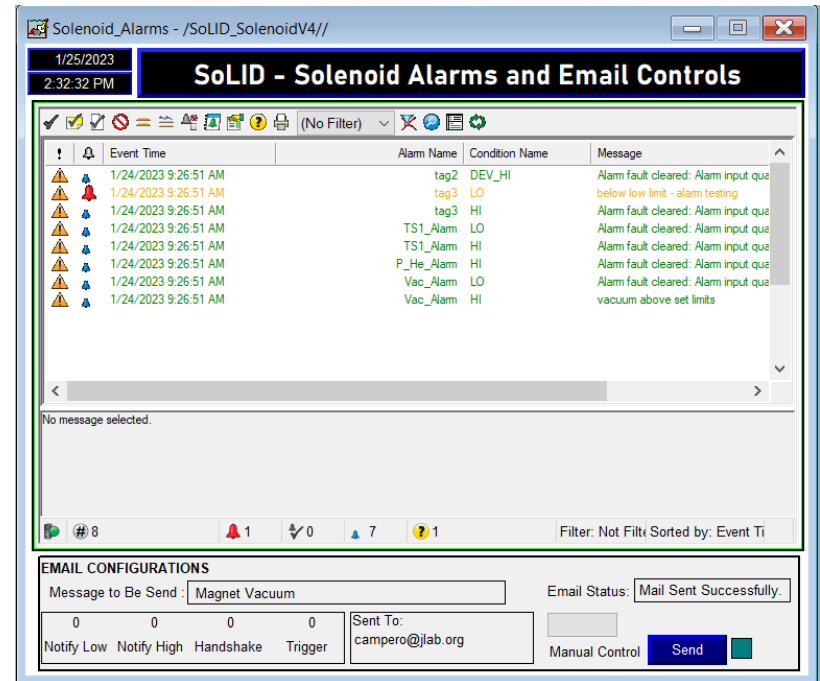


FIG. 2. *Solenoid Alarms and Email Controls* screen