ICP DAS GST-43 Earthquake Switch, Deployed at a Chemical Plant

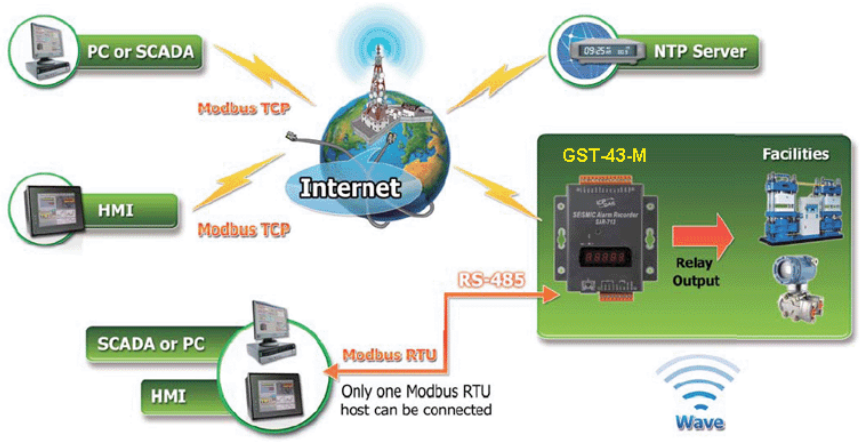
By Edward Fang

ICP DAS R&D team presents the GST-43 seismic switch that's used to predict and prevent secondary disasters. It's Can be applied to people's livelihood, factories, elevators, construction and other occasions

Introduction

Earthquakes come uninvited and unannounced - and while they may sweep through in a space of seconds, that short period is more than enough to collapse houses, highways, and even critical infrastructure. Floods, droughts, typhoons, and many other natural disasters are considerably easier to brace for - but the earthquake has been a global pain in the side for ages. The secondary disasters that follow earthquakes are sometimes even worse - fires, floods, landslides, illness, and so on. And yet the forces of nature are not entirely beyond human control, provided one takes the proper precautions.

Once again, ICP DAS comes in tights and a cape to the rescue - the R & D team presents the GST-43 seismic switch that's used to predict and prevent secondary disasters. It's already used in the elevator industry to make lifts smarter. For example, in case of an earthquake, the elevator controller is made aware of the situation instantly so that it can stop at the nearest floor to let its passengers disembark. The module can also trip additional events per situation, such as cutting off gas / liquid flow in a plant or powering down equipment immediately. These simple things are not so quickly performed by a nervous, quake-shaken crew who are probably all busy ducking and covering - and in the hands of automation the situation need not descend to disaster.



▲ Figure 1: **A GST-43 system application architecture diagram**

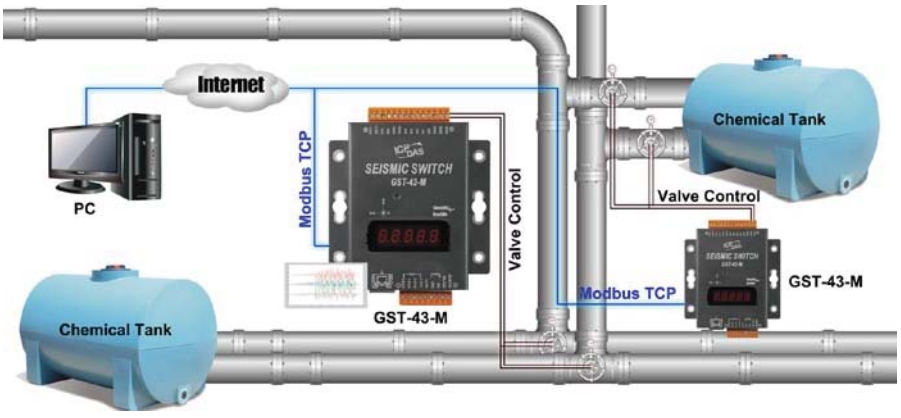
GST-43 Features

The GST-43 uses STA / LTA earthquake judgement logic to sample analog vibration signals a hundred times per second. A 20Hz low-pass filter is used to remove most of the non-seismic vibration signals to distinguish them from actual earthquakes. A built-in real-time clock provides network time management (via the Network Time Protocol) that allows the GST-43 to instantly display the correct time. It can detect and describe the quake along three axes and remember exactly when the last quake occurred. Quake measurement can be done either in CWD (the Taiwanese system) or GB/T-17742-2008 (the Chinese mainland system); triaxial acceleration vector synthesis is built-

in, and the instantaneous maximum acceleration along any of the three axes is easily disseminated. The GST-43 daisy-chains well with existing equipment and can be set to trigger user-defined actions when certain seismic levels are exceeded, such as stopping elevators at their nearest floors, or cutting off gas and electricity, or putting machinery into emergency shutdown. Support for Modbus RTU and Modbus TCP Server protocols make these possible: they allow the GST-43 to be connected directly to computers, PLCs, or human machine interfaces, making the recording of seismic activity and interfacing with other devices much easier.

System Architecture and Operation

When the GST-43 takes on the role of an overseer, it is easily applied in chemical plants to detect earthquakes and immediately stopper chemical lines to prevent dangerous leakage. Should a chemical tank rupture, its contents could cause serious casualties and invite a slew of tragedy - to say nothing of the paperwork, investigations, and probable lawsuits that follow. Relegating the monitoring to a human is inefficient, inconsistent, unsafe, and wasteful. Such an important task is best given to a failsafe system that responds promptly and safely every time. ICP DAS's GST-43 rises to the occasion: once a seismic threshold is reached, the corresponding DO (with two DO groups, a sub-start function is easy to implement) to automatically block the chemical lines is started. Because the GST-43 supports Modbus TCP and Modbus RTU communication protocols, it's easy to integrate into existing systems to ramp up overall control system security. A diagram of the complete seismic monitoring system is shown below:



▲ A diagram of the complete seismic monitoring system

The Choice is Clear: ICP DAS' GST-43 Seismic Switch Will Visibly Improve Your Control System Security

The GST-43 is one of a myriad of products that ICP DAS provides to meet users' diverse needs. The DO is easily tweaked to meet any conditions one cares to set, and the switch supports both Modbus TCP and Modbus RTU, making a marriage to PCs / HMIs and ICP DAS PACs are both speedily accomplished. This particular application - to a chemical plant - is summarized by identify the GST-43 as a dependable system that increases the standard of safety in an industrial setting.

ICP DAS' long-term commitment to earthquake-related product development guarantees that it will continue to provide customers with solutions for a variety of cases. We will strive to keep creating products that both work and integrate well.