

# LinkBus RIMS (Remote Instrument Monitoring System)

For a variety of reasons, decreasing resources are causing plant operators in the process and utility industries to look for more efficient ways of monitoring and servicing their instrumentation. The analyzer maintenance department may have been reduced in size, merged with another department or perhaps no longer exists at all, and reassignments and relocation of staff can lead to a loss of experienced process analyzer operation. At the same time, the importance of the analyzer measurements and demands for consistent analyzer performance are increasing. Tighter control limits, higher throughputs and stricter quality reporting can all demand more frequent calibration and less downtime. Much of the routine preventative maintenance work performed on the analyzers may not be required but is performed as part of a fixed schedule rather than a specific need. It would be preferable to have a system of providing maintenance personnel with information that would direct their efforts to those analyzers that do require more

frequent attention. There is a growing interest in the possibility of being able to monitor plant instrumentation through any personal computer (PC) on the site's local area network (LAN), or through the DCS system and to be able to do this with no specialized software.

In a modern, multi-unit plant there can be a wide range of communication lines between analyzers and control systems. A typical configuration for a Network Core Protocol (NCP) analyzer maintenance data acquisition system network with typical analyzer shelter connections is shown in Figure 1.

## Easy Access

The new LinkBus Remote Instrument Monitoring System (LinkBus RIMS) from AMETEK addresses the limitations of traditional maintenance programs and frees up resources, making them available to give attention where it is most needed. Maintenance and performance personnel now have easy access to all the analyzers' vital signs from their desk computer or through the DCS,

not just the measured parameter that is typically delivered to the process control room. Any analyzer can be interrogated from the PC or through the DCS operating under HART™, Fieldbus FOUNDATION™, Modbus™ protocols, and information may be gathered without having to go to the location. This data provides predictive maintenance intelligence and assists the maintenance personnel in effective repair planning. There is no need to climb up to the analyzer, declassify the area, issue work permits, or even visit the shelter to obtain this critical performance data (Figure 2).

Plants are currently examining ways to reduce the operational costs and increase the reliability of instrumentation. However, although analyzer manufacturers continue to strive for greater reliability, every analyzer will still require periodic calibration or verification (a calibration check) and will eventually need service attention. Some components, such as UV lamps or zirconium oxide

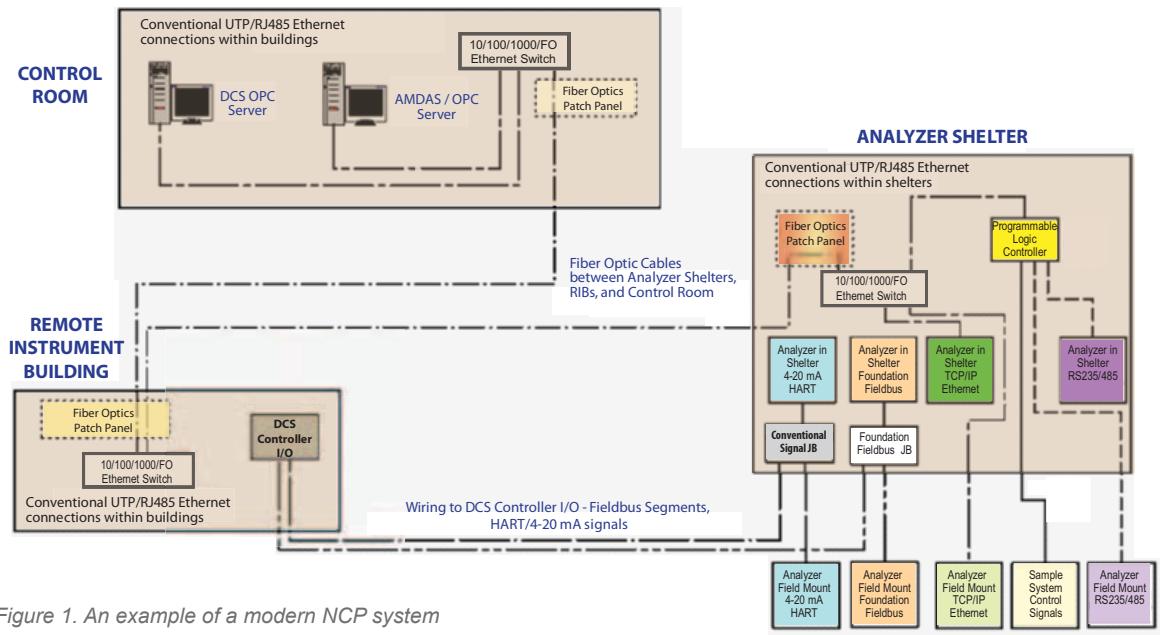


Figure 1. An example of a modern NCP system

cells, have a finite lifetime, and will eventually need to be replaced. The type of analyzer and the process and ambient conditions of the application will also affect the mean time between failures. The recent trend towards smart instrumentation began with the high volume devices such as pressure, flow and level transmitters and has gradually shifted to analyzers. Various asset management approaches are now offered using HART™, FOUNDATION™, Modbus™ or other proprietary software protocol based DCS implementations. Many companies are studying the role of information technology in analyzer performance parameters and considering new approaches such as proactive and reliability centered maintenance.

AMETEK's analyzers are equipped with smart electronics able to identify error conditions and report them to the LinkBus gateway. While it is not possible to eliminate attention to analyzers altogether, the LinkBus gateway combined with the ability to automatically initiate and verify analyzer calibration, removes the need for routine visits.

### LinkBus RIMS Overview

With the use of enterprise systems increasing, it is not only feasible but also economically beneficial to monitor and maintain instruments remotely, whether on or offsite. The LinkBus system is available for IQ and 2000 controller-based Thermox flue gas analyzers, the 4000 and 880 Series photometric analyzers and the 5000 Series moisture analyzers. Up to 16 analyzers of the same type can be connected to each LinkBus RIMS. More than one LinkBus RIMS may be preferred, and each is assigned a unique IP address. For example, all the important analyzers in one processing unit or operation can be linked to a gateway using an RS-485 cable with a separate LinkBus RIMS for another unit (Figure 3).

Each process unit may have multiple analyzers. The analytical measurement result 4-20 milliamp signals from each analyzer are typically routed to the DCS for control. The LinkBus RIMS can be connected to the plant LAN using a standard Ethernet connection, and can then be viewed from any PC on the system simply by using

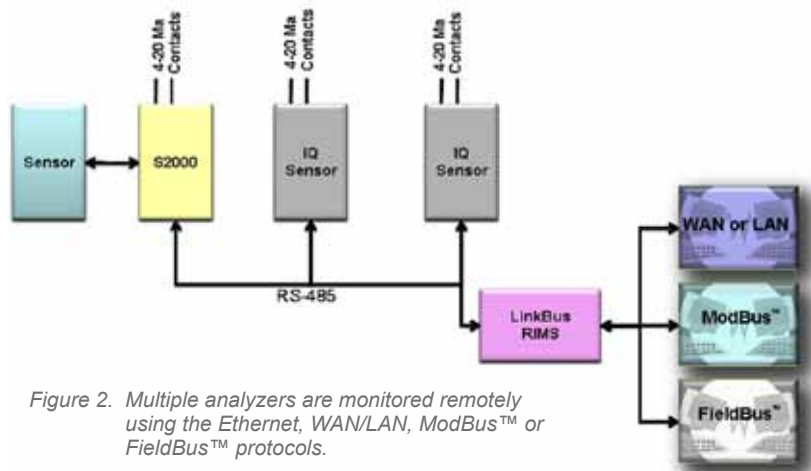


Figure 2. Multiple analyzers are monitored remotely using the Ethernet, WAN/LAN, Modbus™ or FieldBus™ protocols.

the generic web browser. No specialized software is required and the system is independent of the DCS. The LinkBus is either offered as standalone, or with one of the following three levels of AMETEK service.

### Onsite Monitoring

In this scenario, the analyzers are monitored from any PC on the plant's LAN, Wide Area Network (WAN) or DCS system. Email messages can be sent to the plant analyzer service group to schedule the maintenance if there are problems that need attention.

### Onsite Monitoring with Third Party Notification

In addition to onsite monitoring and scheduling plant support maintenance, this option provides

for email communication to remote locations (for example, to notify key personnel at multiple locations). Communications access to the analyzers is limited to the onsite LAN/WAN or the through the FOUNDATION™, Modbus™ protocol-based DCS system; but if third party help is desired, an email can be sent to the factory and limited direct analyzer communication access permission granted to the third party service engineer.

### Web-Enabled Service

Access to the analyzers can be granted to the manufacturer or a regional support center to monitor and support the analyzers for a per point annual fee. Referred to as AMETEK LinkBus RIMS Service, this option provides real time, worldwide support through the Internet for any enabled analyzer.

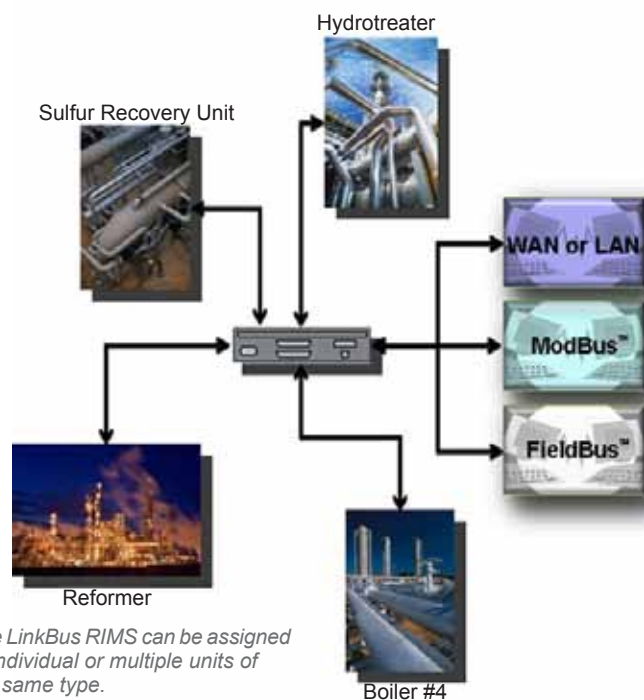


Figure 3: The LinkBus RIMS can be assigned to individual or multiple units of the same type.

This remote service automatically determines the need for maintenance work, parts replacement and hardware upgrades. Monthly reporting of analyzer performance, maintenance performed and process recommendations are also provided.

If remote access is restricted by an Ethernet firewall implementation, the local plant personnel can monitor, calibrate service and maintain analyzers via LAN, WAN, the Intranet or DCS on a continuous basis. This capability assures the highest level of reliability. As an example, in the case of Thermox oxygen and combustibles analyzers, one can view the measurements instantly to ensure operation is at an optimized, low excess, oxygen set point. This helps to realize the maximum possible fuel savings and NOx reductions with low excess air control.

## System Communications

### Interface Hardware

The LinkBus RIMS is a hardware/software platform enabling AMETEK to provide a standard analyzer/computer/database connection and a variety of service packages to customers. The platform provides Internet and Ethernet communications capability as well as bi-directional DCS communications using FOUNDATION™, Modbus™ communications protocols. The real time operating system has the option of incorporating OPC or XML client server capability. In addition to all sensor data and functions currently provided by Thermox Series 2000 and IQ analyzers, the Western Research 880/Series 4000 Photometric Analyzers and the 5000 Series Moisture Analyzers, the LinkBus RIMS collects and reports process trends and analyzer response time information. Fault alarms can be issued automatically by email to any location worldwide.

The LinkBus RIMS unit is installed at the customer's site and connected to each of the analyzers. It communicates via RS-485 with the controller-based analyzers, and provides web-enabled user-interface for up to 16 analyzers. A two conductor, shielded, twisted pair cable runs from the gateway to the analyzers in a chain configuration. The LinkBus is usually connected to an Ethernet LAN (10/100 Base-T auto sensing). The LinkBus

unit acts as an HTTP server and supports TCP-IP, FTP and POP3 email (Figure 3). A single set of alarm contacts is also provided for a combination watchdog/alarm signal. In the event of process or trouble alarms, the LinkBus RIMS sends an email to selected addresses contained in the memory of each LinkBus unit.

Process trend data, buffered in the LinkBus RIMS, is transmitted to the primary list of server addresses periodically as the resident LinkBus memory approaches capacity.

### Software and Interconnect Information

Users may access the gateway using any generic browser (Microsoft Internet Explorer or Mozilla as examples). By browsing to the assigned (user configurable) IP address and correctly completing a login page, the analyzer setup page is displayed (Figure 4). An example of the alarm status page for a Model 880 Analyzer is shown in Figure 5. The login and user account features controls the levels of access to the analyzer features and data. Passwords are assigned to different access levels: administration, maintenance, IT and operations. Up to ten people can be connected to the gateway simultaneously; but if changes are being made to any page it will be locked out to the others.

### System Security Considerations

Security is always a concern when allowing access into or out of the plant LAN. Most companies are easily able to restrict access and provide secure connections to their enterprise network. AMETEK has demonstrated the use of a virtual private network (VPN) through an ISP, enabling access to browse without compromising the security of the customer's enterprise network.

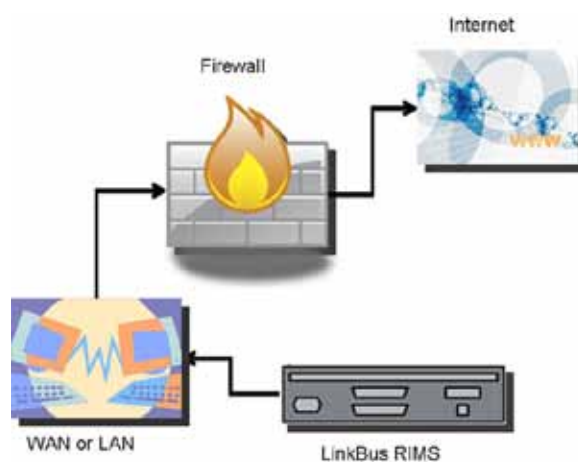


Figure 4. A single LinkBus RIMS used with the Ethernet LAN / WAN connection.

Remote access to the corporate network system via the World Wide Web is achieved by using a VPN system, which is recommended for the AMETEK LinkBus RIMS service support program. To verify that a secure connection can be established, the system was tested using a VPN connection through a typical corporate site firewall. The VPN access is a package in which each remote user is assigned a four digit password and an electronic key that changes its six digit number every minute. In short, security is very high.

### Conclusion

The LinkBus RIMS provides the customer with plant-wide PC access to process analyzers using the existing web browser or through FOUNDATION™, Modbus™ protocol-based DCS systems. For direct connection to the enterprise, system security must be taken into account. The system is already available for Thermox flue gas analyzers, the 4000 and 880 Series photometric and the 5000 Series moisture analyzers. Easy access to analyzer information and trend data allow the maintenance department to make the most efficient use of limited resources and to determine process problems versus analyzer inaccuracy faster. If help is needed, allowing third party access to factory personnel can provide additional expertise to assist in troubleshooting. The elimination of routine maintenance visits allows focused attention where it is most needed. Enhanced reliability and improved analyzer performance both lead to tighter process control.

Figure 5. The system setup page for a Model 880 analyzer

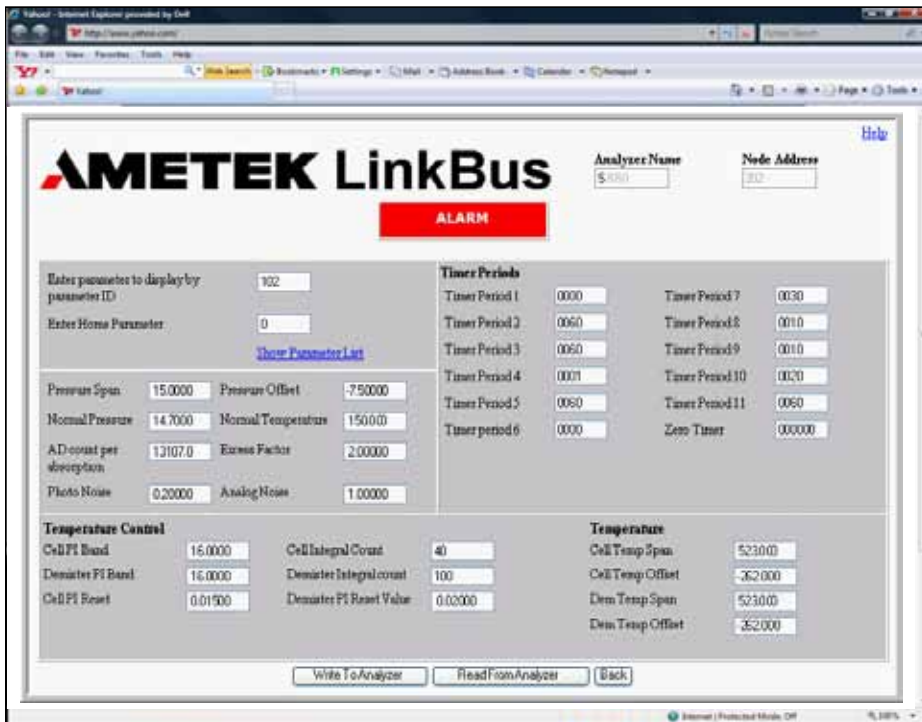
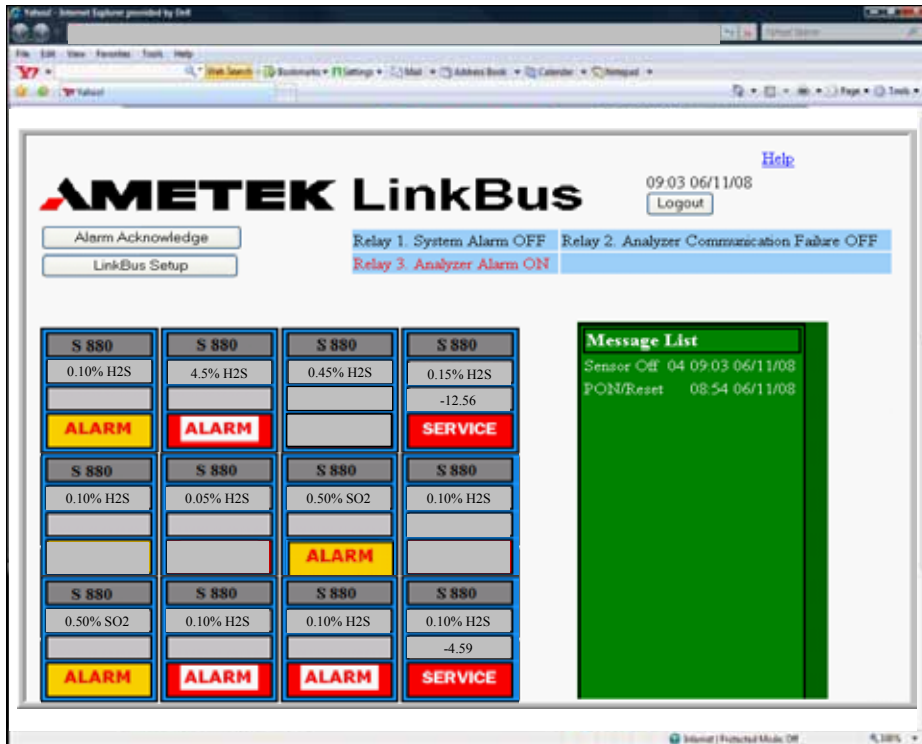


Figure 6. The alarm status page for a Model 880 analyzer. This example shows twelve 880 analyzers connected to a single LinkBus RIMS.



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