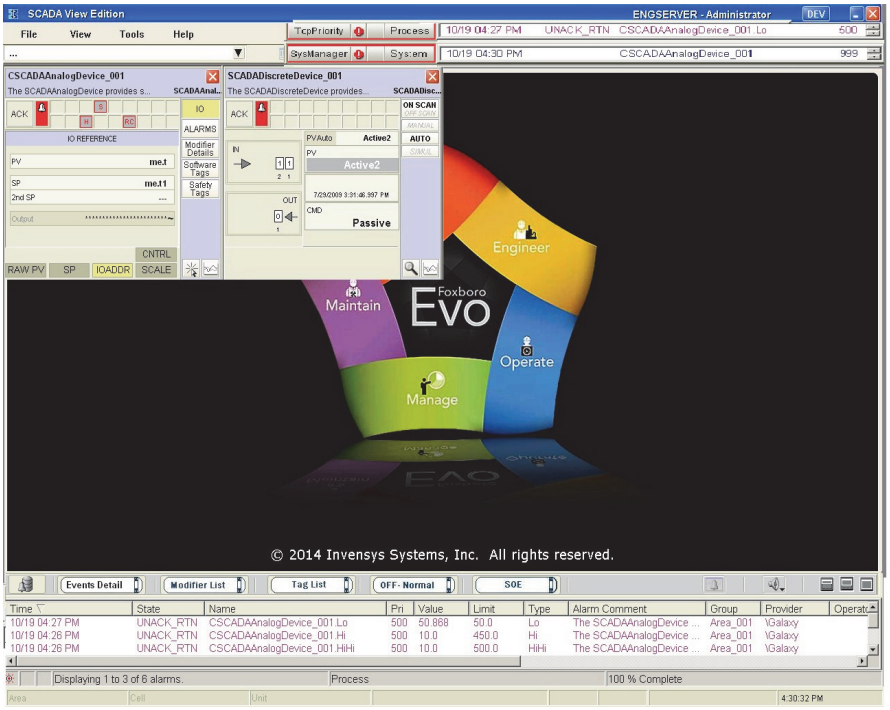
Foxboro Evo™ Process Automation System Software

Product Specifications

PSS 31S-10G7 B3

Foxboro SCADA 3.0 Software



Foxboro® SCADA is a module of the Foxboro Evo™ Process Automation System. It comprises a set of ArchestrA® application objects which provide a full featured secure SCADA Master Station for operation of SCADA systems within the context of the Foxboro Evo Process Automation System. Large scale SCADA systems can be quickly built using PC-based workstations, enterprise servers, and high speed LAN/WAN networking equipment.

OVERVIEW

Foxboro SCADA 3.0 is a package of SCADA specific software application objects, display properties, data quality, and equipment tagging features.

Foxboro SCADA solutions are built on a flexible and highly scalable software architecture that can connect to virtually any automation system or field device in use today. Such solutions empower decision-makers to achieve business goals, without abandoning prior investments in automation systems, operational processes or intellectual property. This enables the Foxboro SCADA System to become compatible with most of the prevalent communication protocols, such as CONITEL, DNP3, ICCP, NTP, SNMP, ICCP, and TCP/IP.

Inherent to the overall Foxboro SCADA platform is an integrated security model, with built-in capabilities, that enables user authentication at every level of the SCADA system. Operational security is embedded at the attribute level of each object, extending the Microsoft Windows® security model down to the physical equipment layer, enabling strict yet easy to manage Areas of Responsibility (AOR) for all SCADA users.

FOXBORO SCADA ADVANTAGE

The Foxboro SCADA System is based on the ArchestrA® Technology, which provides the lowest cost of ownership in supervisory applications. This comes from the unique component-object based environment that encapsulates equipment definitions and communications as templates that can be leveraged in similar applications, driving standards and reducing engineering effort. Also, applications are stored in a central repository, where they can be remotely deployed to any windows-based device in the network. This reduces travel and troubleshooting costs for SCADA networks. Furthermore, once the applications are deployed, changes in the configuration of the system, to incorporate new functions, can be propagated from templates to all running computers with a single click of the mouse.

The key advantages of the system can be summed up as the following:

- Foxboro SCADA adds to the power of Wonderware® and Foxboro® by inclusion of standard objects created from the experience of over 40 years in development of large scale SCADA systems. Invensys has excellent references globally for the application of SCADA systems in Oil and Gas. Projects which range from small well head control to large scale pipeline product transmission pipelines and multi-utility projects.
- Large scale SCADA systems can be built quickly using Foxboro SCADA 3.0.
- Engineering Foxboro SCADA is simple and evolutionary with no downtime, providing a flexible structure and methodology to support ongoing sustainable business decisions.
- Foxboro SCADA is an open software product with particular open protocols and communications management objects used to integrate with other Invensys and third party SCADA products. The product is most commonly to be used in combination with Foxboro or OEM hardware to make up a SCADA Master Station. The resultant Foxboro SCADA Master Station provides a basis for higher level applications to be added for enhanced management and operational effectiveness.
- Capability to quickly integrate 3rd party drivers and solutions at any time.

Further, Foxboro SCADA affects the various aspects of your business by providing the following benefits:

- Operations Improvement:
  - Significantly reduces the engineering efforts on small to large applied projects.
  - Creates higher business value within the ECS by providing a unified operational SCADA architecture for automation and information management applications.
  - Simplifies and reduces costs associated with SCADA products and services, and with the delivery of specific vertical industry solutions.
  - Allows a customer to create a cost-effective SCADA system and expand it, as the business grows, using a scalable license model.

- Incorporates the heritage of the Foxboro brand P6009, IA SCADA, FoxSCADA and SCADA-A2 systems.

- Maintenance Costs:
  - Reduces the risk of integrating your platforms, applications and expertise.
  - Significantly reduces the engineering efforts on small to large SCADA projects.
  - Offers a unified operational architecture for automation and information management applications, thus creating higher value with integrated applications.
  - Simplifies streamlining and reduces the complexity and costs associated with developing and delivering SCADA products and services of specific vertical industry solutions.
  - Leverages the Foxboro architecture to expand customer value by incorporating other Invensys products and technologies plus Invensys engineering and service organizations, partners, and customers.
  - Control Editors provide reduced implementation and maintenance costs, rapid deployment and start-up.
  - Provides Integrated System Management of all related equipment.
  - Builds scalability into the core operational structure.
  - Provides Multiple Historian Synchronization for disaster recovery scenarios.

- Operational Security:
  - Ability to combine security with area of responsibility.
  - Connection to Microsoft Group Policies for password and account management.

Features

Foxboro SCADA Software provides following features:

- Human Machine Interface
- SCADA Application Objects
- Industry Application Objects
- DNP3 Master Protocol
- Device Integration Pack
- Historian Synchronization
- RemoteWatch (Device Relationship Management System)
- SCADA System Manager

Human Machine Interface

These SCADA Human Machine Interface extensions are build on the functionality of SCADA View, Base View and provide the following functionalities:

- List Processing, including Off-Normal List, Modifier List and Safety Tagging List
- Three Most Recent Alarm Windows
- Alarm History
- Real-time Event History
- Display Notations
- Enhanced Operator Safety Tagging System
- SCADA Faceplates which work with the Enhanced SCADA Application Objects

- Extended Quality Attribute (DPQualityA and DPQualityB) Animations, including foreground, background, and blinking Runtime Annotation
- HotLine and Safety Tagging (Operator Control Locking) and Tracking
- Network Monitoring Application

SCADA Application Objects

SCADA Functions are provided with specifically targeted SCADA Application Objects, which though build on standard ArchestrA Objects, offer a number of enhancements and features for both Analog and Discrete tag processing, including:

- Control Reservations and Authorizations
- Alarm Level Enable and Disable
- Advanced Warm-up of Object Attributes over Object Deployments
- 64 Bits of extended Quality Information
- Extensive animation and tagging of values based on Extended Quality
- Operator Safety and Software Tags
- Tag Notes
- Off-Normal State Definition and List Collector Processing
- Network Monitoring

Industry Application Objects

The SCADA Industry Application Objects package enables the Foxboro SCADA System to perform Flow and Energy calculations in the formats prescribed by the American Gas Association. The package allows the flexibility of using both the On-site and Off-site methods.

DNP3 Master Protocol

Developed and Wrapped into a Device Integration Object.

Device Integration Objects

SCADA Device Integration is enhanced with an Optional set of SCADA Device Objects, including:

- DNP3 Master Protocol
- GE SRTP (Fanuc PLC) Drivers
- Inter-Control Center Protocol (ICCP)
- Leeds and Northrup Conitel Protocol using Communication Line Server (CLS)
- SNMP Protocol

Historian Synchronization

The Historian Synchronization module is a custom architecture designed to fill in the data gaps, which arise in the Primary Historian, once per day.

Optionally, it also allows a forced Synchronization and supports up to four Redundant Historians.

SCADA System Manager

This is a Microsoft Management Console (MMC) snap-in application plugged in to ArchestrA System Management Console (SMC).
SCADA System Manager presents the data that is obtained from various field devices in the ArchestrA SMC. The SCADA System Manager cannot obtain this data directly from such devices, instead it relies on an Application Object known as Communication Infrastructure Object. This object obtains this data from the Device Integration objects (e.g., SNMP, DNP, CLS and SRTP) and also from some Application Objects (e.g., SCADAWinPlatform) which in turn collect the data directly from the field devices.

OPERATOR EXPERIENCE

SCADA View visualization experience is enhanced with many new operator functions. Using Foxboro SCADA software, the security of SCADA View is strengthened, allowing operators to see only data that is enabled for their particular roles. List displays are provided permitting operators to view groups of data specifically set up for them. Notations can be added to Windows and extensive animation and extended data quality processing provides for record keeping and animation of information according to extended quality attributes.

Alarm processing is improved with a Three Most Recent Alarms window, which provides details on the three most recent unacknowledged alarms, in addition to full screen alarm and historical alarm displays. Events, including all operator actions from the console, along with the operator name, can be viewed in both real-time and historical context.

The toolbar on the Three Most Recent Alarms window provides access to lists of OffNormals, objects with applied Modifiers, Operator Safety Tags, Alarms, Events, List of the Process Variables, allowing an operator to see the time of the last Process Variable update; various modifier settings (such as Alarm Inhibit) are now preserved over object deployment, so that the original time stamps for each operator action are retained.

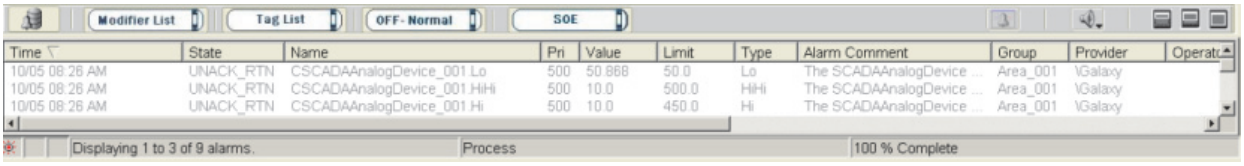


Figure 1. Three Most Recent Alarms Window with Alarms Toolbar

SCADA Application Objects

The new SCADA Application Objects $SCADAAnalogDevice and $SCADADiscreteDevice provide the same functionality as the base ArchestrA $AnalogDevice and $DiscreteDevice objects, but have many enhancements targeted for SCADA Applications. See Figure 2. These two new objects are built using the Application Object Toolkit in native C++ form and provide all of the new functionalities at the highest performance level possible within the Application Server. New SCADA application objects are created and deployed in the same manner as standard ArchestrA Objects and they simply inherit all functions provided by the SCADA Objects.

The $SCADAAccumulator object provides the functionality of Accumulator with Energy/Mass Calculations. The Object has three commands Set/Clear/Hold for daily operations.

The $TimeMonitoring Object monitors the Drift with Time Source Host and Other Host. The Monitoring is precise as Windows NTP is used for getting the host Times. The Drift is alarmed and can be configured.

The $SCADAPostEvent Object is used for pulling a report of different values before and after the abnormal Event/Trip. The report is in Excel® format.

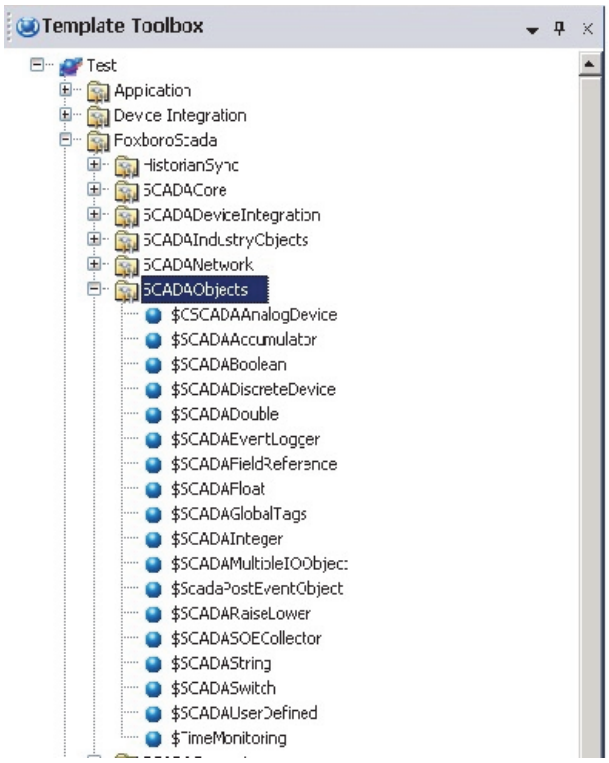


Figure 2. SCADA Objects Available in Template Toolbox

Analog processing supports many new features, including configured attributes, such as Object Type, Object Type Code, Foxboro SCADA Base Directory and Control Timeout. Processing of the Analog Device is enhanced with 64 bits of quality information consolidated into two-32 bit fields; providing fast access to all object quality information with minimal overhead. With the new $SCADAAnalogDevice object, operators can disable alarm levels individually, view the extended quality information including time stamps for each quality indicator, set operator safety and software tags, including tag notes, view the Process Variable last time change, inhibit events, and view underrange and overrange of input indications. The SCADAAnalogDevice is specifically designed to work with the Device Integration Objects to maximize the quality information presented to the operator.

Discrete processing supports many similar new features, including new configured attributes, such as, Object Type, Object Type Code, Foxboro SCADA Directory, Control Timeout, Alarm Direction, Event Direction, Faceplate Control Text, and Normal State Definition. Processing of the Discrete device is enhanced with 64 bits of quality information consolidated into two-32 bit fields; this provides fast access to all object quality information with minimal overhead. With the new $SCADADiscreteDevice object, operators can view extended quality information including time stamps for each quality indicator, set operator safety and software tags, including tag notes, and view the Process Variable last time change. The SCADADiscreteDevice object is specifically designed to work with Device Integration Objects to maximize the quality information presented to operators.

An additional application object natively provides a “Ping” function to monitor devices on the network for failure, raising an alarm on the failure of a device. The Ping object is bundled into the Network Monitoring Application, which provides overview and detailed displays of system network servers and clients.

Device Integration Objects

Foxboro SCADA software provide a set of Device Integration Objects that includes common SCADA drivers. These drivers are written as Device Integration Objects (DI Objects) rather than simple I/O or DA Servers.

Each DI Object provides extensive communication statistics and automatic and manual failover capabilities between primary and backup communication circuits; as well as integration with the Wonderware Application Server (WAS) inherent failover using RMC Channels; this eliminates the need for the WAS Redundant DI Objects for these drivers.

Drivers included in the Foxboro SCADA package are:

- GE SRTP PLC Driver – This driver is designed to interface with the GE Fanuc PLCs over a TCP/IP Network. Failover is handled through both automatic and manual failover capabilities.
- LiveDATA® RTP Agent ICCP Driver – This driver interfaces with a LiveData ICCP Live Server using LiveData RealTime Protocol (RTP).
  (NOTE: This driver requires a separate purchase of the LiveData server)
- Conitel Communication Line Server – The Conitel CLS driver interfaces with an Invensys Process Systems Communication Line Server with Conitel Protocol. The basic functions of Conitel, including Scanning (one or two bit status, MCD, uni- or bi-polar analog processing), and Trip/Close controls are provided. The driver also provides a "listen mode" to an existing Conitel CLS Line Server, so that a new system can watch an existing system and run in parallel operation during cutover.
  (Note: Accumulator processing, time synchronization, and Sequence of Events facilities are not currently provided)
- DNP3 Master - The DNP3 Master DI Object allows Foxboro SCADA software to communicate with the RTU/PLC with slave version in it. The Master allows configuration of different poll rates for each of the DNP3 class objects: class 0 – Integrity poll; class 1,2,3 - Events poll. The DI Object also supports Time Synchronization at specified Intervals. Redundancy is supported up to two channels.
  It also supports serial communication with Terminal servers.
  The Events can be Optionally Configured for Sequence of Events.

Industry Application Objects

Real-Time Electronic Gas Flow Measurement can be interpreted differently by companies and the types of operations performed within these companies. Gas Flow measurement can be accomplished using one of the two methods available, namely, "On-Site Method," which utilizes AGA calculations in the flow computer, PLCs and in the RTUs, or the "Off-Site Method," which applies AGA calculations on data collected on a Central Host Computer Station.

Foxboro SCADA supports both of these methods with the help of the Industry Application objects.

Key features are:

- Computations based upon the latest standards prescribed by the American Gas Association
- Calculations based on the US units
- Full integration with SCADA View that allows operators to view/configure the objects using the HMI
- Precision of up to six digits after the decimal
- Data Historization
- Alarm generation

Foxboro SCADA Industry Objects support the following types of AGA calculations:

- AGA3
- AGA5
- AGA7
- AGA8
- NX19

SCADA System Manager

The SCADA System Manager is a secured Plug-in into ArchestrA SMC. It collects data from systems/devices/equipment with the help of the Communication Infrastructure Object.

This data could be pertaining to ArchestrA Application Objects (like SCADAWinPlatform), LAN/WAN Network and health status (generated by SCADA Ping Object), DI Objects, or could be the data collected by the SNMP Agent. The devices are shown in Logical groups based on Plant name. The Alarms, current and history, can be viewed separately.

The SCADA System Manager application can be also invoked from SCADA View.

FOXBORO SCADA SOFTWARE SUMMARY

Foxboro SCADA software provides a useful starting point for those projects which require SCADA functionalities.

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