OPTO 22

DATA SHEET

Form 1076-050114

Part Number	Description
FACTORYFLOOR	FactoryFloor Suite

Description

Opto 22 FactoryFloor® is a suite of industrial control software applications offering an unprecedented level of price and performance to PC-based automation users. At the incredible price of $349, FactoryFloor's full-featured, integrated components help you finish your automation projects faster, cheaper, and better than before. Additional licenses are only $99 for each component.

The power of FactoryFloor lies in its close integration with Opto 22's world-class control hardware, including SNAP I/O® industrial controllers and input/output (I/O) modules. You can connect to this hardware over serial or ARCNET, or you can connect over high-speed Ethernet networks using an Opto 22 controller with the M4SENET-100 10/100 Mbps Ethernet adapter card.

FactoryFloor also takes advantage of Microsoft® Windows® and Windows programming languages to deliver a complete client/server solution for industrial automation. This solution reduces training requirements and increases productivity, while common Windows programming standards mean ease of integration with other applications.

In a single package, FactoryFloor offers a complete solution for industrial automation, from programming and debugging a control system to developing a networked human-machine interface (HMI). For just $349, FactoryFloor gives you a full-featured set of integrated components:
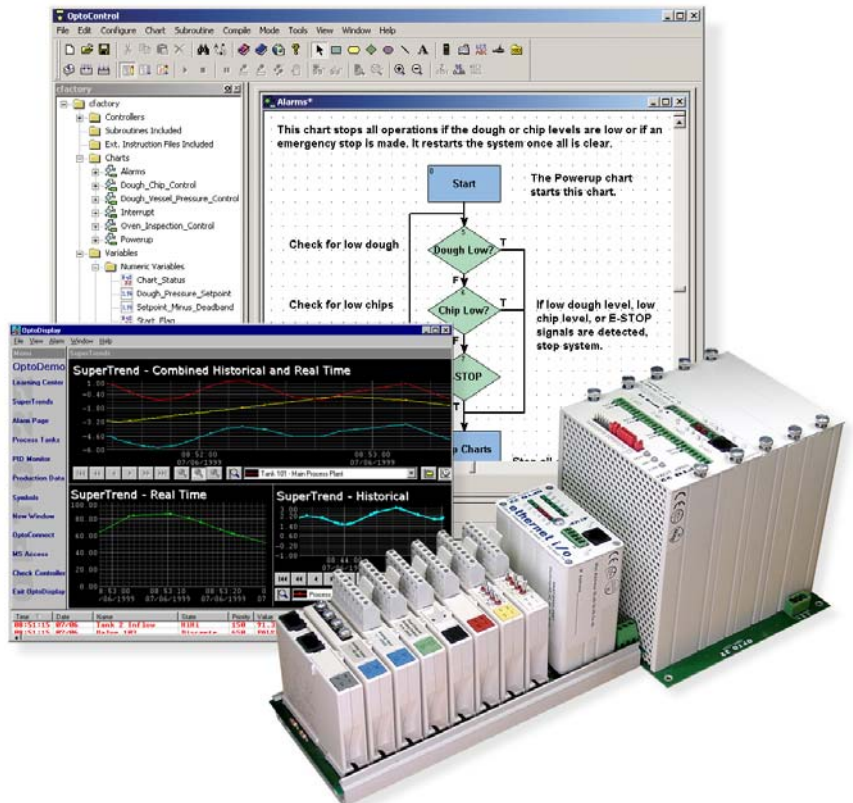
- **OptoControl™,** a graphical, flowchart-based development environment for machine control and process applications. OptoControl includes the versatile OptoScript™, an optional procedural language similar to C or Pascal, which simplifies common programming tasks.
- **OptoDisplay™,** an intuitive, shared database HMI package that includes alarming, trending, security features, and a built-in library of 3,000 industrial automation graphics.
- **OptoServer™,** a data server compliant with OLE for Process Control (OPC) 1.0 and Dynamic Data Exchange (DDE), which connects the controller network with the PC network.

Features

- Flowchart-based programming
- Optional procedural language
- Graphical debugger
- Full-featured HMI with alarming, trending, and security
- Easy to use.

System Requirements

- Minimum processor required for your version of Microsoft Windows (1 GHz Pentium®-class or better recommended)
- Microsoft Windows XP® or Windows 2000® workstation operating system
- 128 MB RAM minimum (256 MB recommended)
- 180 MB available hard drive space.

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OPTOCONTROL

OptoControl is the flowchart software used to develop and download the control instructions, or *strategy,* to an Opto 22 industrial controller.

OptoControl is optimized to fully use the distributed intelligence of Opto 22's SNAP I/O system, a high-density I/O package that can control analog, digital, or mixed I/O on the same mounting rack. The integration of OptoControl with intelligent I/O takes full advantage of your Opto 22 hardware. PID loops, for example, can be configured in

OptoControl but executed within the SNAP I/O serial *brain,* at the I/O level.

EASY TO USE

One of the fundamental advantages of OptoControl is its ease of use. Since the flowchart logic is virtually self-documenting, existing strategies can be easily understood, making maintenance simple and streamlined. When the flowchart or system configuration is modified, the latest changes are apparent.

OPTOCONTROL CONFIGURATOR SCREEN

In the "Strategy Tree," just point and click to display or edit the configuration of any item in the control strategy.

A powerful subroutine builder lets you easily expand OptoControl with your own application-specific commands.

Flowcharts are developed by using simple, familiar constructs. A control strategy can consist of any number of flowcharts, while OptoControl's real-time, multitasking firmware lets you run multiple charts simultaneously.

OptoControl programs are easy to maintain because the flowcharts graphically illustrate the flow of control logic.

Plain English commands are used for communication and I/O control. All variables and I/O points are given meaningful names. Standard data types include floating point, integer, ASCII string, pointer, and tables of all four types, as well as timers.

Powerful network communications include Ethernet with TCP/IP.

Extensive ASCII string handling and serial communications capabilities offer unprecedented control of serial devices.

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OptoControl's extensive command set is in plain English, not a cryptic command language, and it can be easily expanded by using the powerful subroutine builder.

The OptoControl long-tagname database is shared by all FactoryFloor applications, eliminating duplicate databases and tagname-related errors. The tagname database is accessible to third-party applications using the available OptoControl software developer's kit (SDK), which provides open access to the control system data for third-party and custom development.

OptoControl also takes advantage of the graphical Windows interface to make it easy to understand, configure, design, and troubleshoot your solution in a distributed client/server environment. Here are some key features that make OptoControl easy to use:

- OptoControl's workspace is flexible and customizable, and the **Strategy Tree** provides a graphical view of your entire control system configuration.
- OptoControl's intuitive **flowchart-based programming environment** provides a precise, graphical view of your control process.
- **OptoScript**, an optional programming language used within the flowchart environment, simplifies common programming tasks.
- OptoControl's animated **debugger** makes it easy to step through your process in real time and see what's happening at every point in your control strategy.

Using Windows' multitasking features, all these tools can be open and running on your workstation at the same time.

WORKSPACE AND STRATEGY TREE

The OptoControl development workspace is flexible and customizable. You can quickly move toolbars to the most convenient location and add or remove buttons to suit individual preferences. Other software applications can be set up to launch from the Tools menu in OptoControl. Open flowchart windows can be viewed with the click of a tab, and can be split and moved as desired.

The entire system configuration is graphically presented in the Strategy Tree, a hierarchical representation of the Opto 22 control system, similar to Windows Explorer. Every object that is configured as part of the OptoControl strategy has an associated icon. Controllers, I/O points, variables, and flowcharts are represented. Using the Strategy Tree, programmers simply point and click to display or edit system configuration items, while at the same time viewing the flowchart and logic associated with the object.

The Strategy Tree and watch windows, which are used to monitor strategy elements during debugging, can be "docked" at a convenient location in the OptoControl window, and their position and content are saved automatically.

FLOWCHART-BASED PROGRAMMING

Because complex processes are easier to understand using graphics and symbols, OptoControl uses a powerful, flowchart-based language that lets you write control strategies visually, simplifying the design phase. OptoControl also improves communication between design team members already familiar with flowcharts by providing a consistent programming environment for logic and instructions in the control strategy.

OptoControl is designed to make it easy to program your control process, unlike conventional methods that simply evolved from the old electromechanical wiring layouts for relays. OptoControl is easier to learn, easier to use, and designed to harness all the power of Opto 22's distributed control hardware platform.

Configurator

The OptoControl Configurator provides an intuitive user interface that graphically documents the control strategy. The flowcharts are created using a very simple set of drawing tools. Programmers insert and edit instructions using standard pull-down menus, dialog boxes, and controls that are a familiar part of all Windows-based software packages.

Using simple objects, you can lay out the logic of the control strategy by creating a flowchart. These objects include *action blocks* that contain a list of things to do, *condition blocks* that contain one or more things to test for, *OptoScript blocks* that contain OptoScript code, *connections* to show the sequence of operations, and *continue blocks* that allow jumps to other areas in the flowchart.

By choosing from menus and assigning long descriptive names to I/O points and variables, you can add the appropriate details to each block. Once I/O points and variables are named and defined, they are stored in the OptoControl database and never have to be referenced by characteristics again, only by name.

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English Command Set

OptoControl provides programmers with an extensive, fully documented command set that handles a variety of data types, including integer, floating point, ASCII string, pointer, and tables of each. Commands are easy to understand because they appear in plain English. Sophisticated ASCII string handling provides unprecedented control over serial ports.

Subroutines

The OptoControl Subroutine Configurator lets the programmer create and archive application-specific subroutines that can then be called up and executed by multiple control strategies. Subroutines, which are developed and debugged using the same consistent interface used throughout OptoControl, allow complex and repetitive tasks to be defined once, then reused throughout one or more control strategies. Once created, a subroutine becomes a reusable and integral part of the OptoControl command set.
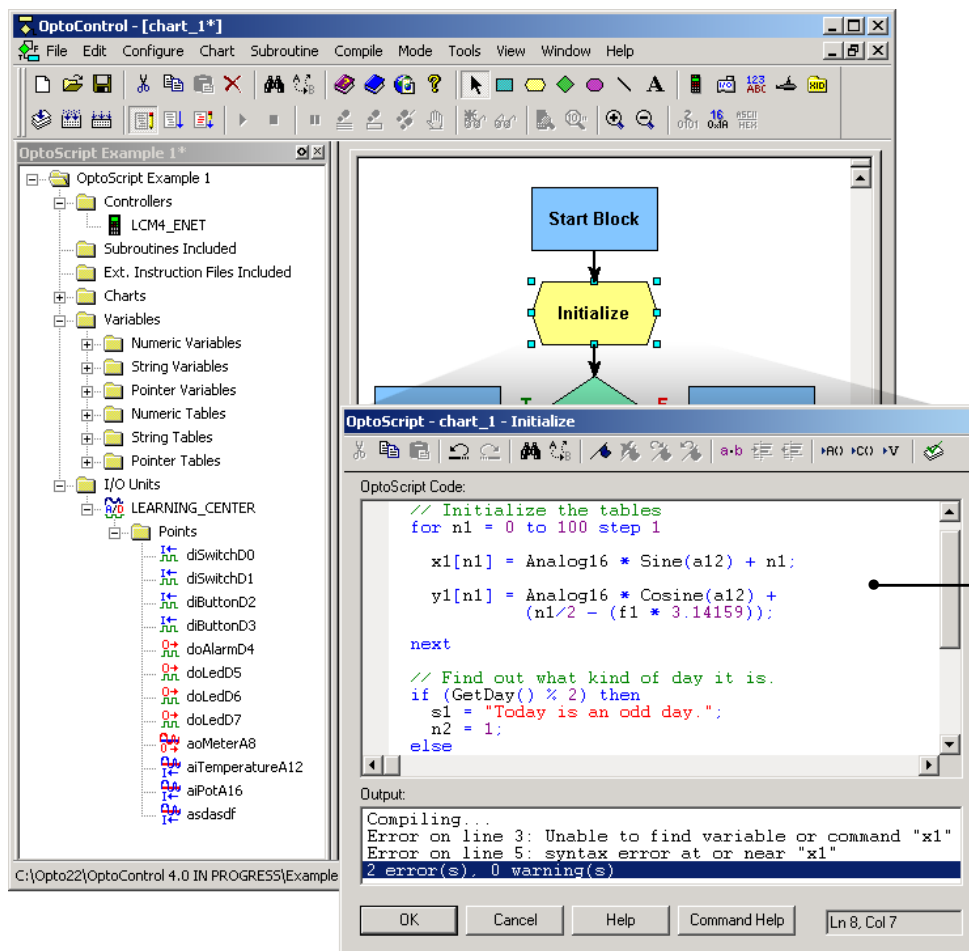
OPTOSCRIPT CODE

Modeled after computer languages such as C, Pascal, and BASIC, OptoScript code gives you a powerful alternative to using standard OptoControl commands. OptoScript can be used within any OptoControl strategy to replace or supplement standard commands and offers an optional programming method within the flowcharting environment. Since OptoScript functions are provided by commands almost identical to the standard OptoControl commands, the same complete range of functions is available.

OptoScript code streamlines common programming tasks such as:

- mathematical expressions
- string handling
- complex loops (for loops, while loops, repeat loops)
- case or switch statements
- conditions (if/then/else)
- combinations of math expressions, loops, and conditions.

OPTOSCRIPT BLOCK AND EDITOR

OptoScript code provides an alternative way to program within the OptoControl flowchart.

The OptoScript Editor shows code in color for easy identification of elements. Commands, variables, and I/O points can be typed in or simply chosen from a list.

Use the Test Compile button to quickly identify errors in the block's code. Errors are shown at the bottom of the Editor window.

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OptoScript code appears in its own hexagonal flowchart block. I/O points can be used directly in the code, wherever a numeric variable can be used. Digital points behave like integer variables with only two possible states, and analog points behave like float variables.

The easy-to-use OptoScript editor provides color coded text, bookmarks, indentation, and simple buttons to insert commands and variables, as well as a test compiler.

Complete documentation for using OptoScript is included, and examples and details for each command are in the *Command Reference* and in online help.

DEBUGGER

OptoControl's real-time debugger makes it easy to check out a system's operation, or to closely follow the flow of control logic to understand what is happening. The debugger lets you get a control strategy up and running as fast as possible.

You can enter breakpoints and manipulate I/O points and variables while the control strategy is running. An animated mode lets you visually step through an OptoControl flowchart and control logic as it executes in real time. You can step through the flowchart one block at a time or step inside blocks to see one line at a time. Dockable watch windows let you simultaneously monitor multiple control elements in your strategy (such as variables, I/O points, and I/O units) in real time.

OptoControl's debugger mode speeds testing and checkout of the entire system during development, and is a powerful diagnostic and troubleshooting tool for maintenance personnel after the project is in production.

OPTOCONTROL DEBUGGER SCREEN
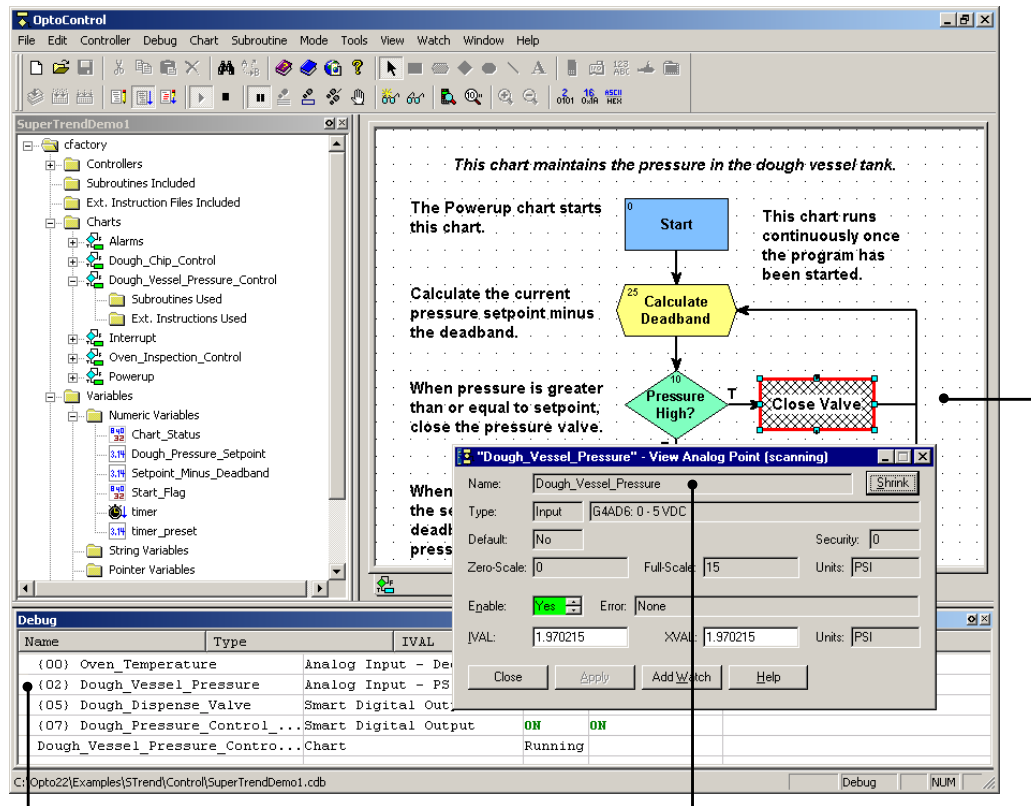
Watch windows let you simultaneously monitor several control elements (variables, I/O points, and so on) in real time.

OptoControl's documented tagname database is used by all Opto 22 FactoryFloor applications and is accessible to third-party software packages.

Animated debugger supports autostep, single-step, and breakpoints for testing, verifying, and troubleshooting. You can also step inside blocks.

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COMMUNICATION OPTIONS

In addition to serial and ARCNET communications, OptoControl supports SNAP Ethernet I/O™ and SNAP Simple I/O™ connected to an Opto 22 M4-series controller using the 10/100 Mbps M4SENET-100 Ethernet adapter card and one of the following brains:

- **SNAP-B3000-ENET,** for mixed configurations of analog and digital I/O
- **SNAP-ENET-D64,** for up to 64 points of digital-only I/O on a single rack
- **SNAP-ENET-S64,** for mixed configurations of analog and simple digital I/O

Opto 22's ioManager utility software, which is required for assigning IP addresses, is included with FactoryFloor.

OptoControl and other FactoryFloor components also have built-in support for dial-up modems. You can quickly configure a dial-up modem connection to remotely download new controller firmware, download an OptoControl strategy, or debug a strategy on a controller located miles away.

INTEGRATION KITS

Two integration kits are available separately for using OptoControl with other manufacturers' products:

- **Allen-Bradley DF1 Integration Kit,** for communicating with Allen-Bradley drivers or PLCs using the DF1 protocol. This kit works with OptoControl version 3.0 or newer.
- **Modbus Integration Kit,** for using Opto 22 controllers to communicate via a serial port as a master or slave using either the Modbus ASCII or RTU protocol. This kit works with OptoControl version 2.2 or newer.

TYPICAL OPTODISPLAY SCREEN
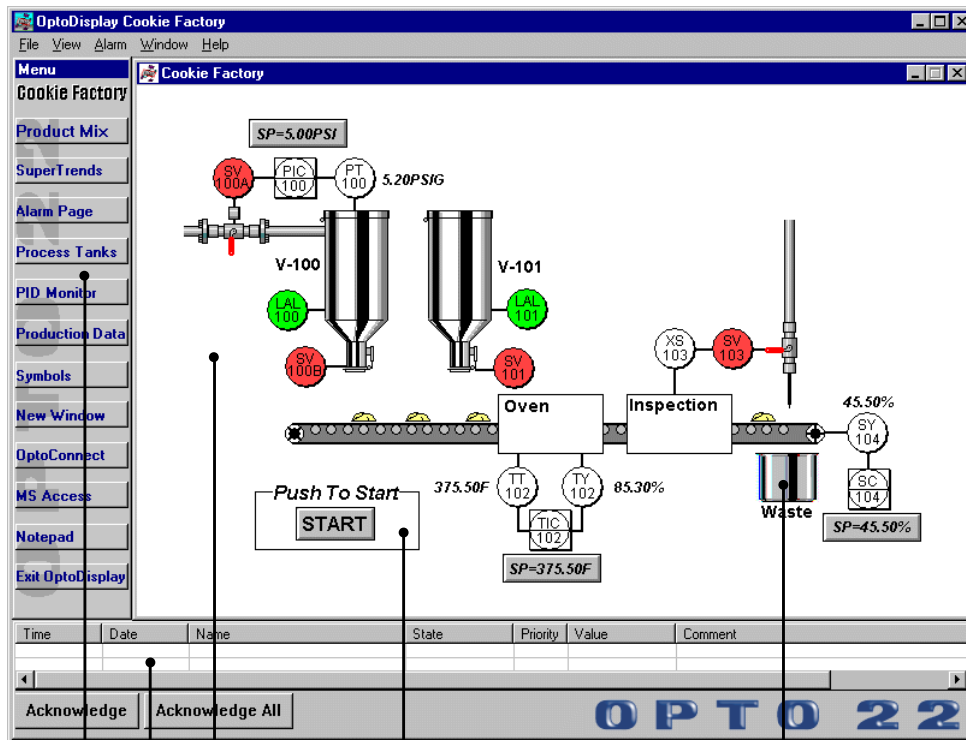
Multiple on-screen windows present operator and process information.

Operator-driven on-screen objects such as buttons and sliders can be easily added to the display.

Use a preconfigured graphic object from the included symbols or built-in Symbol Factory, or import custom .bmp and .jpg files from your own application.

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OPTODISPLAY

OptoDisplay is the human-machine interface (HMI) and trending software that presents controller information graphically and transfers operator instructions to the controller. OptoDisplay also performs alarming and data archiving functions. OptoDisplay's tight integration with OptoControl and its ability to monitor and interact with Opto 22's control hardware gives operators, technicians, and engineers the information they need at a glance.

With OptoDisplay, your operator interface, or *project,* is constructed by designing graphical objects. On-screen windows can combine pictures, symbols, bitmaps, and 3-D graphics created using built-in drawing tools, imported from other applications, or selected from the Symbol Factory, OptoDisplay's extensive library of industrial automation graphics. Display functions can include controller-driven animation and operator-driven commands.

Developing OptoDisplay projects is easy—just point, click, and associate. Advanced features enable you to animate any graphical control object and to associate it with real-world events by choosing a tagname from the shared OptoControl database. Simply use your mouse to select the items you want from the OptoControl strategy and associate them with your OptoDisplay graphical objects or historical collection files.

SUPERTRENDS

OptoDisplay's SuperTrends feature lets you plot trends using real-time data, historical data, or both, switching between current data and any previously logged data with the click of a button.

Sixteen pens give you the power to plot 16 variables or I/O points per trend window. Point markers show you when data is actually sampled. For historical data, you can just click on a point to see the exact date, time, and value when the data was scanned.

OPTODISPLAY SUPERTREND SCREEN
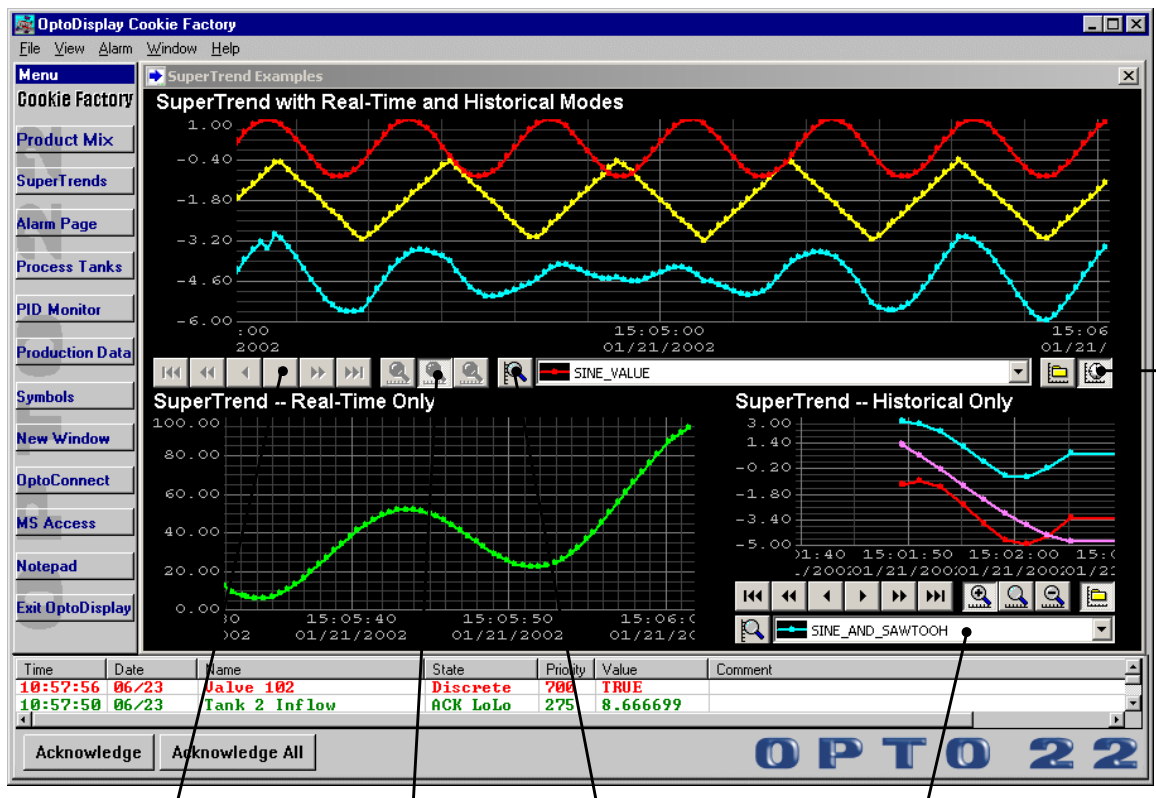
Scroll backward and forward in historical log files.

Zoom in and out along the x-axis.

Adjust y-axis scaling for the active pen.

Select the active pen.

Select real-time or historical mode.

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You can also zoom in or out on the x-axis to see a larger or smaller time span for the trend. The y-axis scaling can be changed in real time for any pen. If the computer running the OptoDisplay project doesn't have a mouse, or you prefer not to use one, you can configure hot keys to provide control from the keyboard alone.

ALARMING

You can view and acknowledge alarms in OptoDisplay, as well as see an alarm history for each alarm point. You can determine which alarm points to set up, define alarm thresholds, and choose colors for each alarm state. Sound files can be added for alarms, and comments or messages can be displayed in alarm graphics while OptoDisplay is running.
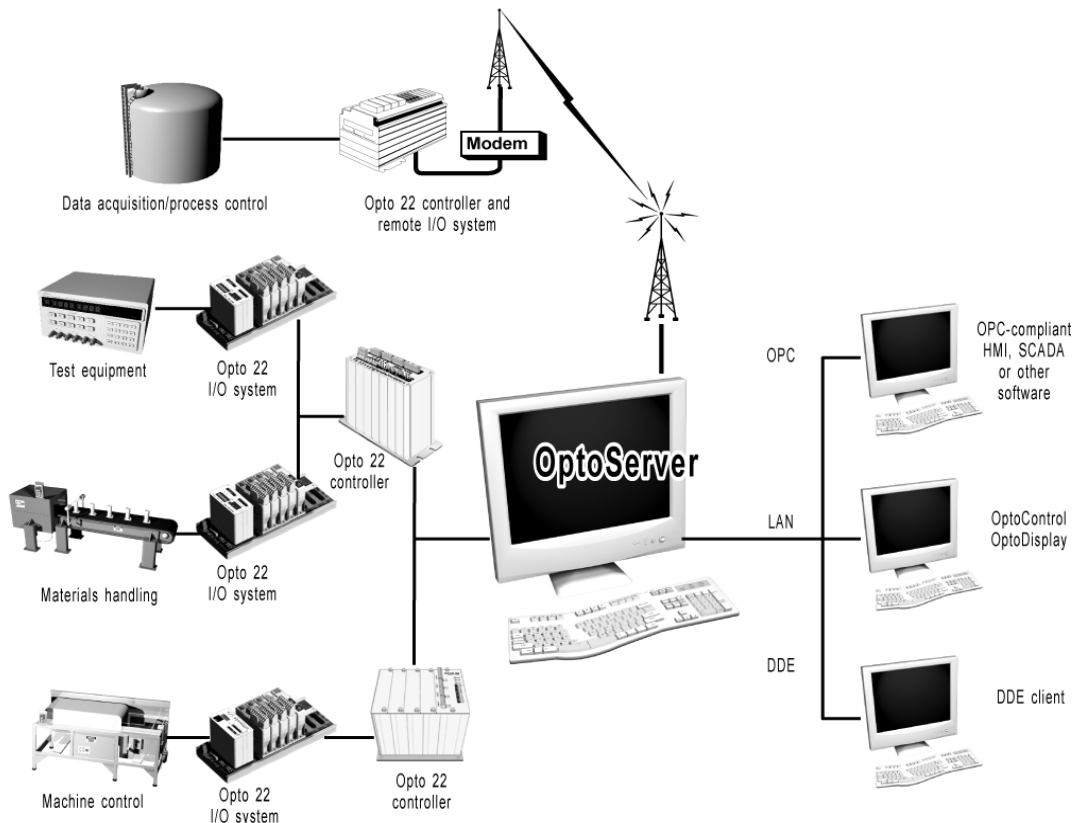
An automatic response to an alarm can be set up to provide immediate action, such as automatically closing a valve when a specific alarm goes off. You can also set priorities for alarms, so that an operator can choose to receive only higher priority alarms during startup, for example. As with trending, hot keys can be set up for mouse-free acknowledgment of alarms.

In addition, you can send the historical log of all alarms to a printer and also to a user-configurable ASCII text file that can be easily imported for analysis into Microsoft Excel, Access, or other applications.

OPTOSERVER

OptoServer is a robust data server that gathers controller information and distributes it via OLE for Process Control (OPC) and Dynamic Data Exchange (DDE) to OPC-compliant and DDE-aware clients on a PC network. FactoryFloor components, such as OptoControl and OptoDisplay, exchange data with OptoServer using Remote Procedure Call (RPC) over TCP/IP.

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OptoServer is fully integrated with OptoDisplay and OptoControl, and can be used in standalone applications or in a complex client/server architecture. Connected to an Opto 22 M4-series controller with the M4SENET-100 Ethernet card, OptoServer can communicate over Ethernet TCP/IP networks at up to 100 Mbps.

Including features such as built-in diagnostics, OptoServer is easy to manage and encourages open systems solution development by customers, integrators, and third-party developers. For example, you can use OptoServer to access FactoryFloor data from custom solutions built with DDE-aware applications such as Microsoft C++ or Visual Basic®.

Because OptoServer is compliant with the OPC 1.0 standard, it's easy to communicate with any vendor's OPC-compliant software. This feature lets you choose among a wide selection of products, applications, and tools from different vendors, knowing that they will all work together seamlessly.

FOR MORE INFORMATION

Contact Opto 22 for additional information about FactoryFloor or any other Opto 22 product. You can reach Opto 22 by phone, fax, e-mail, or the Internet—contact information appears at the bottom of the page.

To order FactoryFloor or other Opto 22 products online, visit the Opto 22 Web site at **www.opto22.com**.

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Products

Opto 22 produces a broad array of reliable, flexible hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications.

SNAP Ethernet Systems

Based on the Internet Protocol (IP), SNAP Ethernet systems offer flexibility in their network connectivity and in the software applications they work with. The physical network may be a wired Ethernet network, a cellular wireless network, or a modem. A wide variety of software applications can exchange data with SNAP Ethernet systems, including:

- Opto 22's own ioProject™ suite of control and HMI software
- Manufacturing resource planning (MRP), enterprise management, and other enterprise systems
- Human-machine interfaces (HMIs)
- Databases
- Email systems
- OPC client software
- Custom applications
- Modbus/TCP software and hardware.

SNAP Ethernet system hardware consists of controllers and I/O units. Controllers provide central control and data distribution. I/O units provide local connection to sensors and equipment.

SNAP OEM Systems

Opto 22 SNAP OEM I/O systems are highly configurable, programmable processors intended for OEMs, IT professionals, and others who need to use custom software with Opto 22 SNAP I/O modules.

Linux® applications running on these systems can read and write to analog, simple digital, and serial I/O points on SNAP I/O modules using easily implemented file-based operations. Applications can be developed using several common development tools and environments, including C or C++, Java, and shell scripts.

M2M Systems

Machine-to-machine (M2M) systems connect your business computer systems to the machines, devices, and environments you want to monitor, control, or collect data from. M2M systems often use wireless cellular communications to link remote facilities to central systems over the Internet, or to provide monitoring and control capability via a cellular phone.

Opto 22's Nvio™ systems include everything you need for M2M—interface and communications hardware, data service plan, and Web portal—in one easy-to-use package. Visit nvio.opto22.com for more information.

Opto 22 Software

Opto 22's ioProject and FactoryFloor® software suites provide full-featured and cost-effective control, HMI, and OPC software to power your Opto 22 hardware. These software applications help you develop control automation solutions, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity.

Quality

In delivering hardware and software solutions for worldwide device management and control, Opto 22 retains the highest commitment to quality. We do no statistical testing; each product is made in the U.S.A. and is tested twice before leaving our 160,000 square-foot manufacturing facility in Temecula, California. That's why we can guarantee solid-state relays and optically-isolated I/O modules *for life*.

Product Support

Opto 22's Product Support Group offers comprehensive technical support for Opto 22 products. The staff of support engineers represents years of training and experience, and can assist with a variety of project implementation questions. Product support is available in English and Spanish from Monday through Friday, 7 a.m. to 5 p.m. PST.

Opto 22 Web Sites

- www.opto22.com
- nvio.opto22.com
- www.internetio.com (live Internet I/O demo)

Other Resources

- OptoInfo CDs
- Custom integration and development
- Hands-on customer training classes.

About Opto 22

Opto 22 manufactures and develops hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel.

Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability.

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