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 four 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. And now you can connect to this hardware over high-speed Ethernet networks—and the Internet—using an Opto 22 controller with the M4-SENET-100 10/100 Mbps Ethernet adapter card.

FactoryFloor also takes advantage of Microsoft® Windows® 95 or 98, Windows NT®, and Microsoft Office software products such as Excel and Access 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 four integrated components:

- **OptoControl™**, a graphical, flowchart-based development environment for machine control and process applications. OptoControl can run on a real-time industrial controller or on a software-based “soft-logic” controller in a Windows NT environment.
- **OptoDisplay™**, an intuitive, shared database HMI package that includes alarming, trending, and a built-in library of 3,000 industrial automation graphics.
- **OptoServer™**, a robust data server compliant with OLE for Process Control (OPC) and Dynamic Data Exchange (DDE) that connects the controller network with the PC network.
- **OptoConnect™**, a bidirectional link between the controller network and Microsoft SQL Server® or Access databases.
**OPTOCONTROL**

OptoControl is the flowchart software used to develop and download the instructions, or strategy, to an industrial controller. OptoControl strategies can run, or execute, on the SNAP-LC controller family, several Mistic® controllers, the entire M4 controller family, and ISA-based controllers such as the G4LC32ISA and G4LC32ISA-LT.

OptoControl strategies can also be executed in OptoRuntimePC, the soft-logic controller for Windows NT. OptoRuntimePC makes testing and debugging control strategies easier than ever because no additional hardware is required to download and test the logic of the OptoControl strategy. It works whether the target system is an Opto 22 hardware controller or the soft-logic controller itself.

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, are configured in OptoControl but executed within the SNAP I/O system interface, or brain, at the I/O level.

**OPTOCONTROL CONFIGURATOR SCREEN**

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. Powerful subroutine builder lets you easily expand OptoControl with your own application-specific commands. In the “Strategy Tree,” just point and click to display or edit the configuration of any item in the control strategy.

OptoControl programs are easy to maintain because the flowcharts are self-documenting. Plain English commands are used to control I/O, perform communications, and do math functions. 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. Powerful network communications include Ethernet with TCP/IP. Extensive ASCII string handling and serial communications capabilities offer unprecedented control of serial devices.
EASY TO USE

One of the fundamental advantages of OptoControl is its ease of use. Since it is virtually self-documenting, existing strategies can be easily understood, making maintenance simple and streamlined. Every time the control strategy or system configuration is changed, the documentation will reflect the latest changes.

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.
• 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.
• OptoRuntimePC, included with OptoControl, is a control option that allows you to run a control strategy on a “soft-logic” controller under Windows NT.

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, 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.

**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.
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 presents a tightly integrated user interface that allows you to 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 a OptoControl flowchart and control logic as it executes in real 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.

RUNTIME OPTIONS

OptoControl strategies have multiple runtime options, including OptoRuntimePC, a Windows NT-based soft-logic controller that runs on a PC. This means that the same OptoControl strategy can run on a PC, an ISA-based coprocessor, an RTU, or an industrial controller.

Soft-logic Controller

OptoRuntimePC lets you develop control applications that run in a Windows NT environment without the need for a separate controller or processor.

Just like all other Opto 22 controllers, OptoRuntimePC is configured and debugged using OptoControl. OptoRuntimePC supports up to 31 flowcharts executing simultaneously. Operating as a service under Windows NT, OptoRuntimePC does not compromise Windows NT, and you can execute control strategies not only on the same workstation where the strategies are developed, but also on any other Windows NT computer.

Open communication is one of the key features of OptoRuntimePC. Individual DLLs can be assigned to each communications port, allowing third-party products to be cleanly integrated with OptoRuntimePC. Access to Windows NT features such as networking is also supported.

OptoRuntimePC is included with every OptoControl package, and you can buy additional runtime licenses as needed per PC.

(Note: OptoRuntimePC currently does not support Ethernet communications. For optimal serial communication between OptoRuntimePC and control system components, Opto 22 strongly recommends that you use AC-37 or AC-47 communication adapter cards with your I/O system.)

Hardware Runtime Options

OptoControl hardware runtime options span Opto 22’s product line of controllers. OptoControl strategies can run on SNAP-LC controllers, the entire M4 controller family, and several Mistic, or “classic,” controllers. Other hardware runtime options include Opto 22’s M4RTU and ISA-based controllers such as the G4LC32ISA and G4LC32ISA-LT.

COMMUNICATION OPTIONS

OptoControl features new commands and support for SNAP Ethernet 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 SNAP Ethernet 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.

Opto 22’s Ethernet I/O 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 (Windows NT only). 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 manufacturer’s 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 later.
- 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 later.
**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.

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![Typical OptoDisplay Screen](image-url)

**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 bitmaps from your own application.
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.

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.

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 Excel, C++, or Visual Basic.

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

OptoConnect is FactoryFloor’s database connectivity software that links real-time information in Opto 22 controllers with Microsoft Access 97 or Microsoft SQL Server 6 databases. (Contact Opto 22 for current information on compatibility with later versions of these products.) You can use OptoConnect to map variables and I/O point data from an OptoControl strategy running on a controller directly into database tables.

OptoConnect works with Microsoft SQL Server, along with other Microsoft BackOffice® products, to provide the enterprise-wide connectivity and communications infrastructure you can use to access data from virtually any platform or business system. With data from your factory floor available in industry-standard SQL tables, you can access the data using Microsoft applications such as Excel or Access, or you can select from a wide variety of Microsoft-compatible applications to meet your unique business and manufacturing needs.

OPTOCONNECT COMPONENTS

OptoConnect consists of three main software components: Configurator, Runtime, and Monitor. OptoConnect Configurator is used to create an OptoConnect project, which is simply a set of table definitions that specifies which data items are to be transferred between the Opto 22 control system and the Microsoft SQL Server or Access database. OptoConnect’s seamless integration with OptoControl makes...
access to manufacturing information easy: just drag and drop the desired data from the OptoControl Strategy Tree into the SQL and Access database tables. From there, snapshot and continuous data are automatically transferred based on rules and intervals you define. And since you can define your own column names, you can present manufacturing information in terms your own business users will understand.

OptoConnect’s Runtime component executes OptoConnect projects and is responsible for creating the database tables and transferring data between the database(s) and the Opto 22 control system. OptoConnect Runtime can operate either as an executable application or as a service under Windows NT, and works in conjunction with OptoConnect’s Monitor component to provide feedback on what the OptoConnect project is doing.

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 Opto 22’s online store at www.optoexpress.com.

Easily drag and drop data items from your OptoControl strategy into an OptoConnect database table.