

# RELIANT™

**The Series 5™  
Reliant™  
Controllers:  
Purpose-built,  
Easy-to-Use,  
Fixed I/O -  
configuration,  
with IEC-61131  
Programming  
Languages**



# The Best of Both Worlds

Series 5 Reliant Controllers combine standard (but easily customized) application software packages with user-programmable logic control.

Hardware features include:

- Simple two-piece design for easy installation and maintenance
- Turbomachinery-specific mix of high-speed local I/O

Series 5 Reliant Controllers work with CCC powerful TrainTools workstations.



## Control Program Options

Reliant Controllers can be purchased with a variety of software packages:

- For many applications, we offer standard control programs that combine various machine control functions. This provides the simplicity of traditional, purpose-built controllers.
- When no standard package fits your needs, our TrainTools engineering programs can be used to build a custom control program that combines the required TrainWare turbomachinery control blocks with IEC-61131 sequencing logic. This provides the flexibility of a programmable controller.

In either case, Reliant Controllers are your best turbomachinery control solution for many common applications, including:

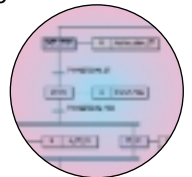
- single-section, steam turbine driven compressor control
- two-section compressor control
- multi-compressor load-sharing station and unit control
- single-section, gas turbine driven compressor control
- companion control for multisection compressors
- packaged air compressor control

Simplification and ease of use have been primary goals in the development of these packages. The I/O channels for most signals are preassigned, and seldom-used control features are omitted. If a standard program fits your needs, a minimum of engineering and configuration (other than tuning) is required.

```
1 (* Generate Test Out
2 IF DevAck THEN
3   TEST:=CBGAT(TEST_
4 ELSE
5   TEST:=CBGAT(TEST_
6   SHG_IF;
7
8 (* Generate Test Out
9 IF DevAck THEN
10  TEST:=CBGAT(TEST_
11 ELSE
12  TEST:=CBGAT(TEST_
13  SHG_IF;
14
15 (* Generate Test Out
```

Should you need a nonstandard loop combination or special features, Reliant Controllers incorporate the five standard, IEC-61131

programming languages. This means our powerful TrainTools engineering programs can be used to develop a custom-control program that provides the exact combination of TrainWare machine-control blocks, and sequencing logic you need.



## Simplex or Duplex Configuration

Each Reliant Controller consists of only two major assemblies:

- A Base Assembly with a mounting base and field wiring terminal board that can be mounted on a 19-inch rack or flat surface as a single unit that rarely needs maintenance or replacement.
- An Electronics Assembly with two handles to facilitate plugging it into and removing it from the base, includes the CPU and I/O circuitry, a local operator interface, and an integral power supply.

Duplex Controllers use two Electronics Assemblies that plug into a taller Chassis and share the same terminals. With either model, no rewiring is required to replace faulty modules. Mean time to repair is typically less than an hour.

If your Reliant Controllers run different control programs, the number of spares you need can be reduced by using a TrainTools Workstation to download their application software before they are put into service.

## Multiple Loop Capacity

The Reliant Controller features a 32-bit microprocessor, and a mix of high-speed local I/O designed to accommodate the following:

- 22 analog, 6 frequency, and 16 digital inputs, all with exceptional over- and transient-voltage protection;
- 6 analog and 14 discrete outputs, with analog output isolation provided by plug-in conditioning modules.

A version with conditioned I/O is also available.



Reliant Controller with conditioned I/O supports the operation of multiple control applications. It also supports peer-to-peer communication functions that are used to coordinate the operations with other controllers over high-speed communication networks.

Reliant Controllers also provide four electrically-isolated, 4-wire RS-485 serial ports: one for communicating with a TrainTools Workstation, one for communicating with companion controllers, and two for Modbus communication with a DCS or TrainPanel 500 Operator Interface.

## TrainPanel 500 Operator Interface

The TrainPanel 500 provides a powerful yet cost effective operator interface tool for the CCC Reliant Controller. It allows you to operate and monitor multiple controllers with color-graphic displays and membrane key navigation buttons. Communication is implemented using the standard RS-422/485 Modbus serial network protocol to multiple controllers per panel. Fast screen response times are accomplished by permanently storing user display screens in local memory. The operator panel can be configured to meet the needs of a specific application.

## Local Operator Interface

The Reliant Controller's 4x20 vacuum florescent display, thirteen control keys, and five LED indicators provide a basic, local interface for units mounted near your process equipment. The built-in interface can be used to monitor I/O signals, alarms, and operating states.

## Standard Series 5 Features

Like all Series 5 Systems, Vanguard controllers utilize a fully deterministic, multitasking operating system. Automation and control programs, including our time-tested algorithms for antisurge protection and loadsharing, are implemented using IEC-61131 standard. Windows-based TrainTools suite provides comprehensive interface for programming and project engineering.

### Proven Application Software

At the core of the Series 5 concept are our industry-leading turbomachinery control algorithms, implemented using programming languages and techniques offered by the IEC-61131 standard (formerly IEC-1131).

CCC offers IEC-61131 applications that cover single- and multishaft gas turbine fuel control; steam turbine speed, extraction, and valve-management control; compressor antisurge, performance, load-sharing, anti-choke, and quench control; and electrical generator load control.

Applications contain control techniques and algorithms that CCC has developed, refined, and successfully implemented over and over during its 25 years in the industry. CCC-developed control techniques include calculating a compressor's proximity-to-surge, innovative combinations of open- and closed-loop control, efficient load sharing for series and parallel compressors, and turbine overspeed avoidance.

### Reliable Real-Time Multitasking


Unlike many control systems and PLCs, which take shortcuts in this area, the Series 5 operating system delivers true multitasking capabilities that optimize CPU usage by executing control applications at different rates. Computationally intensive tasks that do not require fast loop times can be executed at a slower rate, while machine control and protection tasks, which absolutely require short loop times, can be executed at a faster rate. To prevent aliasing, I/O signals are filtered based on the execution rate of the customer's application.

### Powerful Workstation Software

CCC provides a suite of Windows 2000-based tools, TrainTools, for engineering of and interfacing with all Series 5 systems. This powerful package includes:

- **Project Builder**, a comprehensive tool for building a project database. It establishes the connection between a process tag, control system I/O designation and logical name of the process variable used in the software. Project Builder is tightly integrated with the IEC-61131 programming environment, and generates code for downloading to the controller.
- **Application Editor**, a full-service graphical editor for creating IEC-61131 compliant software. Integration of the Application Editor with the Project Builder saves valuable engineering time by eliminating redundant data entry.
- **TrainView-II**, a state-of-the-art object-based graphical interface to all Series 5 controllers, featuring displays that are easily customized to meet specific requirements. TrainView-II uses the same data base as the Project Builder, and can be configured using the Project Builder interface.
- **Alarm Server** provides alarm and event management and reporting facilities. All alarms and events are provided with the controller's time stamp.
- **Archiving and Trending** facilities allow high resolution (down to 100msec) data acquisition and viewing.
- **Configurator**, a troubleshooting, maintenance, and on-line configuration tool allows the change of controller configuration parameters on-line. CCC application software is highly flexible, allowing a wide range of changes on-line through adjustment of parameters.

Most importantly, CCC TrainTools include OPC server for easy connectivity to other systems.



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***For more information about our  
new Series 5™ Reliant™ Controller  
and other state-of-the-art products  
from the world leader  
in turbomachinery control,  
please contact a CCC office near you.  
We are uniquely qualified to  
solve turbomachinery control problems,  
and we will help you achieve maximum  
turbomachinery performance regardless of  
your equipment or process.***

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