Honeywell’s C300 controller provides powerful and robust control for the Experion® platform. With the C300 and the Control Execution Environment, customers can improve engineering productivity and maintenance, maximize process uptime, and reduce production costs.

The C300 joins the C200, C200E, and the Application Control Environment (ACE) node in operating Honeywell’s field-proven deterministic Control Execution Environment (CEE) core software. The CEE provides a superior control execution and scheduling environment. Control strategies for all platforms are configured and loaded through Control Builder, an easy and intuitive engineering tool.

The C300 controller hardware offers unique space-saving, installation, and maintenance benefits consistent with its innovative Series C form factor.

The C300 is optionally redundant, requiring no additional hardware other than an identical second hardware module.

Easy Control Strategy Creation through Rich Function Libraries

The Control Execution Environment function blocks support:

- Continuous control
- Logic
- Sequential control
- Model based control

Each function block contains a rich set of predefined features, such as alarm settings, different algorithm choices, and maintenance statistics, which are enabled by configuring parameters. Function blocks are combined and interconnected through soft wiring in either Control Modules (CMs) or Sequential Control Modules (SCMs) to perform a specific control task, enabling efficient strategy engineering.

Embedded functionality guarantees consistent control strategy execution and delivers consistent alarming and operations behavior. This consistency reduces operator errors and saves implementation time by eliminating the need to create low-level basic functions.

With the C300 and the CEE, customers can:

- Improve engineering productivity and maintenance with rich function libraries and one seamless intuitive user environment,
- Maximize process uptime with a robust deterministic software environment and full hardware redundancy, and
- Reduce production costs with flexible and efficient control strategies, on-process migration, and efficient hardware processing power.

The CEE fully supports the batch standard ISA S88.01 and integrates sequences with devices. The devices will track the state of the sequences and perform pre-configured actions based on those sequences. This reduces the implementation and complexity of the sequence abnormal handling. The SCMs support abnormal handling, recipe parameters, and on-line monitoring of the execution through chart visualization.
One Seamless Environment through Easy Data Communication

Parameters provide access to every imaginable piece of information in the controller. This data can be used throughout the Experion system, whether for other control strategies or for operator purposes. For example, in custom displays, the data can be historized and used in trend views. The engineer does not need to know where information resides. Instead, he can just reference it, and the system manages the deterministic communication of that information. The system will notify the user based on the status information associated with the value and take appropriate action when required.

Each parameter is also protected from accidental changes through a security access level, and certain parameters can only be changed off-line. Communication is based on report-by-exception and publish-subscribe, making efficient use of communication bandwidth by accessing data only when needed and avoiding duplication.

Consistent and Predictive Behavior Makes Engineering and Maintenance Easier

The C300 CEE supports an execution period per control strategy, ranging from 50 msec to 2000 msec. The user can make changes to existing or add new control strategies without interrupting other control strategies executed by the controller. The user has full control over the function block execution order within the control strategy and the execution order of multiple control strategies. Control strategies can be easily moved between control environments by using the convenient drag-and-drop feature within Control Builder.

The CEE guarantees a deterministic execution of the user application; every control strategy is executed within the specified execution period without being influenced by the controller loading. The execution time is not dependent upon the number of loaded control modules or their complexity. When a controller phase is overloaded, the CEE will notify the user through an alarm notification. The user can then reassign a control strategy to other phases or another execution environment to solve the overrun situation. The user can also use the automatic balancing feature and let the system choose the optimum execution phase.

Uniform and Intuitive Detail Displays

The CEE supports detail and group display templates, which can be assigned per control strategy. The user can elect to use the standard displays provided for the most common functions, or create a custom display template. The user simply references the detail display name in the strategy configuration tab, and the operator will be able to interface with the loaded control strategy through the correct detail display. The group displays can also be used as faceplates in custom graphics.

Easy and Intuitive Engineering Environment

Control Builder is the control engineering and maintenance tool for the Control Execution Environment, and improves the control engineer’s productivity by simplifying configuration with a graphical user interface and predefined function blocks ready for wiring into a specific control strategy. The control engineer can enable and change standard function block features without the need to build these from the ground up. The control strategy can be documented with embedded objects such as text, documents or web-links.

The user can easily copy existing control strategies using a standard cut-and-paste feature. When large quantities of strategies must be created, optional features are available to increase the engineering productivity and improve maintenance over a longer term. These features include Template Support, Bulk Build and Bulk Edit.

Control Builder supports a powerful set of algorithm libraries for implementing process control strategies.
**Template Support** is powerful when instances must be kept identical throughout the lifecycle of the installation. The user creates a control strategy as a template, predefining the exact layout and functionality. Each instance created from the template maintains a link to the template. If the template is modified, all instances will automatically inherit the same changes. To safeguard the update, the changes only take effect after the user has verified and loaded the modified control strategies to the controllers. This makes maintenance easy and guarantees consistency of the application.

**Bulk Build** is an option used to create or recreate a large amount of control strategies from, for example, an instrumentation database. Just reference the predefined typical control strategy and supply the unique parameters per instance, and the Bulk Build tool will populate the engineering database with all control strategies. Bulk Build also supports the use of templates, making the generation of template-defined instances fast and easy.

**Bulk Edit** is available for day-to-day engineering activities and maintenance tasks. It supports the modification of a large number of parameters through user-defined parameter lists. The list can be generated using several standard tools like Microsoft Excel, Access or a text editor using a comma-delimited file format. The user has a choice to make the changes off-line or on-line. Every change is validated against existing limits and access levels.

**Online Monitoring Is Available to the Engineer and Operator**

Once a control strategy is created and loaded to the controller, the engineer can monitor the strategy on-line. The same graphical interface will now show the blocks while executing with live updated values and color codes for discrete signals. This is helpful for verifying a control strategy or for troubleshooting a process problem. The control or maintenance engineer can directly modify parameters from the engineering environment without needing an operator interface.

The same view is also available to the operator through chart visualization, a Control Builder view imbedded into every detail display.

**Automatic Loop Tuning Application Provides Efficient Controller Performance Optimization**

The Experion system includes an advanced PID loop tuning package, OperTune. This package provides automated, closed-loop tuning for all CEE-based controllers, accessible from the standard PID displays. OperTune provides an easy and intuitive interface with leading edge and highly robust loop-tuning technology to all levels of Experion users.
Controller Based Model Predictive Tuning with Profit Loop

Profit Loop is Honeywell’s patented algorithm that provides a single input / single output model-predictive function block that is included in the standard C300 controller function block library. It is designed with the operating simplicity and computational efficiency of a standard PID function block. Profit Loop provides tight, robust control – increasing process stability by up to 30 percent. Profit Loop uses a simple model of the process to predict the effect of past, present, and future control moves on the process (controlled) variable. Because Profit Loop can anticipate future process behavior, the controller knows exactly how much to move the process to meet the desired control objectives. Profit Loop incorporates the best elements of both traditional PID algorithms and the model-based control and optimization technologies of Profit Controller at the regulatory level.

Custom Algorithm Blocks

Custom Algorithm Blocks (CABs) are similar in purpose and structure to native function blocks included with Control Builder. These blocks have predefined algorithms and data structures. By contrast, Custom Algorithm Blocks have user defined algorithms and data structures. CABs are developed using Visual Basic integrated into Control Builder.

The C300 controller supports the execution of CABs starting in Experion PKS R400. CABs can greatly reduce the effort required to create complex control strategies that require the extremely robust control environment offered by the C300.

Full Support for FDA 21 CFR Part 11 Validation and GAMP Guidelines

Extending Control Builder with the Qualification and Version Control System (QVCS) option provides versioning functionality required to achieve FDA validation. The QVCS software provides extensive version control on all user configurations. This allows the user to revert to previous versions, make detailed comparison between different versions or compare with the current loaded configuration. It also provides a full audit trail with the user name, action performed, date and time stamp.

In addition, the QVCS software adds an unmatched lifecycle management component, which guarantees the configured user development lifecycle. Each lifecycle stage can be associated with a certain user or group of users such that only they can advance the configuration.

Transparent Integration of Smart Field Devices

The C300 controller transparently integrates FOUNDATION™ Fieldbus, HART®, and Profibus® devices into the CEE. Fieldbus data and control blocks can be seamlessly integrated with C300-based control strategies through the Fieldbus Interface Module or the Profibus Gateway Module, allowing users to take advantage of the rich set of diagnostic and field data available through fieldbus devices.

When HART devices are used with the C300, HART digital information is available in C300 control strategies and is passed through to the operator interface and asset management applications, such as Honeywell’s Field Device Manager application and Asset Manager.

Maximize Process Uptime

The Experion CEE maximizes system and process uptime through several features. The CEE can, for example, be extended with new function block libraries while the controller remains on-process, controlling the process without interruption. In addition, when the C300 controller is redundantly deployed, the CEE supports On-Process Migration, allowing a migration to a new software release without interrupting control or operator view on the process.

The C300, when deployed redundantly, has very high hardware availability, achieved through an improved hardware ‘mean-time between failure’ and extensive diagnostic coverage. A single C300 controller can be made redundant by simply adding a second controller, delivering no single point of failure. There is no change required in the user application, and the system automatically handles the synchronization. In the rare case of a failure, either by the primary or secondary controller, the system will cause a bumpless failover to the healthy controller.

In a typical process, network problems can create various failures. The C300 is shielded from any network attack by the Control Firewall. Residing on Honeywell’s patented Fault Tolerant Ethernet (FTE) technology, the Control Firewall only passes information to the controller that is intended for process control. This creates a robust and reliable network using cost-effective and easily available Ethernet products.

In addition, the C300 is connected through a dedicated redundant I/O communication network with the Series C I/O and Process Manager™ I/O families. Each controller supports
two I/O networks. The I/O can also be fully redundant, which is seamless to the user application.

In the rare event of a power loss, the C300 battery-backed RAM and/or the checkpoint feature will allow the user to quickly restore the controller and continue controlling the process. The user can choose between a warm restart or a cold restart.

**Lower Installed Cost with a Unique Vertical Design**

The C300 Controller is packaged in the same form factor as the Series C I/O. This innovative design features vertical mounting to improve wire entry and wire flow through the cabinet without any footprint penalty. In addition, the vertical orientation directs the heat flow around the air intakes, reducing hotspots and improving reliability.

The modules use high-density components, which reduce the overall size of the boards while maintaining high channel to module ratios.

**Investment Protection**

Honeywell is committed to protecting customer investments by supporting and integrating previous control products. Consistent with this philosophy, the Control Execution Environment, which holds the user application, is platform-independent. This allows the user to make use of new, more powerful hardware platforms when they become available, while retaining the specific user application.

In addition, the C300 controller seamlessly integrates with existing Honeywell I/O families such as the Honeywell Process Manager I/O, a level of integration not possible with any other control system. C300 Controllers seamlessly communicate with any other control node on the network. These can be other C300 controllers, C200 controllers, C200E controllers or ACE nodes. The information is shared without explicit configuration effort by the user.

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**More Information**

For more information on Honeywell’s C300 Controller, visit [www.honeywell.com/ps](http://www.honeywell.com/ps) or contact your Honeywell account manager.

**Automation & Control Solutions**

Process Solutions
Honeywell
1860 W. Rose Garden Lane
Phoenix, AZ 85027
Tel: 800-822-7673
[www.honeywell.com/ps](http://www.honeywell.com/ps)