Honeywell

Product Information Note

Experion C300 Controller



Honeywell's C300 controller provides powerful and robust control capabilities for the Experion® PKS platform. The C300 controller, with its deterministic and flexible Control Execution Environment, greatly improves engineering productivity, reduces maintenance costs and maximizes process uptime. Experion® PKS – The Knowledge to Make it Possible.

The Experion C300 controller forms the heart of the Experion control system and deterministically executes control strategies, batch operations, interfaces to various types of I/O and directly hosts custom programmable applications. All of this is achieved using Honeywell's field-proven Control Execution Environment (CEE) for superior control execution and scheduling. Control strategies are configured and loaded through the Control Builder application, which provides easy and intuitive access to the controller configuration options.



The 'designed-vertical' C300 Controller provides a superior control execution and scheduling environment.

By design, the C300 controller hardware offers unique space-saving installation and maintenance benefits, consistent with the innovative Series C form factor. The C300 controller is optionally fully redundant, requiring no additional configuration other than adding an identical second hardware module.

With the C300 and the CEE, you can:

- Easily implement complex control strategies using various types of I/O and bus interfaces
- Improve engineering productivity and maintenance using the rich function libraries provided in the intuitive user environment
- Maximize process uptime with its robust deterministic software environment and full redundancy
- Reduce production costs with flexible and efficient control strategies, on-process migration, and powerful hardware processing power
- Organize and load-level complex control strategies across multiple controllers using transparent peer-to-peer communication

Fast Execution

The C300 Controller supports a wide range of execution cycle times enabling applications requiring fast scan rates such as turbine control strategies and compressor anti-surge control to be performed in a single integrated control platform.

Easy Control Strategy Creation through Rich Function Libraries

The Control Execution Environment function blocks support:

- Continuous control
- Logic control
- Sequential control

- Model based control
- Batch control

Each function block provided contains a rich set of predefined features, such as alarm settings, different algorithm choices, and maintenance statistics, which are enabled by configuring its 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.

The CEE fully supports the batch standard ISA S88.01 executing all 4 levels of the procedural model in the controller without any server dependency. Class based batch concepts are supported to reduce the project and lifecycle costs of batch applications. Integration with the rest of Experion provides a single platform for all aspects of batch execution.

One Seamless Environment through Easy Data Communication

Named parameters provide full secure access to all application information in the controller. This data can be used throughout the Experion system, whether for other control strategies, for display and operator HMI interaction, or for historization and reporting. Experion's global database means the engineer does not need to know where information resides. Instead, the engineer can just reference it, and the system intelligently manages the deterministic communication and delivery of that information.

Each parameter is also protected from accidental changes through security access levels. Communication is constantly optimized 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 user can make changes to existing control strategies or add new ones 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. They can even be switched between simulated control execution for strategy checkout and deployment in an on-line controller.

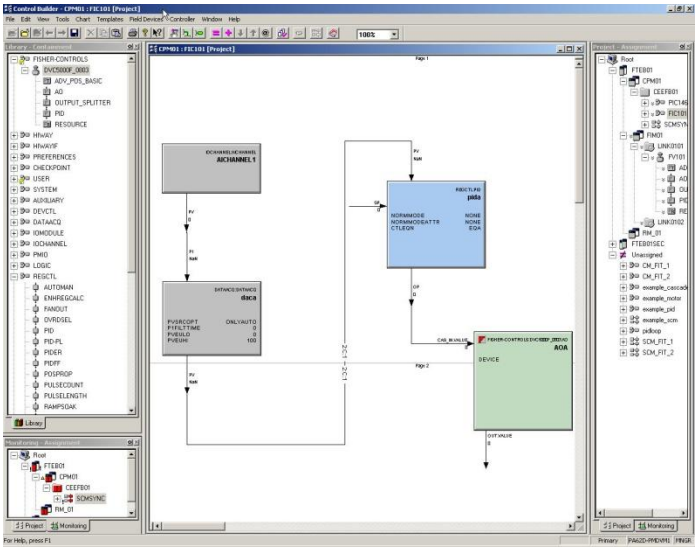
Automated System time functions

The C300 controller supports the Precision Time Protocol (PTP) as defined by the IEEE 1588 standard in addition to the standard NTP protocol. With direct connections to Level 2 network, PTP provides precise time synchronization across controllers irrespective of the system size. The controllers can synch to any PTP grandmaster time source and also provide display of the PTP statistics.

The C300 controller also supports automatic Daylight Saving Time (DST) adjustments without requiring any manual interventions. The controllers periodically adjust their time status, and any newly added controller is automatically configured to the correct time.

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.



Control Builder supports a powerful set of algorithm libraries for implementing process control strategies

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 them from the ground up. The control strategy can be documented with embedded objects like 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.

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 inherent 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.

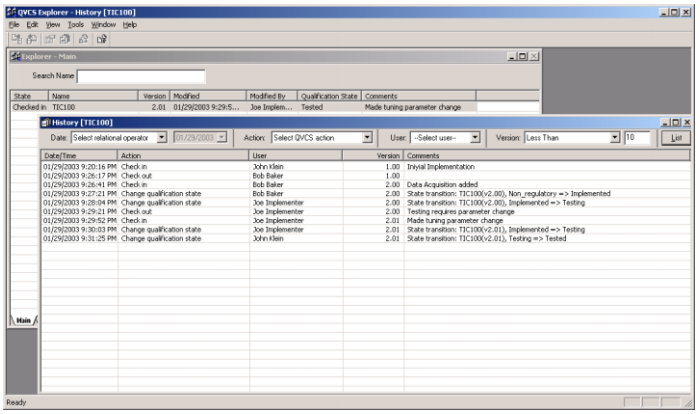
Online Monitoring Is Available to the Engineer and Operator

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.

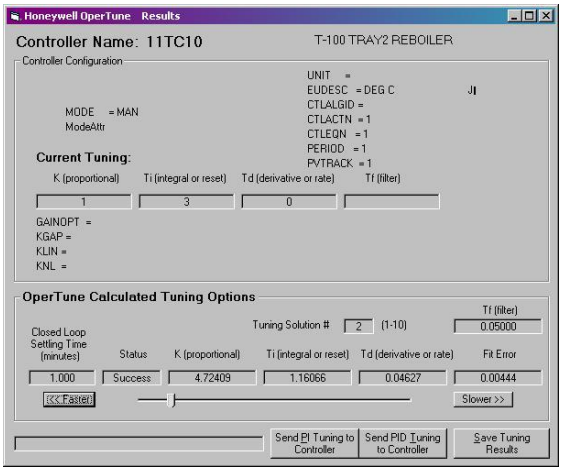
The same view is also available to the operator through chart visualization, a Control Builder view imbedded into every detail display.

Automatic Loop Tuning Application Provides Efficient Controller Performance Optimization

The Experion system includes an advanced PID loop tuning package called OperTune. This powerful integrated capability 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.



The Experion Qualification and Version Control System allows the user to revert to previous versions and track configuration changes



OperTune uses robust tuning technology for automated closed-loop tuning

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 anticipates 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. It can be tuned via a single "knob", and via a patented algorithm, uses similar computational resources to standard PID allowing for broad deployment on difficult loops and to increase valve life through greatly reduced control moves.

Custom Algorithm Blocks

Custom Algorithm Blocks (CABs) can greatly reduce the effort required to create complex control strategies that require the extremely robust control environment offered by the C300. CABs provide end users with the ability to program user defined algorithms and data structures into reusable blocks that share the same attributes as pre-defined function blocks. CABs are developed using Visual Basic syntax via Control Builder, however, all execution in the controller itself is directly in the embedded real-time execution environment.

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 have access to advance the configuration.

Transparent Integration of Smart Field Devices

The C300 controller transparently integrates FOUNDATION™ Fieldbus, HART®, and Profibus® devices into the CEE. Fieldbus and Profibus 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 from intelligent 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.

Integration of ISA100 Wireless Field Devices

The C300 controller directly integrates with ISA100 wireless field devices. Any of the parameters from the wireless devices can be directly used in a control strategy like any other conventional I/O. The configuration of the Wireless Device Manager hardware module and the wireless devices is carried out from the same control builder like any other conventional I/O module or Fieldbus device. This allows complete operational Integration of the wireless technology with the ability to monitor, view and manipulate process data from wireless devices, and view wireless device alarms and events.

Maximize Process Uptime

The Experion CEE maximizes system and process uptime through several features. The CEE, for example, can 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 of the process.

The C300, when deployed redundantly, has very high hardware availability, achieved through a high hardware 'mean-time between failure' and extensive diagnostic coverage. 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 initiate a bumpless failover to the healthy controller.

In many systems, network problems can lead to various failure modes. The C300 is shielded from network attacks 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 fully standard Ethernet network infrastructure.

In addition, the C300 is connected through a dedicated redundant I/O communication network with the Series C I/O and Process Manager TM 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 either choose between a warm restart and a cold restart.



Heat flows uniformly over Series C modules to improve product reliability.

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 foot print 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 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 also seamlessly communicate with any other control node types on the network, such as C200 controllers, C200E controllers or ACE nodes, further protecting your investment in these nodes.

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For More Information
Learn more about Honeywell's C300 Controller, visit our website www.honeywellprocess.comor contactyour Honeywell account manager.

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