

## HC900 Hybrid Controller

## Specification



**Applications**  
 Pump stations  
 Boilers  
 Water treatment  
 Pilot operations  
 Fermenters  
 Utility DAQ  
 Furnaces  
 Kilns  
 Autoclaves  
 Extruders  
 Reactors  
 Retorts  
 Sterilizers  
 Crystal Growing  
 Dryers

### Overview

The Honeywell HC900 Hybrid Controller is an advanced loop and logic controller offering a modular design sized to satisfy the control and data management needs of a wide range of process equipment. When combined with the optional 1042 or 559 Operator Interfaces that are fully integrated into the controller's database, configuration and setup time is minimized. This powerful combination together with Honeywell's performance proven control technology provides users an ideal solution for process control. Open Ethernet connectivity with Modbus TCP Protocol also allows network access using a variety of HMI/SCADA software.

Easy-to-use Windows-based Hybrid Control Designer software, operable over Ethernet, an RS232 port or modem connection, simplifies controller and operator interface configuration. It provides advanced monitoring functions for debug, allows run-mode configuration changes while maintaining process control, uploads the complete, annotated graphic controller and operator interface configuration, plus supplies an array of reports for enhanced documentation.

The HC900 Controller provides superior PID loop control and more

robust analog processing than most logic controllers without compromising logic performance. A separate, fast scan cycle executes a rich assortment of logic and calculation function blocks. Logic blocks may also execute in the same scan with analog function blocks for time critical events. These function blocks may be fully integrated into a combined analog and logic control strategy for uncompromising control performance.

For more information see specification sheets:

- HC900 Hybrid Controller Modules 51-52-03-41
- Hybrid Control Designer Software 51-52-03-43
- 1042 & 559 Operator Interfaces 51-52-03-32.

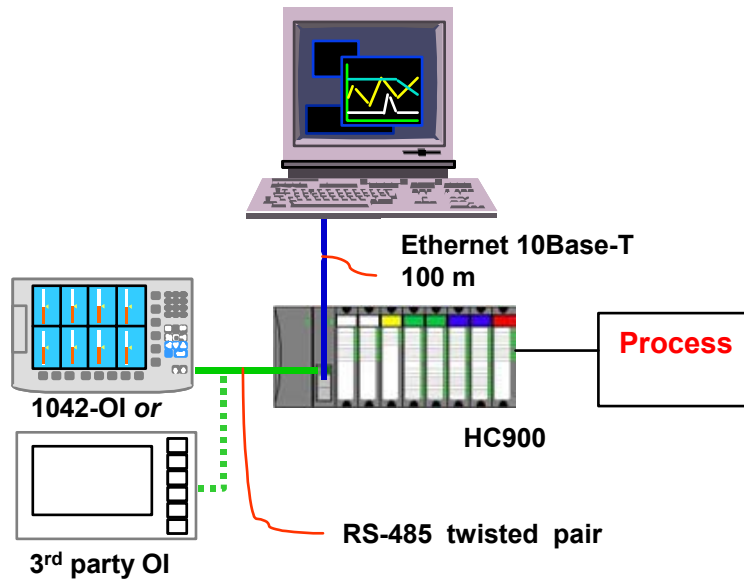
### Features Summary

- Non-redundant and Redundant Architectures
- PID Control with auto-tuning
- Up to 960 points with remote I/O
- Boolean Logic programming
- Robust assortment of over 100 algorithms
- Advanced Floating Point Math Functions
- Extensive Alarm and Event Monitoring
- Up to 256 Isolated, Universal Analog Inputs
- Remote I/O Racks
- I/O Insert/Remove under power
- LED on/off indicators on digital I/O
- Graphic Function Block Configuration – 400, 2000 or 5000 blocks
- Fast updates – 27 ms logic, 0.5 sec analog
- Open 10MB or 10/100MB Ethernet interface using Modbus/TCP
- Peer-to-peer communications via Ethernet
- E-mail alarm/event messaging on priority
- Stored recipes, SP profiles, sequences, schedules
- Ramp/Soak Setpoint Programmers
- Setpoint Schedulers with multiple outputs
- Sequencers with 16 Outputs each

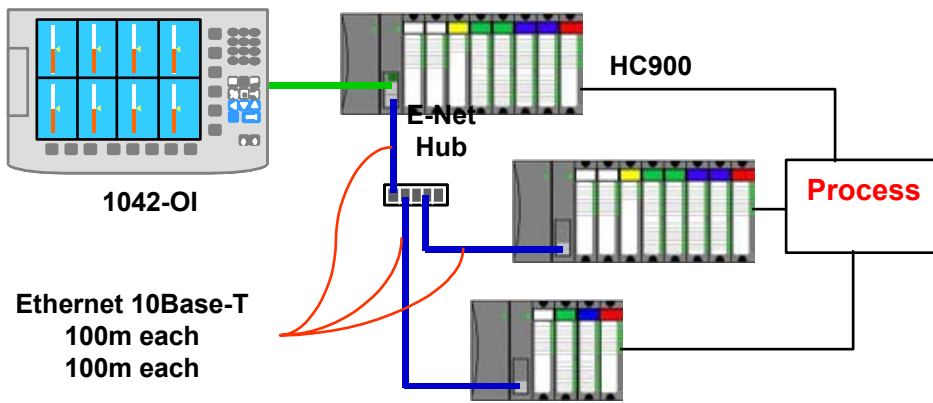
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Non-redundant Architectures

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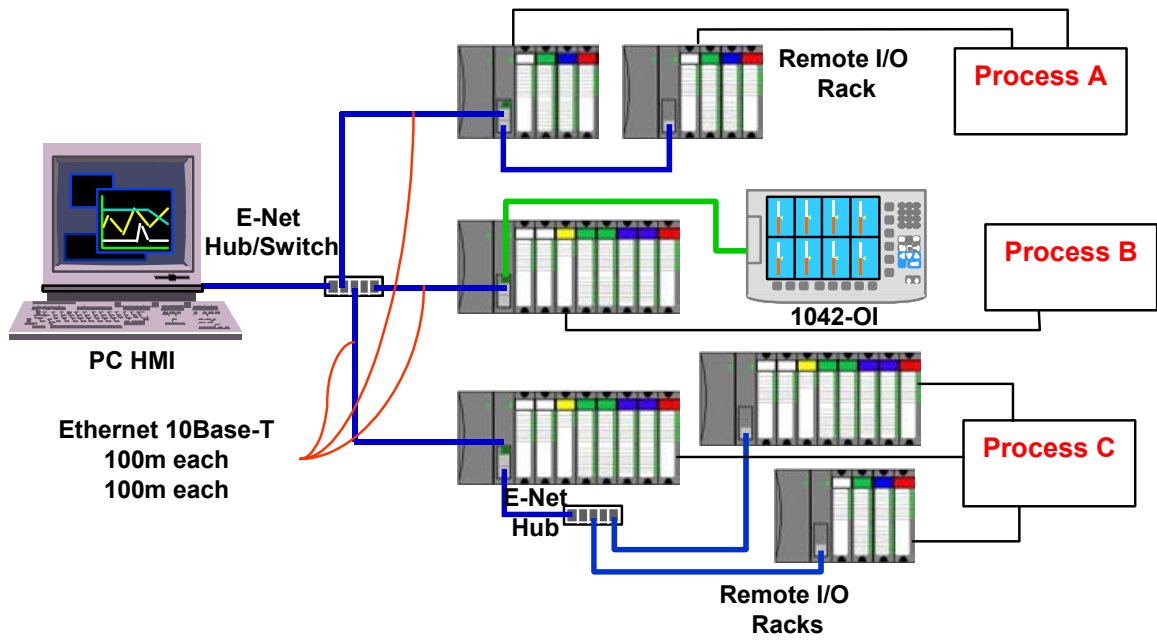
*Single process/single rack*



*Single process/ multiple remote I/O Racks*

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Non-redundant Architectures



*Multiple processes/multiple racks*

**HC900 Controller**

- The rack based HC900 Controller is available in 3 rack sizes with 4, 8 or 12 I/O slots each to support a wide range of requirements.
- Dual Redundant HC900 controllers use a separate controller rack for CPUs without local I/O. Two power supplies provide separate CPU power. A redundant controller switch module provides status and performs mode changes.

**CPU Modules**

- The CPU options available for the HC900 Controller include the C30 and C50 for non-redundant applications and the C70R for redundant CPU applications.
- All HC900 CPU modules offer open Ethernet communications for access by a variety of HMI and SCADA software applications and peer to peer communications for control data exchanges between controllers. The C70R provides redundant Ethernet ports for high network availability installations.
- HC900 CPU modules use a dual scan method to handle fast digital scanning and normal analog input scanning in the same integrated control environment. Both scans support a wide range of computational function block algorithms and a user adjustable execution sequence order.
- HC900 CPUs use Flash memory for permanent user configuration program storage and battery-backed memory for dynamic data storage allowing for graceful recovery following a power interruption or other discontinuous operations.

**CPU I/O Scanners**

HC900 Remote I/O is processed and communicated to the main CPU module through a remote I/O Scanner module. Two I/O scanner modules are available, a single port model for non-redundant CPU systems and a dual port model for redundant CPU systems. Scanner addressing in multi-rack systems are jumper selectable for single port scanners and via switch setting for dual port scanners.

**Inputs and Outputs** - A variety of I/O modules are available for selection in creating a custom control solution. These include:

- 8 point universal analog input module: Inputs may be mixed on a module and may include multiple thermocouple types, RTDs, ohms, voltage or millivoltage types. High point to point isolation simplifies installation and saves the expense of external isolation hardware.
- 4 point isolated analog output module: Supports from 0 to 20mA each.
- 16 point digital input cards: Contact closure type, DC voltage and AC voltage types.
- 8 point AC or 16 point DC digital output cards
- 8 point relay output card: four form C type and four form A type relays.

See Module Specification sheet 51-52-03-41 for details.

**Insert & removal of I/O under power-**

For ease of maintenance, the HC900 controller supports removing and inserting I/O modules from the card

rack without removing power from the controller. Each card is sensed for validity by the controller and auto-configured on insertion.

**I/O Terminal Blocks** - Terminal Blocks are available with either barrier style or Euro style screw connections. A module label area is provided for field wiring identification.

**Remote I/O** - I/O racks may be remotely mounted from the controller via a dedicated Ethernet 10Base-T (100Base-T with C70R) connection at up to 300 meters (984 feet) between the controller and the most remote rack using two Ethernet hubs.

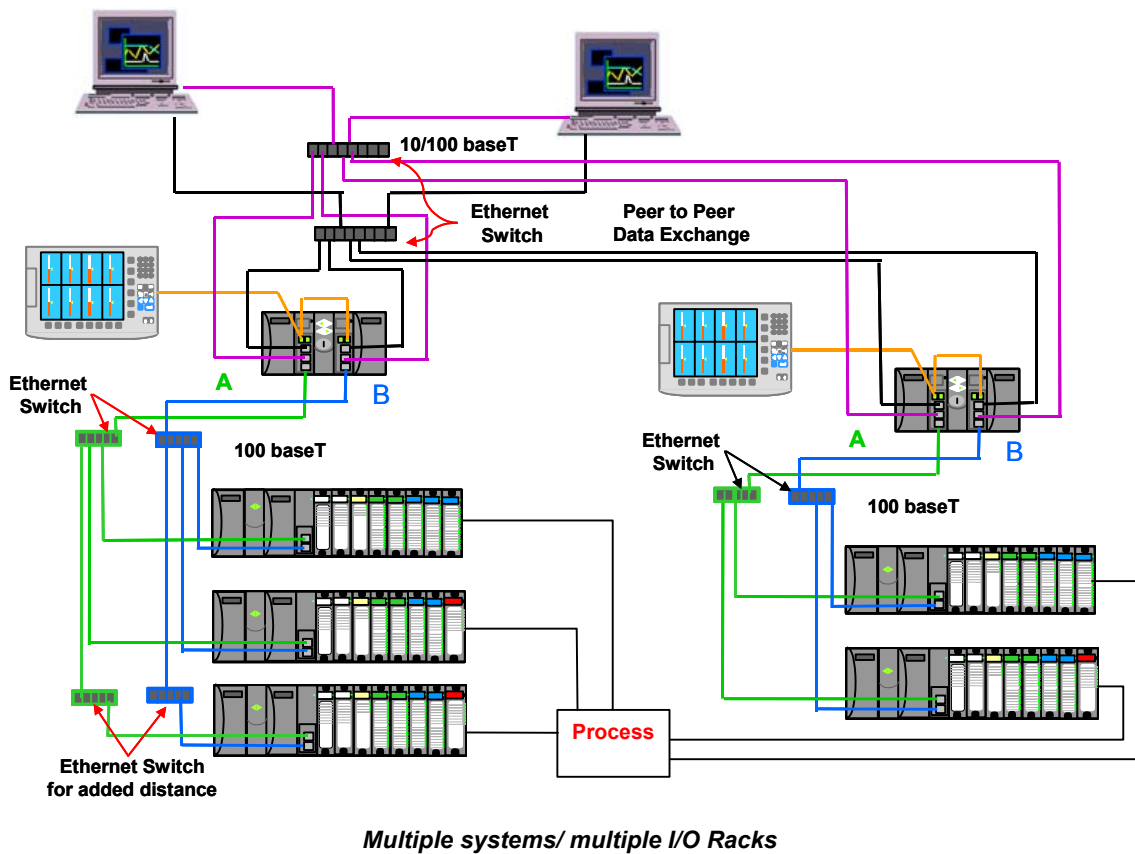
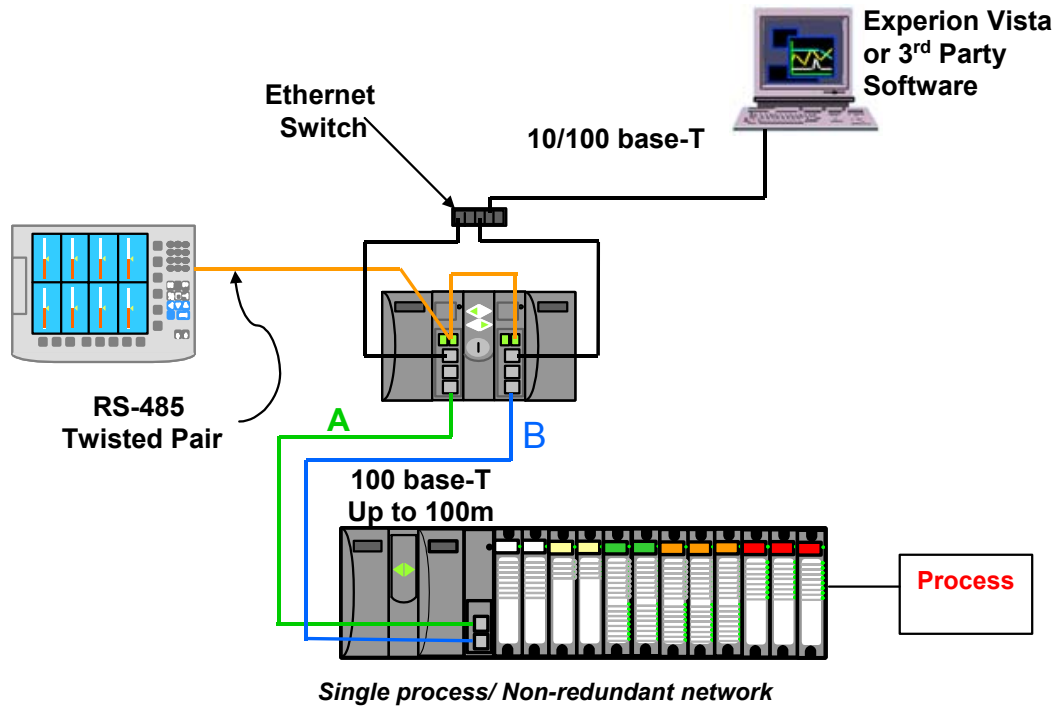
**Remote Terminal Panels** - Optional DIN rail mounted Remote Terminal Panels (RTPs) are available for use with pre-wired cables to reduce installation time and labor expense. RTP types available: analog input, relay output, discrete input, discrete output, analog output. Three cable lengths are also available to match hardware to installation variations. See Module Specification sheet 51-52-03-41 for more details.

**Redundant Power** - A second (backup) power module may be added to each HC900 controller rack . An extended rack is available that expands the standard I/O rack to accommodate a second (redundant) power supply and power status module.

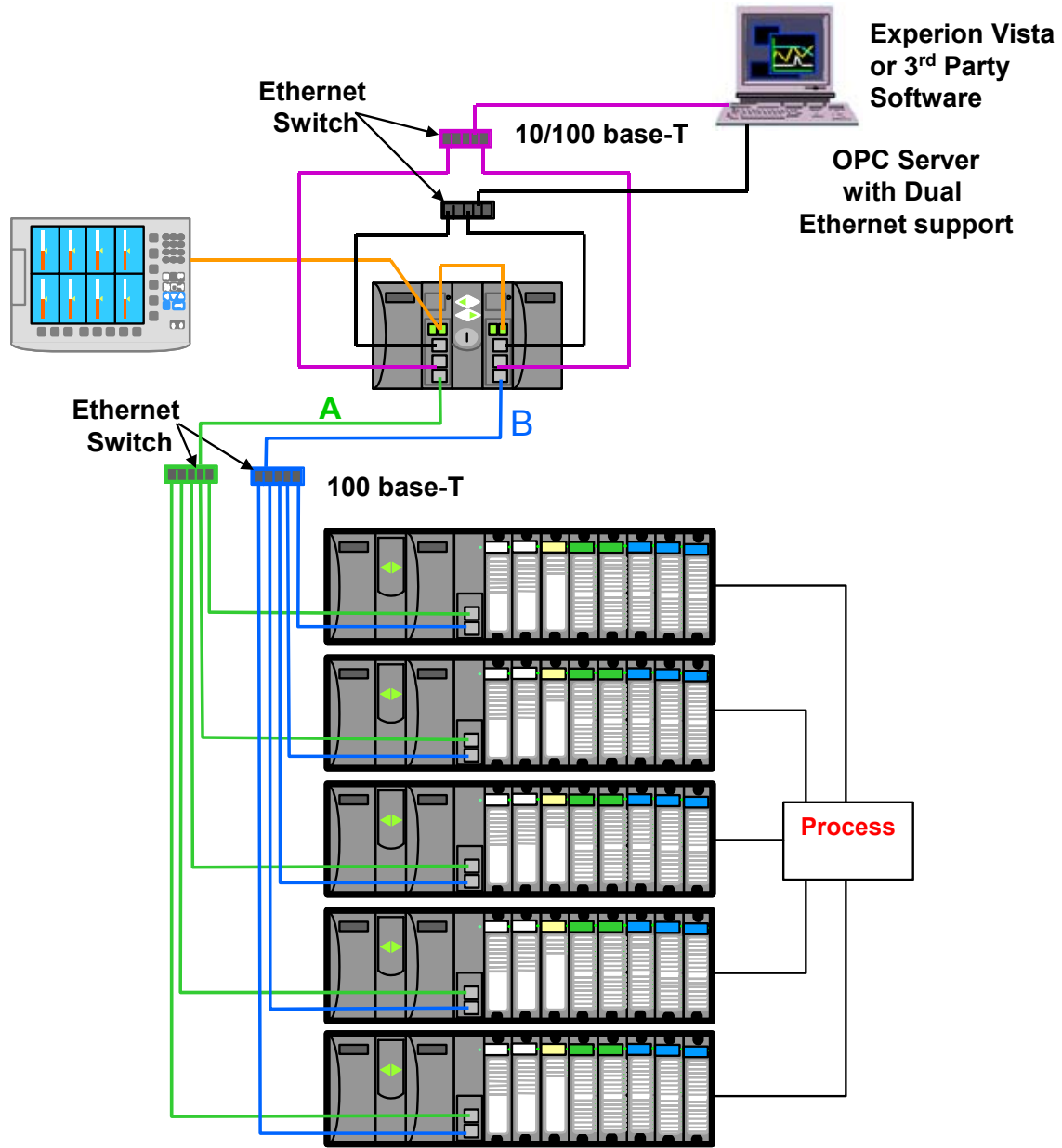
**Table 1 CPU Capacities**

Function	Point per Module	Max. for C30 CPU	Max. for C50 CPU	Max. for C70R CPU
Analog In	8	96	256	256
Analog Out	4	48	64	64
Digital In	16	192	960	960
Digital Out	8 AC or 16 DC	192	960	960
Function Blocks		400	2000	5000
PID Loops		8	32	32

Redundant Architectures



Redundant Architectures



*Single process, multiple I/O racks, redundant networks*

### Redundant Controller

Two redundant C70R CPUs operate in a separately mounted controller rack, each with an independent power supply. A Redundant Switch Module (RSM) is located in the rack between the two C70R CPUs. A key switch on the RSM allows the user to change the operating mode of the Lead CPU. There is no I/O in the controller rack; the CPUs communicate with up to 5 racks of I/O over a 100 base-T Ethernet physical communication link. When more than one I/O rack is used in the system, Ethernet switching hubs are required, one for each Scanner connection. In operation, all control functions and host communication exchanges are handled by the Lead controller, including configuration and operator changes. The Lead controller updates the Reserve controller with all the information needed to assume control in the event of a fault condition. After power-up of the C70R CPUs, the first available CPU assumes the Lead function. The Lead may be transferred to the Reserve controller by:

- failure of the Lead controller,
- manually changing a keyed switch located on the Redundant Switch Module, or
- instruction from host communication.

Redundant Networks for Host communications are provided on the C70R CPU. Both network ports are continuously active on the Lead controller. The network ports on the Reserve CPU are not available for external communications. An OPC server is available from Honeywell to support redundant Ethernet communications and automatically transfer communications.

The C70R network ports may otherwise be used in non-redundant mode where only one of the communication ports is used.

**Remote I/O** - Up to two Ethernet switches may be used in each I/O connection to extend the distance between the CPU rack and the most distant I/O rack to 300m, 984 feet.

**Operator Interface** - 1042 and 559 series operator Interfaces are supported with the C70R CPU. The RS-485 serial connection is made to the serial communication ports of both CPUs. The operator interface communication to the controller follows the Lead controller assignment.

**Status/Diagnostics** - An output parameter of the system monitor function block of C70R CPUs provides a digital status of the Reserve controller to allow integration of this information into the control strategy. C70R CPUs also provide diagnostic status on redundancy operation that may be observed using Hybrid Control Designer configuration software. A Redundancy status function block is also available to monitor redundant controller operation. A single C70R CPU cannot be used without a redundant CPU; this will cause on-going background diagnostic reporting.

### Function Blocks

Advanced control and computational capability - A large assortment of analog and digital function blocks are available to solve the most demanding control requirements. Function blocks are grouped by scan rate, fast or normal, and by function, Principal or Standard.

**Function Block execution** - All function blocks operate synchronously with I/O processing. Inputs are measured at the start of every scan and outputs are updated at the end of every scan. Function blocks such as Time Proportioning Outputs (TPO) and Position Proportioning outputs (PP) require higher output resolution and are updated when the function blocks are executing. Micro-controllers on digital I/O modules can maintain TPO duty cycle operation during failsafe conditions. Micro-controllers on all I/O modules allow outputs to be configured to assume a default state in the event of a fault condition.

**Normal Scan:** Function blocks that execute during the Normal Scan are synchronized to the analog input measurements. The fastest update rate is 500ms.

**Fast Scan:** The fastest update rate for fast scan function blocks in a single controller rack is 27ms. The update rate starts at 53ms when remote racks are used and for redundant systems.

**Principal Function Blocks** - These function blocks are supported by dedicated displays on 1042 and 559 series operator interfaces. They have Tag names and other attributes to support on-line user interaction. Typical Principal function blocks include PID, Set Point Programming, Sequencers, Alternators, Stage, etc.

**Standard Function Blocks** - The number of standard function blocks that may be used in a configuration is virtually unlimited. Typical Standard blocks include totalizers, free-form

math, average, mass flow, function generator, periodic timers based on real-time, carbon potential, RH, Dew Point, signal selection, comparison, and many others. These blocks may be configured to create control schemes that precisely address the needs of your process.

Digital status outputs are also provided on many of the analog function blocks to facilitate intelligent signal alarming and default operation strategies. Typical logic function blocks include AND, OR, XOR, NOT, Latch, Flip-flop, On/Off Delay and Resettable timers, Counters, Free-form Boolean logic and more. The execution of analog and digital functions is seamlessly integrated into a single control strategy in the controller.

### Recipes

Recipes are groups of data defined by the user that are used to make multiple value changes in the controller through a single action. Function block types that accept recipe data and the quantity of recipes stored in the controller are listed in Table 2. Recipes may also include Variables, which are dynamic analog and digital values used as inputs to standard and principal function blocks. Recipes may be loaded through the 1024 and 559 operator interfaces by name or number, or via a dedicated recipe load function block and user configured logic.

### Alarms/Events

Alarms and events represent changes in digital status that require user notification. The HC900 controller supports an internal alarm annunciation system that may be setup to operate with 1042 and 559 operator interfaces or via e-mail to a remote computer (see Communications, E-mail Alarming). Up to 240 alarm points per controller may be grouped in 20 groups of 12.

Events are digital status changes that cause messages to be presented on 1042 and 559 operator interfaces. They may prompt e-mail messages, do not require acknowledgement, and are reported and logged in a separate group. Up to 64 event points are supported in a controller.

Alarms and events are time stamped in the controller to a one second resolution.

**Table 2 Recipe capacities**

Function	Description	Content	Recipe size	# of recipes stored
Setpoint Programs	Profiles	Ramp/Soak values, times and event actions	50 Segments	99
Setpoint Schedules	Schedules	Ramp/Soak values, times and event actions	50 Segments	20
Sequencer	Sequences	State sequence, analog values	64 steps	10
Variable	Recipe Variables	Analog and digital values	50 Variables	99

**Configuration**

Controller configuration is performed using Hybrid Control Designer Configuration software on a PC operating with a Microsoft Windows® operating system. Configuration files may be built independently on the PC and downloaded to the controller in a separate operation. Validation of proper physical I/O to support the configuration is provided along with appropriate warnings.

**Configuration Back-build** - In the event a PC configuration file is lost or misplaced, it can be easily reconstructed using the upload function of the Hybrid Control Designer configuration software. Simply read the configuration from the controller to exactly duplicate the original configuration, including all text descriptions and operator interface display selections.

**Configuration edit** - In the event edits to a controller's configuration are required after the unit is in operation, an uploaded file may be monitored during process operation, edited, and downloaded with the on-line download function of the HC900 Hybrid Control Designer. The software allows configuration changes while in the Run mode, limiting process disturbances.

**Operator Interfaces**

HC900 system supports a choice of two operator interfaces that are integrated into the database configuration of the controller. The model 1042 provides a 10-inch color display and the model 559 offers a 5-inch color display. The full configuration of these operator interfaces is stored in the database of the controller and loaded into the interface on power-up. See specification sheet 51-52-03-32 for more information on these interfaces.

**Communications**

**Remote I/O Rack Port (C50, C70R)** – An Ethernet port is dedicated to supporting remote I/O racks. This 10Base-T

connection on the C50 CPU supports a single direct connected remote rack or up to 4 remote racks when connected through an external Ethernet switching hub. The C70R CPU uses a 100base-T connection to support a single direct connected rack or up to 5 remote racks using external switching hubs.

**User Interface Support** – An RS 485 port provides communications between the controller and a 1042 or 559 Operator Interface. This port supports a single Operator Interface for distances up to 2000 feet (609 meters) between the controller and operator interface. The Honeywell Operator Interface configuration is stored in the controller CPU and is loaded into the operator interface on startup.

3rd party user Interface support is provided through RS232 and/or RS485 port connections using Modbus/RTU protocol, or Ethernet with Modbus/TCP protocol.

**Ethernet Communications** –HC900 controllers communicate with their host PC interfaces over an Ethernet 10Base-T (C30/C50) or 10/100Base-T (C70R) communication network using the Modbus/TCP protocol, an open protocol interface available for most popular HMI software packages. The C30 and C50 support up to 5 host connections while the C70R supports up to 10 host connections concurrently over an Ethernet network for control supervision and data acquisition. The Hybrid Control Designer software can also address any of the controllers concurrently over Ethernet for configuration monitoring, diagnostic interrogation, upload/ download, or on-line configuration changes. As a result, a HC900 network of controllers and operator interfaces can be partitioned into process segments to assure proper control performance. Each of these process segments, in turn, can be accessed via common HMI software within the plant environment using an Ethernet LAN.

**Ethernet Peer to Peer Communications** - Peer data communications between one HC900 controller and up to 8 other HC900 controllers is supported over Ethernet via UDP protocol for process interlocks or data sharing. Both digital and analog data exchange are supported using peer data exchange function blocks, up

to 1024 parameters between peer controllers. No specialized software is required. Peer data can be given signal tag references for use in a control or data acquisition strategy. Peer to peer data interchange does not consume one of the host connections.

**Serial Modbus RTU Communications** - Serial Modbus RTU communications is available on the RS232 and RS485 (2 wire) ports of the HC900 Controller C50, C30 and C70R CPU assemblies in a Master or Slave mode. The protocol of these ports is user selectable between ELN protocol for use with HC Designer software and Honeywell operator interfaces, or Serial Modbus to interface with other compatible devices.

**Modbus RTU Slave** - The RS232 and RS485 ports may be configured for simultaneous operation as a Modbus slave port to allow each to communicate with a single Modbus master. The Modbus protocol supports read and write access to variety of controller parameters using predefined address locations. In addition, a 1000 register array is available to allow the user to specify the address locations of specific controller data to optimize controller communications. The data in the array may also be accessed in user specified formats (data types) such as analog data in Float 32, unsigned 16, signed 16, unsigned 32, signed 32, and digital data in signed 16 or unsigned 16. The data type selections in the 1000 register array provide compatibility with devices such as 3rd party touch panels.

**Modbus RTU Master** - Either of the ports may be configured as a Modbus RTU master, one per controller. Up to 16 devices may be multi-dropped on the RS485 port or the RS232 port with an external, user supplied, RS232 to RS485 converter. Function blocks are available in the HC900 controller to allow the user to specify read and write operations to up to 16 external Modbus compatible slave devices and up to 384 data points. For C30 and C50 only: if the RS485 port is configured for Modbus RTU communications, a local 559 or 1042 operator interface will not be available.



**Communications (cont'd)**

**E-mail Alarms/Events**--HC900 alarms or events can be individually configured to send an e-mail alarm (or event) message to e-mail addresses with the assigned alarm priority.

- Number of e-mail addresses: 3 based on alarm priority
- From: Controller name (up to 16 characters)
- Subject: text (up to 32 characters)
- Content: date and time of alarm/event, alarm/event tag name, alarm/event state
- Message: 48 character text (for alarms only)
- Priority Levels: 4 for alarms, 1 for events

**Controller Configuration Access** – HC Designer software supports communicating with HC900 controllers using an Ethernet or serial connection using ELN protocol to support direct PC connection for configuration upload, download, debug and maintenance. Modbus RTU protocol is also supported through the serial port interface. Once the HC900 controller has been configured using Hybrid Control Designer Software, on-line configuration changes may be made while maintaining process control.

Configurations may also be loaded into the controller via the Ethernet TCP/IP network from a host PC. On-line monitoring for program debug and on-line program edit functions are also supported via the Ethernet port.

**Modem Access**--Communications to the HC900 controller may be via an external modem connected to the controller's RS232 port. HC Designer software supports configuration upload, download and on-line edits via modem. When modem communication is selected, Modbus RTU communication timeouts are extended.

**Experion-Vista Supervisory Software**-- Honeywell's Windows 2000 version is available when PC-based supervisory control and data acquisition is required. Ethernet network interface to an Experion-Vista server is via the controller host Ethernet 100 Base-T port using Modbus/TCP protocol. Client Stations over Ethernet allow multiple user access to an HC900 network. Using the large selection of standard

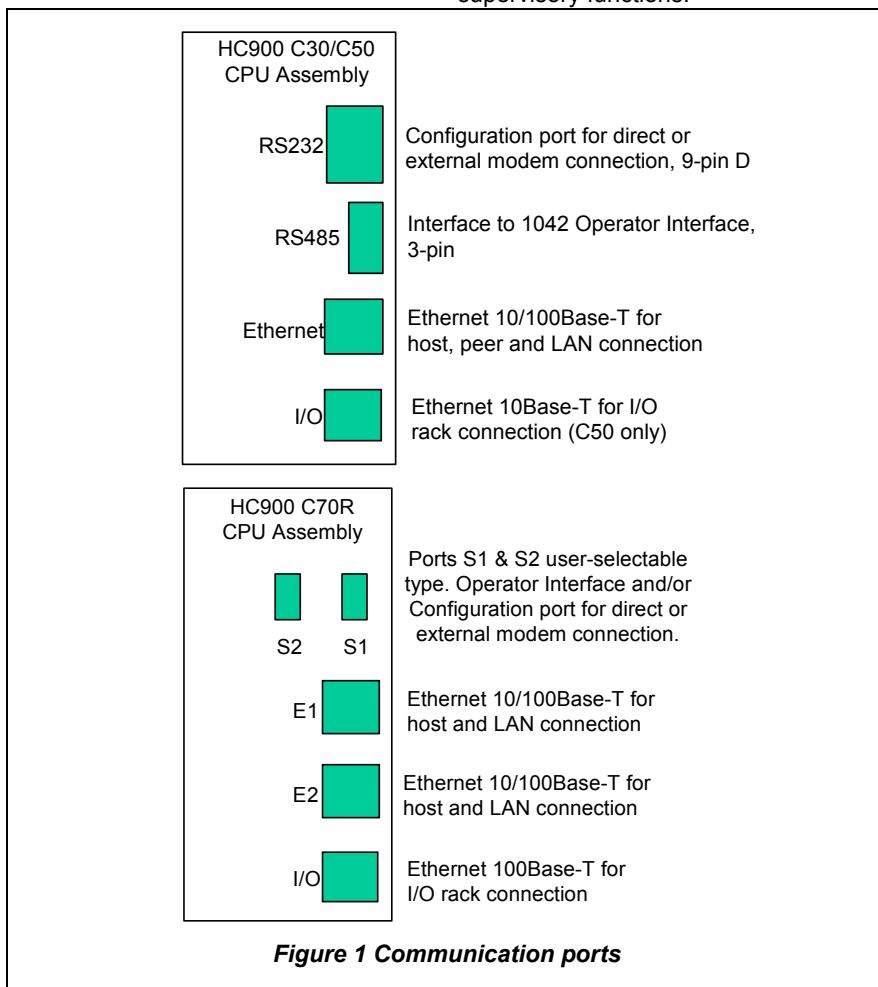
operating display templates in Experion-Vista saves development time. When further customization is needed, the full graphic display development environment of Vista may be used to fully animate your process supervisory displays.

A batch reporting option is offered in Release 400 which enables batch reports to be created using a standard template. User-entered lot data is supported and up to 50 parameters can be defined for batch logging. The file can be exported in .csv format using a lot number-encoded filename.

**SpecView32 Supervisory Software**--SpecView32 software can be used as a supervisory interface for thermal-based applications, offering historical trending, batch reporting, recipe development involving setpoint programs and simplified graphics configuration. HC900 parameters are simply selected from categorized lists for placement on user-configured displays or onto display objects.

Network connection is via the controller host Ethernet 10Base-T port using Modbus/TCP protocol. A variety of Windows operating environments are supported including Windows 98, NT, 2000, and XP.

**OPC Server**--Network communication access to HC900 controllers through third party PC interfaces is simplified with Honeywell's OPC server software program. This software supports the Modbus/TCP interface to either redundant or non-redundant HC900 controllers. In redundant applications, Honeywell's OPC Server software supports dual redundant Ethernet connections to both C70R CPUs. Communications to the controller is maintained during a single network failure and/or following the transfer of the Lead function from one CPU to another. Compatible OPC client programs can use the Ethernet connection to the HC900 via Honeywell's OPC Server for remote supervision, data collection or other supervisory functions.



**Specifications**

	<b>C30</b>	<b>C50</b>	<b>C70R</b>
<b>Controller Design</b>	Modular design with metal rack enclosure, power supply, controller CPU and user selectable I/O module types.		
<b>Rack Mounting and Installation</b>	Surface mounting with 4 screws in back of rack. Installation Category II, Pollution Degree 2, IEC 664, UL840 Installation coordination		
<b>Controller I/O support</b>	4, 8, or 12 I/O slots per Rack		None (requires remote I/O racks)
<b>Remote I/O racks</b>	None	1 w/o hub, using Ethernet direct cable. Up to 4 with recommended Ethernet hub(s).	1 w/o hub, using Ethernet direct cable. Up to 5 with recommended Ethernet switching hub(s).
<b>Remote I/O interface type</b>	None	Separate Ethernet 10Base-T port on CPU, RJ-45 connection, dedicated communications link	Separate Ethernet 100Base-T port on CPU, RJ-45 connection, dedicated communications link
<b>Remote I/O Distance</b>	None	328 ft. (100 m.) – controller to remote rack or controller to hub. Up to two hubs per connection, 984 ft. (300 m.), maximum distance.	
<b>I/O Capacity</b>			
Combined Analog and Digital	192	960	
Analog Inputs	96	256	
Analog Outputs	64	64	
<b>Rack Size</b>			
4 I/O slot chassis	5.4"(137mm) H" x 10.5"(266.7mm) W x 6" (151.7 mm) D (rear mounting plate extends height to 6.9" (175.3mm))		
8 I/O slot chassis	5.4"(137mm) H x 16.5"(419.1mm) W x 6" (151.7mm) D (rear mounting plate extends height to 6.9" (175.3mm))		
8 I/O slot chassis with redundant power support	5.4"(137mm) H x 20.9"(530.9.1mm) W x 6" (151.7mm) D (rear mounting plate extends height to 6.9" (175.3mm))		
12 I/O slot chassis	5.4"(137mm) H x 22.5"(571.5mm) W x 6."(151.7mm) D (rear mounting plate extends height to 6.9" (175.3mm))		
12 I/O slot chassis with redundant power support	5.4"(137mm) H x 26.9"(683.3mm) W x 6."(151.7mm) D (rear mounting plate extends height to 6.9" (175.3mm))		
CPU rack	N/A	N/A	5.4"(137mm) H x 10.3"(261.6mm) W x 6" (151.7mm) D (rear mounting plate extends height to 6.9" (175.3mm))
<b>I/O Wiring</b>			
Type	Removable terminal blocks		
Terminal Block Styles	2, Screw terminal or Euro-style, tin-plated or gold-plated (for DC connections)		
Gauge wires	Screw terminal – #14 to 26 AWG, solid or stranded Euro-style - #14 to 26 AWG, solid or stranded		
Shield terminals	Optional brackets mounted top/bottom of rack		
<b>Power (P01)</b>			
Voltage	Universal power, 90 to 264VAC, 47 to 63 Hz		
In Rush Current	7 Amps peak-to-peak for 150 ms at 240VAC		
Power wiring	130 VA		
Fuse	Internally mounted, non-replaceable fuse. User installed external fuse.		
<b>Power (P02)</b>			
Voltage	Universal power, 90 to 264VAC, 47 to 63 Hz		
In Rush Current	7 Amps peak-to-peak for 120 ms at 240VAC		
Power wiring	90 VA		
Fuse	Internally mounted, non-replaceable fuse. User installed external fuse.		
<b>Normal Scan Time</b>	500ms. Each analog input card has its own A/D converter providing parallel processing.		

**Specifications**

	<b>C30</b>	<b>C50</b>	<b>C70R</b>
<b>Fast Scan Time</b>	53ms for up to ~250 fast logic blocks 67ms for up to ~315 fast logic blocks 107ms for up to ~400 fast logic blocks	27ms for up to ~250 fast logic blocks 53ms for up to ~500 fast logic blocks 67ms for up to ~780 fast logic blocks 107ms for up to ~1040 fast logic blocks 133ms for up to ~1300 fast logic blocks	53ms for up to ~500 fast logic blocks 67ms for up to ~780 fast logic blocks 107ms for up to ~1040 fast logic blocks 133ms for up to ~1300 fast logic blocks 267ms for up to ~2500 fast logic blocks
<b>Detection+Failover time from Lead to Reserve CPU</b>	N/a	N/a	Up to 4 analog scan cycles
<b>Run-Mode Edit Transfer Time</b>	3 normal scan times (1.5 sec. typical) for all configuration edits not applicable to I/O		
<b>Operating Modes</b>	Run (No configuration download in this position) Run/Program (Download allowed) Program (Outputs Off, initialization on download). Offline mode is available via software selection (for AI calibration).		

**Specifications**

<b>Features</b>			
	<b>C30</b>	<b>C50</b>	<b>C70R</b>
<b>Maximum user-configurable Function Blocks</b>	400	2000	5000
<b>Maximum Control Loops</b>	8	32	32
<b>System Blocks (Not user configurable)</b>	100 (not part of 400, 2000 or 5000), for Alarm Group blocks, System block, Rack Monitor blocks, Communications		
<b>Loop Outputs</b>	Current, time proportional, position proportional, 3-position step (motor positioning), dual output [heat/cool]		
<b>Control Loop Types</b>	PID A, PID B, Duplex A, Duplex B, Ratio, Cascade, % Carbon, Dewpoint, Relative Humidity, On-Off, Auto/Manual-Bias		
<b>Auto-tuning</b>	Accutune II, fuzzy logic overshoot suppression, applicable to all control loops		
<b>Setpoint Programmers</b>	8 (independent programmers) Ramp Types: Ramp Rate or Ramp Time Time Units: Hours or Minutes Segment Time: 0-99,999.999 hours or minutes Program Cycles: Up to 100 or infinite, configurable segment range		
<b>Programmer Events</b>	16, assignable to DO or internal status		
<b>Setpoint Profiles</b>	99 profiles of 50 segments each stored in controller		
<b>Setpoint Scheduler</b>	Two (2) Ramp type: Ramp time Time units: Hours or minutes Segment time: 0.001 to 9999.999 hours or minutes Cycles: Per segment to 999 or infinite		
<b>Auxiliary Scheduler Setpoints</b>	Up to 8 setpoints, soak only		
<b>Schedule events</b>	Up to 16, assignable to DO or internal status		
<b>Setpoint Scheduler Schedules</b>	20 Schedules stored in controller, 50 segments each		

**Specifications**

<b>Features</b>			
	<b>C30</b>	<b>C50</b>	<b>C70R</b>
<b>Sequencers</b>	Four (4) States: 50 State text: 12 characters Steps: 64 Time Units: Minutes or Seconds Digital Outputs: 16 Analog Output: 1, configurable value/step Step Execution: On Time, Event 1, Event2, or via Advance Next Step: Any step		
<b>Sequences</b>	20 sequences stored in controller		
<b>Recipes (Variables)</b>	50 stored in controller		
<b>Recipe Parameters</b>	Up to 50 analog or digital Variables — (may include profile numbers)		
<b>Signal Tags (Read only)</b>	2000 Tags		
<b>Tag Identification</b>	8-character tagname, 16-character descriptor, 4-character units of measure (analog only), 6 character on/off state (digital only)		
<b>Variables (Read/Write)</b>	600		
<b>Variable Identification</b>	8-character tagname, 16-character descriptor, 4-character units of measure (analog only), 6 character on/off state (digital only)		

**Specifications**

<b>Communications</b>			
	<b>C30</b>	<b>C50</b>	<b>C70R</b>
<b>Network Communications Ports</b>			
Ethernet 10/Base-T, RJ-45 connection	Supports Modbus/TCP Protocol to PC supervisory and data acquisition software packages, OPC server, and Hybrid Control Designer configuration software		
Two Ethernet 10/100Base-T, RJ-45 connections			Lead CPU supports redundant Modbus/TCP Protocol to OPC server, PC supervisory and data acquisition software packages and Hybrid Control Designer configuration software.
Max. number of concurrent Ethernet host connections	Up to 5 (peer data exchange does not consume a host connection)		Up to 10 shared between two ports (peer data exchange does not consume a host connection).
<b>RS-232 Ports</b>			
Ports per controller	One, 9-pin "D", Honeywell or Modbus RTU protocol. Supports link to PC running Hybrid Control Designer software or third party applications.		Two, user selectable between RS 232 and RS-485 with Modbus RTU or Honeywell protocol. 3-Plug connectors supplied.
Baud rates	9600, 19.2K, 38.4K, 57.6 K, configured by Hybrid Control Designer software or OI.		
Modem	For remote connection to Hybrid Control Designer software, requires external modem at controller, 9600 baud to 57.6KB		

Specifications			
Communications			
	C30	C50	C70R
<b>RS-485 Ports</b> Ports per controller  Cable type 1042, 559 Distance from controller 1042, 559 Power to OI Unit addresses	One, RS-485 (connector supplied), Honeywell or Modbus RTU protocol, 1042, 559, or third party operator interface support		Two, user selectable between RS-485 and RS-232 (connector supplied), Honeywell or Modbus RTU protocol. Only one port for 1042/ 559 operator interface support.
	2-wire plus shield, Belden 9271 or equivalent		
	2000 ft. (600 m.)		
	24VDC, user-provided at OI		
1 to 247			
<b>RS-232, RS-485 Ports</b> Parity (user selectable) Stop bits (user selectable) Speed (user selectable) Double Register Format for Modbus RTU Slave and Master data (User selectable)	Odd, even, none		
	1 or 2		
	9600, 19200, 38400, 57600		
	FPB – Big Endian- (0,1,2,3) FP LB – Little Endian Byte Swap (2,3,0,1) FP BB – Big Endian Byte Swap (1,0,3,2) FPL – Little Endian (3,2,1,0)		
<b>RS-232, RS-485 Modbus Slave Operation</b> Number of ports per controller Masters per port User Specified Register Address Array Principal Function Block Address Range	Up to two		
	One		
	1000 register addresses (45057 to 46056 decimal)		
	Data Types; Unsigned 16, Signed 16, Unsigned 32, Signed 32, Float 32		
	User selectable starting address range for registers assigned to each principal block type.		
<b>RS-232, RS-485 Modbus Master Operation</b> Number of ports per controller Function Block Types  Slave devices per controller Number of read/write Modbus Parameters Double Register Format Speed	One (RS232 or RS485)		
	Slave – 4 read and 4 write data points Read (Slave extension block ) up to 16 parameters Write (Slave extension) up to 8 parameters (No limit on the number of Read and Write extension blocks per Slave block up to the maximum 384 parameters per controller.)		
	Up to 16		
	Up to 384 max. per controller		
	Selectable per device		
	1 second max. – load dependent		
<b>Peer-to-peer</b> Ethernet 10Base-T  10/100Base-T via Network port  No. of Peers/Controller Update rate Peer Data	Supports UDP protocol and Peer Data Exchange function blocks for peer data exchange.		
			Supports UDP protocol and Peer Data Exchange function blocks for peer data exchange.
	8		
	500 ms to 5 sec., selectable		
	Digital and Analog Signal Tags, Variables - up to 1024 parameters, addressed numerically		
<b>Ethernet</b> Ethernet Network Connection Host Network Protocol	10 Base-T, RJ-45 (10 Mbits/sec.)		10/100 Base-T, RJ-45
	Modbus/TCP		

Maximum distances per Ethernet specifications		
C70R CPU to I/O Rack	Ethernet CAT5 cable with RJ-45 connectors	100m /328 ft
C70R to Ethernet Switch	Ethernet CAT5 cable with RJ-45 connectors	100m /328 ft
Ethernet Switch to I/O Rack	Ethernet CAT5 cable with RJ-45 connectors	100m /328 ft
C70R CPU to Network Switch	Ethernet CAT5 cable with RJ-45 connectors	100m /328 ft
Network Switch to PC	Ethernet CAT5 cable with RJ-45 connectors	100m /328 ft
C70R to 1042 Operator Interface	Shielded, Twisted pair	610m /2000 ft

Approvals		
<b>CE Conformity</b>	This product is in conformity with the protection requirements of the following European Council Directives: <b>73/23/EEC</b> , the Low Voltage Directive, and <b>89/336/EEC</b> , the EMC Directive. Conformity of this product with any other “CE Mark” Directive(s) shall not be assumed. EN61326: Electrical Equipment For Measurement, Control and Laboratory use. EMC requirements.	
<b>General Purpose Safety</b>	Compliant with EN61010-1, UL, UL 3121-1, CSA C22.2 No. 1010-1	
<b>Hazardous (Classified) Location Safety</b>	FM Class I, Div. 2, Groups A, B, C, D CSA Class I, Div. 2 Groups A, B, C, D Class 1, Zone 2, IIC	
<b>Module “T” ratings</b>	Module Type	“T” Rating
	Rack (4, 8, 12 I/O slots)	T6
	Power Supply	T4
	Power Status Module (PSM)	T6
	Controller C30 CPU	T5
	Controller C50CPU	T5
	I/O Scanner 1	T5
	Controller C70R CPU	T4
	Redundancy Switch Module (RSM)	T6
I/O Scanner 2	T5	

Environmental Conditions				
Ambient Temperature	Reference	Rated	Extreme	Transportation & Storage
F	77+/-5	32 to 140	32 to 140	-40 to 158
C	25+/-3	0 to 60	0 to 60	-40 to 70
Ambient Relative Humidity	*45 % to 55 % RH non-condensing	*10% to 90 % RH non-condensing	*5 % to 90 % RH non-condensing	*5 % to 95 % RH non-condensing
Mechanical Acceleration Duration	0 g 0 ms	1 g 30 ms	1 g 30 ms	Not rated
Vibration	0 Hz 0 g	0 Hz to 14 Hz— amplitude 2.5 mm (peak-to-peak) 14 Hz to 250 Hz— acceleration 1 g	0 Hz to 14 Hz— amplitude 2.5 mm (peak-to-peak) 14 Hz to 250 Hz— acceleration 1 g	
* Applies up to 40C				

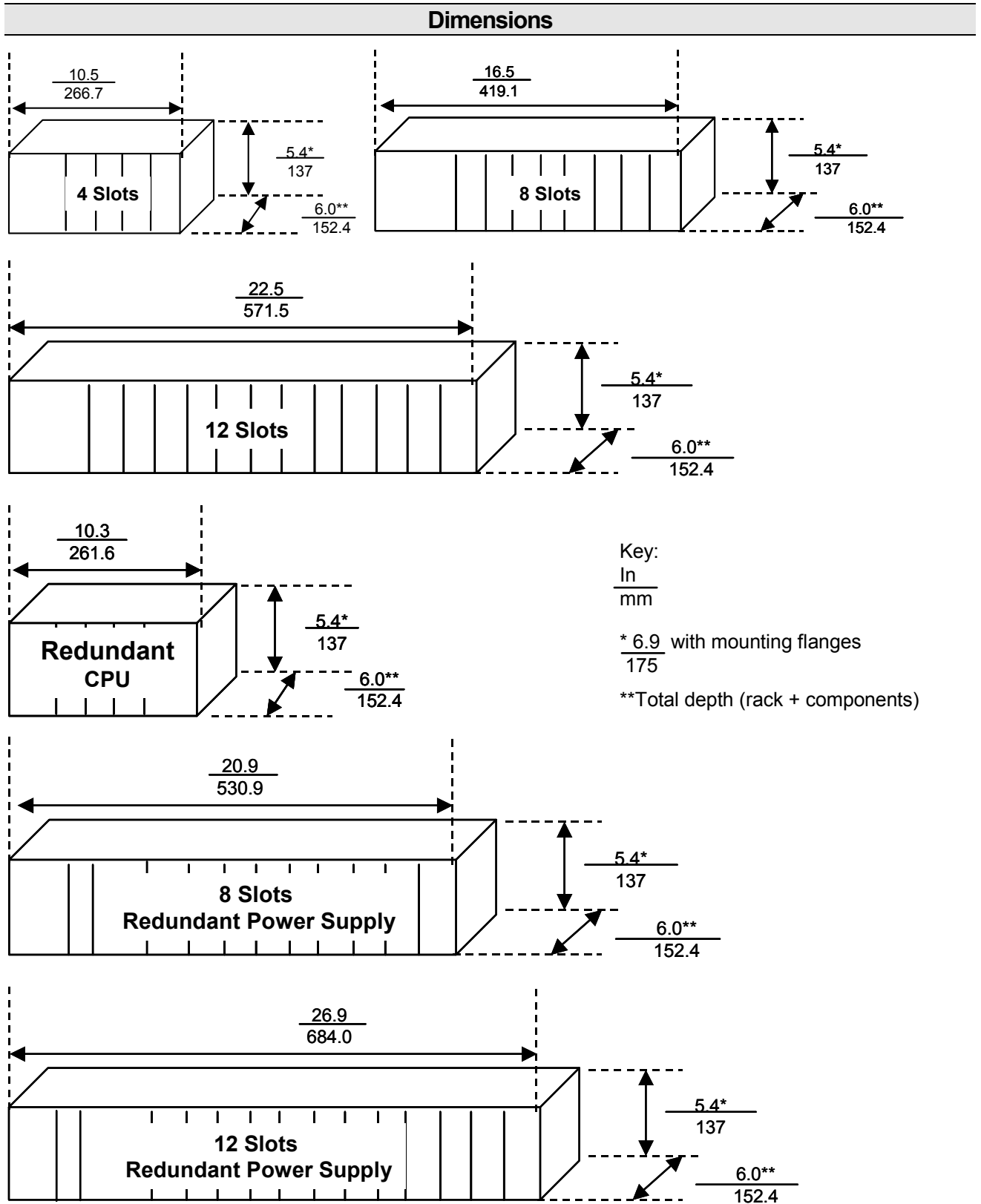


Figure 2 HC900 Hybrid Controller Dimensions

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## Warranty/Remedy

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose**. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Distributor :

For more information, contact Honeywell sales at:  
US: 1-800-343-0228  
Canada: 1-800-461-0013

**Honeywell**

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**Industrial Measurement and Control**  
Honeywell  
1100 Virginia Drive  
Fort Washington, PA 19034



## HC900 Hybrid Controller Assemblies

## Model Selection Guide

RACKS	MODEL NUMBER
4 I/O Slot Rack	900R04 - 0001
8 I/O Slot Rack	900R08 - 0101
12 I/O Slot Rack	900R12 - 0101
8 Slot Rack -Red. Power	900R08R - 0101
12 Slot Rack - Red. Power	900R12R - 0101
Redundant Power Status Module	900PSM - 0001
<b>Power Supplies</b>	
120/240VAC, 60W	900P01 -0001
120/240VAC, 28W <b>Note 5</b>	900P02 -0001
24Vdc, 60W	900P24 -0001
<b>CPU Assemblies</b>	
Controller C70 CPU Config. SW & Docs	900C71 - 0144-00
Controller C70 CPU <b>Note 1</b>	900C72 - 0144-00
Controller C50 CPU Config.SW & Docs	900C51 - 0244-00
Controller C50 CPU <b>Note 1</b>	900C52 - 0244-00
Controller C30 CPU Config. SW & Docs	900C31 - 0244-00
Controller C30 CPU <b>Note 1</b>	900C32 - 0244-00
I/O Scanner (for remote rack)	900C53 - 0244-00
<b>I/O Card Selections</b>	
Analog Input (8 channel)	900A01 - 0102
Analog Input Hi level (16ch)	900A16 - 0001
Analog Output, 0 to 20mA, (4 channel)	900B01 -0101
Analog Output, 0 to 20mA, (8 channel)	900B08-0001
Analog Output, 0 to 20mA, (16 channel)	900B16-0001
Digital Input, Contact type, (16 channel)	900G01 - 0102
Digital Input, 24VDC (16 channel)	900G02 - 0102
Digital Input, 120/240 VAC, (16 channel)	900G03 - 0102
Digital Input, 24VDC (32 channel)	900G32 - 0001
Digital Output, Relays ( 8 channel)	900H01 - 0102
Digital Output, 24VDC (16 channel)	900H02 - 0102
Digital Output, 120/240 VAC (8 channel)	900H03 - 0102
Digital Output, 24VDC (32 channel)	900H32 - 0001
Pulse/Freq/Quad (4chan, 1Quad)	900K01 - 0001

Terminal Blocks, Cables, Jumpers		MODEL NUMBER
Low Voltage Terminal Block (Euro style)	<b>Note 3</b>	900TEK - 0001
Low Voltage Terminal Block (Barrier Style)	<b>Note 3</b>	900TBK -0001
High Voltage Terminal Block (Euro style)	<b>Note 3</b>	900TER - 0001
High Voltage Terminal Block (Barrier Style)	<b>Note 3</b>	900TBR - 0001
Low voltage Terminal Block (36 pos)	<b>Note 3</b>	900TCK - 0001
Analog Input Remote Terminal Panel (RTP)	<b>Note 6</b>	900RTA - L001
Relay Output Remote Terminal Panel (RTP)	<b>Note 6</b>	900RTR - H001
DI, DO, AO Remote Terminal Panel (RTP)	<b>Note 6</b>	900RTS - 0001
Low Voltage RTP Cable (1.0M, 3.28ft.)	<b>Note 6</b>	900RTC - L010
Low Voltage RTP Cable (2.5M, 8.2ft.)	<b>Note 6</b>	900RTC - L025
Low Voltage RTP Cable (5.0M, 16.4ft.)	<b>Note 6</b>	900RTC - L050
High Voltage RTP Cable (1.0M, 3.28ft.)	<b>Note 6</b>	900RTC - H010
High Voltage RTP Cable (2.5M, 8.2ft.)	<b>Note 6</b>	900RTC - H025
High Voltage RTP Cable (5.0M, 16.4ft.)	<b>Note 6</b>	900RTC - H050
LV RTP Cable (32/16 channel) (1.0M, 3.28ft)	<b>Note 6</b>	900RTC - 3210
LV RTP Cable (32/16 channel) (2.5M, 8.2ft)	<b>Note 6</b>	900RTC - 3225
LV RTP Cable (32/16 channel) (5.0M, 16.4ft)	<b>Note 6</b>	900RTC - 3250
8 ch A/O RTP Cable (1M, 3.3ft)	<b>Note 6</b>	900RTC-B810
8 ch A/O RTP Cable (2.5M, 8.2ft)	<b>Note 6</b>	900RTC-B825
8 ch A/O RTP Cable (5.0M, 16.4ft)	<b>Note 6</b>	900RTC-B850
Filler Block Terminal Cover		900TNF - 0001
Shield Terminal Strip (package of 2)		900TSS - 0001
Terminal board jumpers (10, two pos jumpers)	<b>Note 4</b>	900J02 - 0001
Terminal board jumpers (10, ten pos.jumpers)	<b>Note 4</b>	900J10 - 0001
<b>Manuals</b>		
Full document set on CD	<b>Note 2</b>	900ME1-0044-44
Full document set, hard copy - English	<b>Note 2</b>	900ME2-0044-44
<b>Software</b>		
HC Designer Config. Software CD		900W01-0044-44
HC Utilities Software/Documentation CD		900W02-0044-44
HC Historian Software		50045756-001

**Note 1:** Documentation and Hybrid Control Designer Configuration Software are not provided with this model. If required, specify CPU model numbers 900C71-NNNN-NN, 900C51-0NNN-NN, 900C31-0NNN-NN or order items separately.

**Note 2:** A full documentation set on CD is provided with CPU 900C51-00NN-NN and 900C31-00NN-NN. If additional copies or if a hard copy manual set is desired, specify them as separate items. The manual set contains one each of all HC900 product manuals. Doc

**Note 3:** Terminal blocks for I/O modules must be ordered separately. Two styles are available for each of the two types--Euro style and Barrier style. The type of terminal block (gold and tin contacts) must be matched to the appropriate I/P board type. S

Card Type	Terminal Blocks	
Analog Input (8 channel)	900TEK-0001	900TBK-0001
Analog Output, 0 to 20mA, (4 channel)	900TEK-0001	900TBK-0001
Analog Output, 0 to 20mA, (8 channel)	900TCK - 0001	
Analog Output, 0 to 20mA, (16 channel)	900TCK - 0001	
Digital Input, Contact type, (16 channel)	900TEK-0001	900TBK-0001
Digital Input, 24VDC (16 channel)	900TEK-0001	900TBK-0001
Digital Input, 120/240 VAC, (16 channel)	900TER-0001	900TBR-0001
Digital Output, Relays ( 8 channel)	900TER-0001	900TBR-0001
Digital Output, 24VDC (16 Channel)	900TEK-0001	900TBK-0001
Digital Output, 120/240 VAC (8 channel)	900TER-0001	900TBR-0001

**Note 4:** Jumpers available for Barrier Style terminals only.

**Note 5:** How to choose an AC Power Supply

	A	B	C	D	E
Module type	<i>Enter Quantity</i>	Max Current @ 5 V	Max Current @ 24 V	<i>Calculate 5V current (D = A * B)</i>	<i>Calculate 24V current (E = A * C)</i>
Controller (C30)	( )	820 mA	0 mA	( )	( 0 )
Controller (C50)	( )	930 mA	0 mA	( )	( 0 )
Controller (C70)	( )	1150 mA	0 mA	( )	( 0 )
Controller (C70R)	( )	1500 mA	0 mA	( )	( 0 )
Scanner 1 Port	( )	670 mA	0 mA	( )	( 0 )
Scanner 2 Port	( )	770 mA	0 mA	( )	( 0 )
Power Status Module (PSM)	( )	22 mA	0 mA	( )	( 0 )
Analog Input(8 pts)	( )	40 mA	25 mA	( )	( )
Analog Input(16 pts)	( )	75 mA	50 mA	( )	( )
Analog Output(4 pts) <sup>*</sup>	( )	40 mA	200 mA	( )	( )
Analog Output(8 pts) <sup>***</sup>	( )	225 mA	350 mA	( )	( )
Analog Output(16 pts) <sup>***</sup>	( )	350 mA	700 mA	( )	( )
AC Digital Input (16 pts)	( )	130 mA	0 mA	( )	( 0 )
DC Digital Input (16 pts)	( )	130 mA	0 mA	( )	( 0 )
Contact Input (16 pts)	( )	130 mA	40 mA	( )	( )
DC Digital Input (32 pts)	( )	215 mA	0 mA	( )	( 0 )
AC Digital Output (8 pts)	( )	220 mA	0 mA	( )	( 0 )
DC Digital Output (16 pts)	( )	340 mA	0 mA	( )	( 0 )
DC Digital Output (32 pts)	( )	235 mA	0 mA	( )	( 0 )
Relay Output (8 pts)	( )	110 mA	100 mA	( )	( )
Pulse/Frequency/Quadrature <sup>**</sup>	( )	110 mA	250 mA	( )	( )
*Limit 10 Analog Output modules per I/O rack.					
** Limit 4 PFQ modules per I/O rack.					
*** Limit 2 16-pt. modules per rack. Limit 5 8-pt. modules per rack with internal power supply. Use 0 mA for 24V value when using an external 24V supply.				Total mA @ 5V =	Total mA @ 24V=
				( )	( )
Complete columns A, D and E above.					
Is column D total mA @ 5V less than 2000mA?			Yes/No		
Is column E total mA @ 24V less than 900mA?			Yes/No		
If the answers to 1 <u>and</u> 2 are YES, go to 4. If the answer to 1 <u>or</u> 2 is NO, use power supply 900P01-0001.					
Multiply 5V total by 5.1.			( )		
Multiply 24V total by 24.5.			( )		
Sum results of 4 and 5.			( )		
Divide results of 6 by 1000			( )		
Is the result of 7 less than 28?			Yes/No		
If the answer to 8 is Yes, use power supply 900P02-0001					
If the answer to 8 is No, use power supply 900P01-0001					

**Note 6**

Using the table below, select a Remote Terminal Panel and Cable Assembly to match the module type.

<b>Module Types</b>	<b>Module Model</b>	<b>Remote Terminal Panel</b>	<b>Acceptable Cables</b>
Analog Input Module	900A01 – 010X	900RTA – L001	900RTC – L010 900RTC – L025 900RTC – L050
Relay Output Module	900H01 – 010X	900RTR – H001	900 RTC – H010 900 RTC – H025 900 RTC – H050
Analog Output Module Contact Discrete Input Module DC Discrete Input Module DC Discrete Output Module	900B01 – 010X 900G01 – 010X 900G02 – 010X 900H02 – 010X	900RTS - 0001	900RTC – L010 900RTC – L025 900RTC – L050
AC Discrete Input Module AC Discrete Output Module	900G03 - 010X 900H03 – 010X	900RTS - 0001	900 RTC – H010 900 RTC – H025 900 RTC – H050
Digital Input , 32 channel Digital Output, 32 Channel Analog Input, 16 Channel	900G32-000X 900H32-000X 900A16-000X	900RTS - 0001 (2 required)	900RTC – 3225 900RTC – 3210 900RTC - 3250
Analog Output Module 8 Channel	900B08-0001	900RTS - 0001	900RTC – B810 900RTC – B825 900RTC – B850
Analog Output Module 16 Channel	900B16-0001	900RTS – 0001 (2 required)	900RTC – 3225 900RTC – 3210 900RTC - 3250