Honeywell

ControlEdge HC900 Controller Controlware Specifications

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Overview

ControlEdge HC900 Controller Controlware is the execution environment, control algorithms and firmware infrastructure programmed into the controller's memory to allow users to apply the product in process control applications.

Operation

A control strategy configuration in the ControlEdge HC900 controller consists of function blocks, or predefined algorithms that get executed in a sequential manner during a scan cycle. During controller configuration, the user specifies the quantity and type of function blocks needed for the application.

Two scan engines (Fast and Normal) contain the specific function blocks and the execution sequence to run its blocks. Physical inputs are read at the start of each scan cycle, then all function blocks are executed according to the execution order, then physical outputs are updated. Due to their nature, TPS, TPO and PPO functions have their physical outputs updated during their execution.

The execution environment for the controller is based on two deterministic execution cycles, one for fast logic type operations and a second cycle for normal analog based operations. Within these two fixed time cycle operations, time is allocated by the system to execute other functions such as communication tasks, and background diagnostic checking. These tasks are assigned function block numbers 1 through 100 and may not be altered by the user. The user's configuration begins with function block number 101.

In order to maintain the deterministic operation of the controller, time may be added to the scan cycles in fixed increments based on the size and scope of the user's configuration. The maximum time required to execute the user's configuration is determined when a configuration is loaded into the controller and does not change during on-line operation.

The time needed to execute communications and other background tasks is accounted for in the configuration timing and does not impact the deterministic operation of the controller.

For more information see specification sheets:
ControlEdge HC900 Controller 51-52-03-31
ControlEdge 900 Platform Modules 51-52-03-41
Designer Software 51-52-03-43
900 Control Station Operator Interfaces 51-52-03-46.

Controller Configuration

User configurations are permanently retained in flash memory in the controller. In the event a PC configuration file is lost or misplaced, it can be easily reconstructed using the upload function of the Designer configuration software or via the 900 Control Station. Simply read the configuration from the controller to exactly duplicate the original configuration, including all text descriptions. In the event edits to a controller's configuration are required after the unit is in operation, the on-line download function of the ControlEdge HC900 Designer software allows configuration changes while in the Run/Program mode, limiting process disturbances.

During power interruptions to the controller the dynamic control status is retained in battery backed RAM memory. This function minimizes process upsets during momentary power interruptions and other discontinuous operation. If power is lost and the battery is not available, the controller defaults to the configuration stored in Flash memory and a cold start is performed.

Function Block Attributes

The CPUs of the ControlEdge HC900 provide different function block capacities to allow matching controller performance to application needs. The C30 CPU provides up to 400 function blocks, the C50 up to 2000, and the C70/C75 up to 15000 (5000 for version below 6.6) function blocks. Similar proportions apply to available support items such as soft-wire connections and page connectors.

Principal function blocks may be identified with tag names and they have dedicated widgets provided in Honeywell Station Designer/Control Station. All function blocks support user-entered tags on their outputs.

Function blocks that define the operation of physical inputs and outputs provide a failsafe state. The failsafe state will be the state of the physical output resulting from a fault condition. See ControlEdge HC900 Function Block Types (page 5) for available failsafe actions. Function blocks that depend on physical hardware for their operation have also a fail output pin on the block that may be used in a control strategy to trigger appropriate default operations. A fail pin on a function block activates when the associated I/O module fails or when communications to a module in a remote rack fails. Validated Output function blocks provide two additional fault monitoring pins. FBFAIL, stands for Feedback Fail, and activates when the corresponding INPUT channels fails, VFAIL, stands for Verification Fail, and activates when the associated input does not match the driven output. Voting INPUT function blocks also provide two additional fault monitoring pins, SFAIL, stands for Source Fail, it activates when one or more of the configured INPUT channels fail, VFAIL activates when one or more of the channels disagree. All of these validated function blocks contain a disable pin that may be used to disable the function block and its associated FAIL logic. The validated I/O function blocks contain a restart pin that allows the user to maintain the output and fault outputs until an OFF to ON transition occurs. This is functionality is useful to maintain a safe condition while repairs are being made.

Customizable memory allocation

The percentage of memory for recipes (Setpoint Profiles, Setpoint Schedules, Sequences, Variable recipes) is adjustable, allowing more space for recipes or for configuration (i.e., function blocks), whichever is needed. For details see ControlEdge HC900 Controller specification 51-52-03-31, section “Capacity.”

Advanced control and computational capability

A large assortment of analog and digital function blocks are available to solve the most demanding control requirements. Typical analog function blocks include totalizer, 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.

Loop Control

The robust control loops of the ControlEdge HC900 Controller support configurations from simple PID to interactive cascade, ratio, duplex, position proportioning and three position step for motor positioning or custom control strategies. Standard for every control loop is auto-tuning using Honeywell’s performance proven Accutune III tuning algorithm. A selectable “Fuzzy Logic” algorithm is also provided for each loop to suppress unwanted process setpoint overshoot. A soft start feature allows output rate limiting for protection of a process load on startup or after power failure.

Setpoint Scheduling

The scheduler function provides up to 8 ramp and soaks outputs plus up to 8 soak only outputs that operate on a common time base. The scheduler also supports up to 16 event digital outputs. Soak guarantee, jog to a segment and nested looping features are also provided. Applications include multi-zone diffusion furnaces, CVD furnaces, and environmental chambers.

Logic

Logic programming may be used to implement more robust and higher speed logic functions in the controller. The fast scan program executes all inputs, outputs and function blocks as fast as 10 milliseconds. The fast scan instruction set includes 2, 4 and 8 input logic blocks with selectable input inversion plus timers, triggers, latches, counters, timers, math and other supporting functions. A Sequencer function is also included with functionality beyond typical drum sequencers.

Stage

Stage blocks may be configured to control the on and off states of up to 4 outputs, for the control of processes such as tank level. Interlocking between stages and between multiple stage function blocks is available to guarantee proper output sequencing.

Alternator

Alternator function blocks accept digital inputs and drive digital outputs in an alternating sequence as determined by the user. The user may select from 4 alternating styles: Direct, Rotary, FOFO and Fixed.

AGA (American Gas Association)

The AGA function blocks are divided into two categories: Gas *Compressibility* calculations AGA8 Detail (AGA8DL) and Gross Method (AGA8GS) and *Meter* Calculations (AGA3OM- Orifice, AGA7TM – Turbine, and AGA9UM – Ultrasonic). In almost all configurations, a complete calculation will consist of a compressibility calculation followed by a meter calculation.

Calendar Event

The Calendar Event block compares user entered time and date set points to the real-time clock to generate digital status (one-shot) outputs that can be integrated into a control strategy to activate time synchronized activities. The setpoints of the block's outputs are grouped into sets to provide a convenient method to perform periodic changes. Up to 5 setpoint groups are available for items such as seasonal time changes. Up to 16 special days can be designated which override the normal event processing on that day. For example, selected outputs can be configured to remain off on holidays.

Sequencers

The ControlEdge HC900 controller supports sequencer function blocks, greatly enhancing configuration of sequence operations. Each sequencer supports up to 16 digital outputs that may be either on or off in each of 50 states e.g. PURGE, FILL, HEAT, etc. The sequencer may have up to 64 sequential steps that activate the states of the sequence. Steps of the sequencer may be configured to advance based on time, on event (2 per step), or a manual advance. A separate jog function is also provided. The function can also output an analog value on a step basis. The operational sequence for the steps is retained in a separate sequence file in the memory of the controller that may be selected on-demand through a user interface or via a recipe.

Example Sequence Control

			Outputs															
Step	**State**	**State Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
1	**1**	**PURGE**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**1**
2	**5**	**AGITATE**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**1**
3	**2**	**FEED B**	**0**	**1**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**1**
4	**3**	**MIX**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**0**	**1**	**1**
5	**8**	**PREHEAT**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**1**	**1**
↓																		
64	**50**	**STOP**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

Set Point Programming

Set point programmers, each with an auxiliary soak output, may be configured. A pool of profiles, each with up to 50 segments may be stored in controller memory for user selection. Each programmer may have up to 16 event outputs for integration with the sequence control functions. Also provided are guaranteed soak, jog to a segment and looping.

Example Setpoint Profile Table

Seg	Ramp/ Soak	SP Value	Time/ Rate	Aux Out	Guar Hold	Events
1	Ramp	100	20	0.0	OFF	100110000000000
2	Ramp	500	30	1.1	OFF	100100100000000
3	Soak	1300	90	1.1	ON	101110100000000
4	Ramp	1300	50	1.1	OFF	100100100000000
5	Soak	100	0.1	0.0	OFF	00000000100000

Recipes (Variables)

Recipes consist of up to 50 analog and digital Variables assigned within the configuration. This allows Variables representing setpoint profile, setpoint schedule, or sequencer numbers and/or other Variables for associated loop setpoints, bias values, alarm setpoints, limits, setpoints to external controllers, digital states, tuning constants, etc. to be part of a recipe. Recipes are selected by recipe tag name and descriptor from the ControlEdge HC900 Operator Interface or via a Recipe Selection block with a recipe # input.

Example Recipe

Recipe: P1023-F7
TYPE 1023 HARDEN

Variable		Value
Tag	**Descriptor**	
PROFNUM	Profile Number	2
BIAS2	TempBias–Zone2	12
BIAS3	TempBias–Zone3	18

Up to 50 Variables

HIALMSP1 F1 Hi Temp Alarm	1280

Safety Controller Configuration

Safety Controller configuration can consist of two worksheet types, process and safety. Safety applications are restricted to the configuration on the safety worksheet. Function block execution can be distributed across the worksheet types; safety worksheets are isolated from dataflow elements from the process worksheet (Process outputs, MODBUS communications, Writes) while operating in the safety “RUN” (locked) mode of operation with the exception of the WVAR function block. WVAR function blocks may be used to transfer information from the process worksheet into safety worksheet variables. WVARS used for this purpose are restricted to variables used for non-critical safety functions. Non-critical safety functions is functionality that cannot interfere with critical safety functionality. The dataflow restrictions are removed while operating in the “RUN/PROGRAM” or “PROGRAM” modes of operation. Dataflow is allowed to flow out of the safety worksheet in all modes of operation. This semi-permeable membrane protects the integrity of the safety functionality.
For more details please see ControlEdge HC900 safety manual “51-52-25-153_ControlEdge HC900_Safety_Manual.pdf”.

Additionally, a limited number of process type function blocks (i.e. AGA blocks) are restricted inside a safety worksheet. Safety applications must run in the “RUN” mode to ensure proper operation.
Switching from “PROGRAM”, “RUN/PROGRAM” into the “RUN” mode will not be permitted with forced blocks on the Safety worksheet.

ControlEdge HC900 Function Block Types

I/O Blocks (F=Fast Scan Rate, N=Normal Rate)		
Analog Input	N	Universal Analog Input, with table selection of input type. (For input types see ControlEdge HC900 Controller Module Specification 51-52-03-41) Filter – 1st order lag, 0 to 120 seconds Bias – Input value adjust for calibration correction Burnout – Off, Upscale, Downscale, Default Value Warn Output – activates if thermocouple resistance > 100 ohms. Input Disable –digital input when ON disables input, sets output to a defined default Bad Channel Detection – Optional selection to treat a sensor failure and hardware fault the same.
Analog Input with Voting	N	Universal Analog Input, with table selection of input type. (For input types see ControlEdge HC900 Controller Module Specification 51-52-03-41). AI-V differs from AI in that multiple inputs (up to 3) may be specified, the values of the inputs (whose channel has not failed) must match within 3% for the input value to be considered good overall. The block output pin reflects the first channel that is within the 3% tolerance. This block contains three output status pins: *Fail PIN* – reflects the highest failure level where the value of the block cannot be determined. The Blocks Output will reflect the programmed failsafe value. *SFAIL* – Stands for Source failure. This pin turns ON if a channel/module has failed *VFAIL* – Stands for Validation Failure. This pin turns ON if the SFAIL Pin is OFF and one of the selected channels is outside the 3% tolerance band. Monitoring the block directs the operator to the failure source. • Filter – 1st order lag, 0 to 120 seconds • Bias – Input value adjust for calibration correction • Bad Channel Detection – Optional selection to treat a sensor failure and a hardware fault as the same. • Disable Pin – Places the block output to the selected Failsafe value and turns the Output status pins OFF. For safety configurations, it is recommended that the channel inputs physical source be from different input modules. This provides a means to correct the failure achieving higher reliability. Additionally, locating the modules on independent racks increases availability to the highest level.
Analog Input RCJ	N	This block is used only for **Thermocouples** when the thermocouple Cold Junction is in a remote location, i.e., NOT connected at the AI module. Cold Junction compensation is performed using the value presented at the RCJ input, which is a temperature value in degrees C of the remote junction and which will come from another AI block. CJ compensation and linearization is performed in the block producing a value in engineering units at the OUT pin. Fail status of the AI block measuring the Remote CJ can be applied to the RSTAT pin. (i.e. if the RCJ measurement Fails, the Thermocouple measurement fails)
Analog Output	N	Regulated analog output current Input scaling in Engineering Units, Output scaling within 0 and 20 mA Slew rate (rate of change in mA/sec.) definable, Fail output pin is ON when output fail sensed. Failsafe definable as High, Low, Hold or go to a user specified value

I/O Blocks (F=Fast Scan Rate, N=Normal Rate)		
Analog output with Validation	N	Regulated analog output current with assignable feedback channel for output validation. Input scaling in Engineering Units, Output scaling within 0 and 20 mA Slew rate (rate of change in mA/sec.) definable. The feedback channel range is fixed to the output range with selection of the appropriate shunt (62.5, 100, 250, 500 ohms). Failsafe definable as High, Low, Hold or go to a user specified value on the Process worksheet. Failsafe value on the Safety worksheet is set to OFF. This block contains three output status pins: *FAIL PIN* – reflects the highest failure level where the value of the output may be in error or the output modules loses communication to the controller. The Blocks Output will reflect the programmed failsafe value and the physical channel's output will be driven to its configured Failsafe value. *FBFAIL PIN* – Stands for Feedback failure. This pin turns ON if an assigned input channel fails. *VFAIL PIN* – Stands for Validation Failure. This pin turns ON if the FBFAIL Pin is OFF and the assigned input channel is outside the 3% tolerance band. **Input Pins** Restart PIN – This Pin, if connected, releases the output from failsafe mode. A transition from Low to High with error free inputs is required for the operation to work. This provides a means to correct the failure and resume operation in a safe controlled fashion. Disable Pin – Places the block output to the selected Failsafe value and turns the Output status pins OFF.
Digital Input (1)	F, N	Provides the digital status of a digital input point. The output status may be inverted. Failsafe definable as ON, OFF or Hold last state
Digital Input with Voting	F, N	Digital Input, with voting DI-V differs from AI-V in that multiple inputs (up to 3) may be specified. Voting is achieved using a binary, On – OFF state. The block output pin reflects vote of the majority of valid, no failures, input channels. This block contains three output status pins: *Fail PIN* – reflects the highest failure level where the value of the block cannot be determined. The blocks output will reflect the programmed failsafe value. *SFAIL* – Stands for Source failure. This pin turns ON if an assigned channel has failed. *VFAIL* – Stands for Validation Failure. This pin turns ON if the SFAIL Pin is OFF and one of the assigned channels is in the minority. Monitoring the block directs the operator to the failure source. For safety configurations, it is recommended that the channel inputs physical source be from different input modules. This provides a means to correct the failure achieving higher reliability. Additionally, locating the modules on independent racks increases availability to the highest level.
Digital Input (Up to 8 inputs)	F, N	Provides the digital status of the first or last 8 digital inputs of a 16 point input card. The output status may be inverted. Failsafe definable per input as ON, OFF or Hold last state
Digital Output (1)	F, N	Directs a digital status to a physical logic output. Output status may be inverted. Failsafe definable as ON, OFF or Hold last state

I/O Blocks (F=Fast Scan Rate, N=Normal Rate)		
Digital output with Validation	N	Digital output current with assignable feedback channel for output validation. Two physical channels are configured in this block. One output channel and a matching input type channel. Failsafe definable as High, Low, or Hold on the Process worksheet. Failsafe value on the Safety worksheet is set to Low. This block contains three output status pins: *FAIL PIN* – reflects the highest failure level where the state of the output may be in error or the output modules loses communication to the controller. The Blocks Output will reflect the programmed failsafe state and the physical channels output will be driven to the configured Failsafe state. *FBFAIL PIN* – Stands for Feedback failure. This pin turns ON if an assigned input channel fails. *VFAIL PIN* – Stands for Validation Failure. This pin turns ON if the FBFAIL Pin is OFF and the remaining inputs do not agree. **Input Pins - Restart** PIN – This Pin, if connected, releases the output from failsafe mode. A transition from Low to High with error free inputs is required for the operation to work. This will provide a means to correct the failure and resume operation in a controlled fashion. Disable Pin – Places the block output to the selected Failsafe value and turns the Output status pins OFF.
Digital Output (Up to 8 outputs)	F, N	Directs 8 digital statuses to 8 physical logic outputs of an 8 point output card or to the first or last 8 physical logic outputs of a 16 point output card. Output status may be inverted. Both fast logic (27 ms) and normal logic (500ms analog rate) blocks available. Failsafe definable per input as ON, OFF or Hold last states.
Time Proportioning Output (applied to any PID output)	N	Proportions the amount ON time and OFF time of a digital output. Input scaling in engineering units Cycle time—2 second to 120 seconds Output minimum ON and OFF time—0 seconds to 15 seconds Failsafe definable per input as ON, OFF or Hold last duty cycle

I/O Blocks (F=Fast Scan Rate, N=Normal Rate)		
Position Proportional Output	N	A combination Input and Output function block that accepts position feedback input and generates forward/reverse digital outputs. Positions actuators with slidewire, current or voltage position feedback sensors. Provides output pins for actuator position (0 to 100%), motor fail, and feedback fail – automatically defaults to 3-position step on feedback fail. Input scaling in engineering units Actuator speeds from 12 to 300 seconds Output limits – adjustable (between 0 and 100%) Deadband – adjustable (0.5 to 5%) Feedback filter – adjustable (0 to 3 sec.) Feedback input types: Slidewire 100 to 250 ohms (requires AI card 900A01-0002) Slidewire 250 to 1000 ohms (requires AI card 900A01-0002) mA - 4 to 20mA mA - 0 to 20mA Voltage - 0 to 1V Voltage - 0 to 5V Feedback calibration – HC Designer, 1042 or 559 Operator Interfaces Automatic, Semi-automatic, and Hand methods supported. Failsafe – Hold last position.
Pulse Input	F, N	Reads a single input channel from a Pulse/Frequency/Quadrature input module. It scales pulses from this input to user-configured engineering units. The scaling typically represents a quantity or rate.
Pulse Output	F, N	Outputs a pulse train of user controllable duration. It controls a relay on a Pulse/Frequency/Quadrature module.
Frequency Input	F, N	Used for measuring speed and flow rate. It reads a single frequency channel from a Pulse/Frequency/Quadrature input module. The signal is ignored (filtered) if it does not meet the selected pulse width/frequency range conditions. Otherwise, the signal is scaled from the selected frequency span to the selected output range in engineering units.
Quadrature Input	F, N	Measures/controls movement of an actuated device. A digital encoder connected to the actuated device produces two channels (A and B) of square waves, offset 90 degrees. The block measures by counting the waves' rising edges.
Universal IO Analog Input	F, N	Reads value of an UIO-Analog Input from a specified real I/O address. Please refer "51-52-25-109" manual for more details.
Universal IO Analog Output	F, N	Regulated analog output current. Please refer "51-52-25-109" manual for more details.
Universal IO Digital Input	F, N	Provides the digital status of a digital input point. The output status may be inverted. Please refer "51-52-25-109" manual for more details.
Universal IO Digital Output	F, N	Directs a digital status to a physical logic output. Output status may be inverted. Please refer "51-52-25-109" manual for more details.
RUIO Analog Input	F, N	Reads value of an RUIO-Analog Input from a specified real I/O address Please refer "51-52-25-109" manual for more details.
RUIO Analog Output	F, N	Regulated analog output current Please refer "51-52-25-109" manual for more details.
RUIO Digital Input	F, N	Provides the digital status of a digital input point. The output status may be inverted. Please refer "51-52-25-109" manual for more details.
RUIO Digital Output	F, N	Directs a digital status to a physical logic output. Output status may be inverted. Please refer "51-52-25-109" manual for more details.

Control Loop Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
PID	N	PID algorithm includes: • Accutune III auto-tuning and selectable fuzzy logic overshoot suppression • PID A (normal) or PID B (only integral response to SP change) operation, DUPA and DUPB operation which switches tuning constants for heat/cool applications • Two sets of PID constants selectable via program control. Choice of Gain or Proportional Band entry and Integral time or Repeats/minute entry • Setpoints—Two setpoint values or one value and one remote setpoint • Setpoint tracking – Local SP tracks PV or RSP on a RSP to LSP change • Setpoint limits, output limits, SP rate of change • Soft start for output rate limiting on startup or after power fail (not available with output tracking) • Ratio and Local/Remote Bias selections for Ratio control applications • Feedforward input (scaled in % of output) • Back calculation output for Cascade operation (supplied to primary loop) • Output tracking to track a remote input (for backup applications) • Remote A/M, R/L mode switching and mode status outputs • Function block access to tuning constants for gain scheduling • Alarms—Two outputs with up to two high, low, or dev band conditions each Inputs: PV, remote setpoint, feedforward, output track and track command, ratio, bias, switch block connection, mode switch block connection, and back calculations Outputs: Control output, working setpoint, alarm status (2), Autotune indication, mode status
PID for Carbon Potential (displaces PID)	N	A combined carbon potential calculation and PID algorithm for controlling the carbon potential of furnace atmospheres using a Zirconia probe input and temperature input. Local/remote %CO adjustment, probe manufacturer selection (4 selections), anti-sooting protection, Dewpoint calculation output, and furnace factor adjustment is supported; probe burn-off configurable. Consumes 1 loop.
PID with 3 Position Step Output	N	Motor position control without position sensing. Standard PID features with addition of hysteresis (in %) and full stroke time (in sec.) entries for motor. Forward and Reverse outputs specified within the block. Physical outputs updated during block execution.
ON/OFF Control (displaces PID)	N	ON/OFF control algorithm with selectable hysteresis. Consumes 1 loop.
Loop Switch	N	Digital interface to control loops to initiate autotuning, change control action, force bumpless transfer, select tuning set #1 and select tuning set #2. Connects to PID (all) and ON/OFF block switch input.
Mode Switch	N	Digital interface to control loops to select automatic or manual modes and/or local or remote setpoint. Connects to all control loop types.
Mode Flags	N	Decodes control loop mode status into a set of discrete (Boolean or digital) mode flags. Outputs activate for states: Auto, Manual, Initialization Manual, Local Override, Local Setpoint, Remote Setpoint
Write Tuning Constants	N	Automatically changes the GAIN, RATE, and RESET parameters of an internal PID loop without operator interaction. A digital input controls changes.
Auto-Manual Bias (for Boiler Control applications) (displaces PID)	N	Allows a manually adjusted output to be maintained on transfer to automatic by applying bias to the input signal (from a Steam master to adjust participation of boiler). Bias value is maintained as output value tracks input value changes. Consumes 1 loop.

Setpoint Programmer and Recipe Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
Setpoint Programmer	N	Produces a setpoint output for a time-based ramp/soak profile that is loaded into the block. Inputs: Process Variables, up to 3, to establish setpoint guarantee operation based on a deviation band from setpoint. Profile Number (for auto-load of a profile # for next run), New Starting Segment (uses a Set input to enter a new segment number). Digital Inputs: Enable (allows programmer to be operated), Set (to load a program or new start segment), Start, Hold, Restart (from power failure, can allow slower ramp up to previous SP to protect product), Reset, Advance, Jog (to a specified segment), and Guarantee Hold (to synchronize with another programmer). Outputs: Setpoint value, segment number, program number, time remaining in segment, time elapsed in segment, program elapsed time. Digital Outputs: Status (Ready, Running, Hold, Stopped), synchronize hold state, program state
Setpoint Program Event decoder (up to 16 events per block)	N	Provides up to 16 digital status outputs that may be ON or OFF on a per segment basis. Inputs include program number, segment number, and program state (READY, RUN, HOLD, GHOLD, or STOP) from setpoint program block from program state output.
Setpoint Program Synchronizer	N	Used to synchronize the operation of two setpoint programs given the Run, Hold and Reset signals from each program.
Recipe Selection Block	F, N	Used to initiate loading of recipe values into a chosen set of controller variables based on a recipe number. Inputs include recipe number and load command, allowing remote recipe selection.

Setpoint Scheduler Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
Setpoint Scheduler	N	Produces up to 8 ramp or soak setpoint outputs on a common single time base. (See Scheduler description for details.) Inputs: Process variables, up to 8, to establish setpoint guarantee operation based on deviation from setpoint. Schedule number is used for automatic schedule loading and starting segment number allows first segment selection. Digital inputs: Dedicated input for connection to State Switch block output. Outputs: Up to 8 setpoint values, segment number, schedule number, time remaining in segment, time elapsed in segment, schedule elapsed time. Digital Outputs: Dedicated output for connection to State Flags block input.
State Switch Block	N	Provides digital switch status inputs to the Scheduler block for Run, Hold, Reset, Ghold, Advance and Jog.
State Flags Block	N	Accepts status output from the Scheduler block and provides digital output signals for Run, Hold, Ghold, Ready and Stop.
Setpoint Scheduler Auxiliary Output Block	N	Provides up to 8 additional analog setpoint (soak only) values for each segment of the schedule. Inputs: Up to 8 process variables used for display.
Event Decoder	N	Provides up to 16 digital outputs that may be ON or OFF on a per segment basis.

Auxiliary Control Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
Lead Lag Signal Conditioner	N	Modifies an analog input value to include lead and lag time constants when a digital input is true. Lead time constant = 0 minutes to 99 minutes Lag time constant = 0 minutes to 99 minutes
Function Generator	N	Generates an output characteristic curve based on up to 11 configurable "breakpoints" for input and output values.
High/Low Limiter	F, N	Limits an analog variable between high and low limit values. Provides separate digital status outputs when high or low limit values are exceeded.
Rate (Velocity) Limiter	N	Limits the rate at which an analog variable can change when a logic input is ON. Provides independent increasing and decreasing rate of change limit values. Separate digital status outputs indicate when high or low rate limits are active.
Rate of Change	F, N	Provides an output value representing the rate of change value of the input in units per minute. Output value is positive for increasing input values and negative for decreasing input values. Two setpoint values and digital outputs are provided to indicate excess increasing or decreasing rates of change or insufficient increasing or decreasing rates of change.
Read Constant	F, N	Provides a read access to internal static parameters of selected blocks by Block number and parameter index number.
Write Constant	F, N	Provides write access to internal static parameters of selected blocks by Block number and parameter index number.
Write Variable	F, N	Provides a write of a value to a selected analog or digital variable number based on the ON state of a digital input. Writes into the safety worksheet (Safety controllers) are only configurable when the variable is enabled for non-critical safety functions. When operating in Run-Locked/Safe Mode.
Track and Hold	N	Allows updating or holding the value of an analog input based on the state of a digital input.
BCD Translator	F, N	Accepts up to 8 digital inputs in sequence and interprets the ON/OFF status of the first 4 inputs as a BCD value between 0 and 9, and the second 4 digits as a value between 10 and 90.
Digital Encoder	N	A 16 input block whose output is the decimal value of the number of ON inputs.
Digital Decoder	N	A block whose 16 outputs are the binary equivalent of the input's decimal value.
Trend Rate	N	The trend block is used to configure up to three storage rates for the ControlEdge HC900 trend backfill (historical data collection) feature. Only one trend block is allowed in a configuration.
Trend Point	N	The trend point block is used to configure the data points to be stored by the ControlEdge HC900 trend backfill (historical data collection) feature. The data collection rate for the points configured in the block is determined by the output pin of the TRND block that it is connected to.

Specific Application Principal Blocks (F=Fast Scan Rate, N=Normal Rate)		
Device Control (for Pump Control)	N	Provides device control (pumps, etc.) including Start, Stop, Feedback Delay times along with feedback confirmation and failure check.
Stage	N	Accepts one or two analog variables and compares the values to high and low setpoints for each of 4 stages per block. Outputs are digital signals that remain ON after exceeding one setpoint until exceeding the second setpoint value for the specific stage.
Ramp	N	Accepts an analog variable and re-scales the value to new, user specified units. Up to 4 re-scale calculations may be configured per block. The re-scale calculation that is currently active is controlled by digital inputs to the block. Digital inputs may also be used to force the output to a high or low limit value.
Alternator	N	The alternator accepts up to 16 digital inputs and, on a one for one basis, turns on up to 16 digital outputs as determined by a user specified alternating sequence. Alternator sequences include: Direct – Inputs are mapped to specific outputs. Rotary – Outputs are managed on a Last ON/ First Off (LOFO) basis and the mapped sequence indexes by one each time all of the outputs are off. FOFO – First On, First Off alternates the outputs based on the sequence in which the outputs were turned on. The first output to turn on is moved to the end of the list once it turns off. Fixed – The output sequence follows a user specified mapping sequence. A manual advance causes the mapping sequence to index by one when enabled. Both “make-before –break” and “break –before –make” selections are available for the block with user specified time delays for output changes.

Signal Selector Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
High Selector/Low Selector	F, N	Provides the highest (high select) or lowest (low select) of two analog input variables.
Switch	F, N	Output switches between two analog input values based on the status of a digital input.
Bumpless Analog Transfer	N	Output switches between two analog input values based on the status of a digital input. When switched, output ramps to the new value at a specified rate. A rate value is available for each direction.
Rotary Switch	F, N	Single output is selected from up to 8 analog values based on the numerical value of a select input (1 to 8).

Calculation Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
Compare	F, N	Compares one analog variable to a second analog variable and generates separate digital outputs to indicate greater than, equal, or less than status.
Absolute Value	F, N	Provides an absolute value output for a single analog variable input.
Square Root	F, N	Output is the square root of a single analog variable input.
Mass Flow	N	Calculates the mass flow of gases when measuring flow using an orifice plate. Output = Kg * sqrt ((Kx * X + Bx) (Ky * Y + By)/ (Kz * Z + Bz)) With inputs X = differential pressure Y = pressure, and Z = temperature. A low flow cut-off feature provides a user-specified drop-off value below which the output goes to zero.
Minimum – Maximum – Average – Sum	N	Accepts inputs from up to 6 analog variables and outputs analog variables representing the highest value, lowest value, average value, sum, and standard deviation. Removes bad inputs and provides an alarm output for deviations of any variable outside user-specified standard deviation.
Negate	F, N	Accepts a single analog variable input and negates the output.
Totalize	F, N	Integrates an analog variable using a specified rate. Rate may be in units per minute, hour, or day. A preset is provided to indicate when a specific quantity has been accumulated. Separate enable and reset inputs are provided.
Deviation Compare	N	Compares up to 6 analog variables to deviation limits set around a 7th variable. If any variable is outside the limits, a digital signal is provided.
Dewpoint	N	A Dewpoint PV derived from high temperature O2 sensor is supplied to a PID function block for furnace Dewpoint control. Used in conjunction with other blocks including a PID to generate more elaborate control strategies than that provided by the carbon potential function block.
Continuous Average	F, N	Provides the average value of a single analog parameter for a user-specified time period, plus the running average within the time period. Average value is updated at the end of each sample period. Time periods to 1440.0 minutes are supported. A hold input allows excluding samples from the average when active.
Orifice Meter (AGA3)	N	Calculations for Orifice Metering – When connected to an AGA8 block, the input value and multiple related parameters will be obtained from the AGA8 block. The meter block will use this information to inherit the AGA8 block data for use in the calculations.
Turbine Meter (AGA7)	N	Calculations for gas measurement by Turbine Meters – When connected to an AGA8 block, the input value and multiple related parameters will be obtained from the AGA8 block. The meter block will use this information to inherit the AGA8 block data for use in the calculations.
Ultrasonic Meter (AGA8)	N	Calculations for gas flow measurements from multi-path Ultrasonic Meters – When connected to an AGA8 block, the input value and multiple related parameters will be obtained from the AGA8 block. The meter block will use this information to inherit the AGA8 block data for use in the calculations.

Detail (AGA8)	N	The Detail method (AGA8DL) uses the gas analysis of up to 21 components. From the gas analysis, the super-compressibility factor, gas density at flowing and standard conditions, and gas relative density at standard conditions are calculated for input into the AGA calculation for the meter type chosen. Used when accurate gas analysis is available either via an on-line gas analyzer or from laboratory measurements. The Detail method can handle up to 21 gas components typically found in natural gas. If this information is available, the Detail method is preferable, as accurate results are obtainable over a wider range of conditions than the Gross method.
Gross (AGA8)	N	The Gross method (AGA8GS) is used to approximate natural gas by treating it as a mixture of three components, equivalent hydrocarbon component, Nitrogen and Carbon Dioxide. It is typically used for dry, sweet (no H_2S) natural gas. There are two methods used: **Gross Method 1** calculates the super-compressibility and gas density from knowledge of the relative density, heating value and carbon dioxide, hydrogen and carbon monoxide components. **Gross Method 2** calculates the super-compressibility and gas density from knowledge of the relative density, Nitrogen, carbon dioxide, hydrogen and carbon monoxide components. The Gross Method only works over a limited range of conditions but requires less instrumentation to implement.
8 Min-Max-Avg-Sum	F, N	Accepts inputs from up to eight analog input values (X1 – X8) with individual disables and calculates these values for output: - Minimum input value - Maximum input value - Average of input values - Sum of input values - Standard Deviation value - Alarm output for deviations

HVAC Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
Relative Humidity	N	Calculates the relative humidity using wet bulb, dry bulb, and atmospheric pressure inputs. Output may be in degrees Fahrenheit or Celsius.
Humidity and Enthalpy	N	Calculates the Absolute Humidity and Enthalpy based on the inputs for air temperature, air relative humidity and barometric pressure.
Psychrometric	N	Accepts Temperature, relative Humidity and Barometric Pressure inputs and calculates humidity ratio, enthalpy, dewpoint, wet bulb temperature and absolute moisture. Calculations may be in Metric or English.

Math Function Blocks (F=Fast Scan Rate, N=Normal Rate)		
Scale and Bias	F, N	Output = (K * X) + b with single analog variable input X.
Two and Four Input Math	F, N	Executes +, – or * on two or four analog variable inputs, / on two inputs.
Free Form Math	N	Calculates the result of a user-specified equation with double precision. The block accepts up to 8 input signals (including Constants or Variables). Operators include: +, -, , /, ^, and multiple levels of parentheses. Functions include: absolute value, exp, ln, Log, neg, sqrt. Example: a*(sqrt(b+c)) +d

Logic Function Blocks (F=Fast Logic Rate, N=Normal Rate)		
AND, OR, XOR (2 inputs) Boolean logic blocks	F, N	Provides a digital status output based on the digital status of two digital inputs for logic AND, OR, or XOR (exclusive OR) operations. Input status of each input may be inverted.
AND, OR (4 and 8 inputs) Boolean logic blocks	F, N	Provides a digital status output based on the digital status of four or eight digital inputs for logic AND or OR operations. Input status of each input may be inverted.
NOT (Complement)	F, N	Inverts a logic input status.
Latch	F, N	Provides a digital output that turns ON when a digital input turns ON and remains ON (latched) after the input goes OFF until an unlatch input turns ON.
Edge Detection Element (One-shot) [Trigger]	F, N	Provides an ON state of its output for one controller scan when a digital input goes from OFF to ON.
Selectable Trigger	F, N	Provides selectable input conditions for triggering its digital output.
Toggle (Flip-Flop)	F, N	Provides an ON state output when a digital input goes from OFF to ON and the previous state of the output was OFF, and an OFF state output when the digital input goes from OFF to ON and the previous state of the output was ON. A reset input holds the output OFF when the digital input is ON or active high.
Free Form Logic	F, N	Reads eight digital inputs and calculates the output based on specified Boolean logic functions (e.g., AND, OR, NOT, etc.) and multiple levels of parentheses. **Example: (A*B) +C**
Pushbutton	F, N	Provides a one-shot output based on an OFF to ON change of an operator interface key action. Supports four pushbuttons per block.
Four Selector Switch	N	Provides up to 16 digital outputs in groups of four outputs each. Only one output from each group may be ON at a time and when selected automatically turns other outputs OFF. Simulates 4-position panel selector switches.
Sequencer	F, N	The sequencer function block controls the output statuses of up to 16 digital outputs and one auxiliary analog output. Each combination of outputs represents a “State” of the sequence such as Heat, Mix, or Cool, for example. The function block supports up to 50 states. The sequencer contains up to 64 steps. Each step enables a State, allowing for a State to be designated for several steps. Each State supports two digital events as inputs that can designate the end of the associated step. Time in seconds or minutes, a manual advance, or a digital event can be used to terminate a sequencer step and cause the sequence to advance. A pool of sequences, up to 64 steps each, may be stored in controller memory for quick recall and assignment to any of the sequencers.
Hand/Off/Auto	N	Provides Hand-Off-Automatic outputs based on digital inputs emulating a standard H-O-A panel switch

Counters/Timers Function Blocks (F=Fast Logic Rate, N=Normal Rate)		
Resettable Timer	F, N	Provides a timing function based on an enable input. Elapsed time value is provided as an output. A Preset value allows settings from 1 second to 999999 seconds. A digital output is ON when time value is equal to the preset. An up/down digital input is provided to allow reverse timing from the preset value. A pre-load value allows initiating the timer to a non-zero starting time.
Periodic Timer	F, N	Provides an ON state output for one controller scan cycle based on a specified time period using the controller real-time clock. Periods may be monthly, weekly, daily, or time period in a day.
Up/Down Counter	F, N	Counts the number of raising edge logic transitions on the input to the block up to a preset value. When the preset value is reached a logic, output is enabled. A reset input resets the block. Value may be set to increase to the preset value or decrease from the preset value (1–99999).
ON-Delay Timer	F, N	An OFF to ON change of the digital input is delayed on the block output by a user-specified time (0.1 seconds to 999.9 seconds).
OFF-Delay Timer	F, N	An ON to OFF change of the digital input is delayed on the block output by a user-specified time (0.1 seconds to 999.9 seconds).
ON/OFF Delay Timer	F, N	Programmable as either ON-Delay Timer or OFF-Delay Timer (above).
Calendar Event	N	The Calendar Event Block compares user-entered time-and-date setpoints to the real-time clock to generate digital Event outputs. These Event outputs can be integrated into a control strategy to activate time-synchronized activities. Each Calendar Event block supports up to eight Event outputs. In addition, the block allows you to configure up to five sets of time-and-date setpoints, called Setpoint Groups. These Setpoint Groups can be used to activate different sets of time-and-date setpoints to handle different conditions. Each Calendar Event block supports five Setpoint Groups. The block also allows you to configure up to 16 Special Days. On these Special Days, the Calendar Event Block will override its normal Event processing for a 24-hour period.
Real Time Clock	N	The Real Time Clock block provides outputs pins that you can access in your configuration to make decisions based on the value of the controller's Real Time Clock value. The RTC function block has the following dynamic outputs based on the value of the real time clock of the controller: Seconds, Minutes, Hours, Day of Week, Day of Month, Day of Year, Month, and Year.
Time and Date	N	Controls change between Daylight Saving and Standard time. Indicates when controller time is in Daylight Saving. If the controller is using a network time server, indicates if the connection to server has failed.

Alarm and Signal Monitoring Blocks (F=Fast Scan Rate, N=Normal Rate)		
High Monitor	F, N	Accepts two analog values and provides a digital status output if the first input is higher than the second input. A hysteresis adjustment is provided to prevent output cycling.
Low Monitor	F, N	Accepts two analog values and provides a digital status output if the first input is lower than the second input. A hysteresis adjustment is provided to prevent output cycling.
Analog Alarm	N	The analog alarm block accepts an analog signal as a process variable and compares it to a user-entered limit value (setpoint) to determine an alarm condition. The setpoint may be entered by the user or be another analog signal in the controller. Alarm actions may be high, low or high deviation, low deviation or band deviation. For deviation alarming, a second analog signal provides the reference and setpoints represent deviation from the reference. The alarm output may be inverted to create normally active digital output. A user selection for latching until acknowledged or automatically reset is provided. A user-specified hysteresis value in the engineering units of the process variable is provided. An on-delay time value up to 240 seconds is available to prevent momentary alarm actions. A digital reset input is available to disable alarm actions.
System Monitor Block (1 block for normal scan and 1 block for fast logic scan) – (does not count against the maximum block count)	F, N	• Provides system and start-up status outputs including: • Program scan cycle time • Newstart pulse (ON for one scan cycle after a “cold” start (reset)) • Restart pulse (to activate a custom control action on power-up after power loss) • Two common alarm outputs – Active Unacknowledged (ON when at least one alarm not acknowledged), Active alarm (ON when at least one alarm is active), for assignment to digital outputs • Time off (the time that power has been off previous to restart) • Low Battery (alert to change battery without power shutdown) • Hardware OK (ON when all hardware including remote racks are OK) • Hi Temp (Cold Junction temperature exceeds limits on a rack) • Bad Block • Master Fail • Locked (controller toggle switch is in Run/Locked or Program position) • DS Limit (OI data storage has reached its alarm limit) • Reserve status of C70R CPU is active
IO Rack Monitor– (does not count against the maximum block count)	N	One monitor block per rack, 12 racks maximum. Provides I/O module fault status
Alarm Group (Up to 20 blocks) – (do not count against the maximum block count)	N	Supports acknowledgement of a group of up to 12 alarms using a controller digital signal to block, internal or external (for remote acknowledge). Each alarm group consists of up to 12 alarms. Outputs include Unacknowledged alarm and Active alarm states. The 30 blocks support up to 360 alarms.
Force Present	N	Output indicates the presence of any forced blocks in the controller. Input can clear all forces and prevent new forces.
Redundancy Status	N	Used with redundant CPUs only, such as C75. The output pins indicate the lead/reserve status of CPU A and CPU B. The input can force a failover between CPUs.

Alarm and Signal Monitoring Blocks (F=Fast Scan Rate, N=Normal Rate) continued...		
Four Alarm with Hysteresis	F, N	Monitors four analog input values and performs up to four high or low alarm comparisons against the PV input. Hysteresis settings for each alarm are used to prevent output cycling.
Fault Monitor	F, N	Provides Control Application a means to take action on numerous fault conditions. The reaction on detected faults is configurative depending on the applications for which the ControlEdge HC900 is used. The FMON block has a fault clear input pin used for clearing all the faults generated and a fault output pin to display the selected diagnostic fail status. Each FMON function block requires a rack number, module number and a corresponding diagnostic to be selected during configuration, depending on the type of diagnostic group selected.
Configuration Access Status	N	Provides read access to configuration access status values including the configuration file CRC (Cyclic Redundancy Check). The function block provides pins to generate the number of times the configuration is downloaded to the controller, number of times unauthorized TCP write is requested, number of times the controller password is changed.
IO Module Monitor	F, N	Provides Control Application a means to take action on numerous fault conditions. The reaction on detected faults is configurative depending on the applications for which the ControlEdge HC900 is used. The IMM block has a fault clear input pin used for clearing IO module faults generated and a fault output pin to display the selected diagnostic fail status. Each IMM function block requires a rack number, module number to display faults as outputs at module level.

Communications Blocks (Peer to Peer) (F=Fast Scan Rate, N=Normal Rate)		
PDE (Peer Data Exchange) Control	N	Interfaces to one ControlEdge HC900 peer device, accessed by controller name, supporting 8 parameter read requests and 4 event-triggered writes. Outputs may be given tag names for use in configuration strategy. Update rate can be configured from 500 ms to 5 sec.
PDE Read	N	Expands Read access for designated ControlEdge HC900 peer to an additional 16 parameters.
PDE Write	N	Expands Writes to designated ControlEdge HC900 peer by an additional 8 parameters, each triggered on event.
Safety Peer Monitor	N	Interfaced to one ControlEdge HC900 peer device, accessed by controller name, supporting peer connection and communication status. Failsafe timeout and Failsafe action can be configured (This is supported for SIL variants from versions 6.300 and above).
Safety Analog Import (Read)	N	Analog signal import (read) access for designated ControlEdge HC900 peer (This is supported for SIL variants from versions 6.300 and above).
Safety Digital Import (Read)	N	Digital signal import (read) access for designated ControlEdge HC900 peer (This is supported for SIL variants from versions 6.300 and above).

Modbus Slave	NA	Interface to one Modbus slave device, accessed by unit address (1 to 247), supporting 4 parameter read requests and 4 event triggered writes. Outputs may be given tag names for use in configuration strategy. Update rate is determined by the system, with the fastest rate being 1000ms per cycle. Max. 32 Modbus slave blocks per controller. A maximum of 1024 Modbus parameters for all slaves are supported per controller. When the serial port is used with the Modbus Master Advanced protocol (for gateway applications), the fastest update rate is equal to the Normal Scan rate of the controller (typically 100 ms per cycle). The master's actual scan rate is determined dynamically by the controller based on the following criteria. -Number of slaves present on the serial link -Serial port baud rate -Maximum number of Modbus registers per transaction defined by the user -Number of Modbus registers used in the configuration -Number of transactions required per scan cycle -User configured slave reply timeout
Modbus Read	NA	Expands Reads from Modbus Slave devices for Modbus Slave blocks to an additional 16 parameters. Max. 32 Modbus devices.
Modbus Write	NA	Expands Writes of Modbus Slave blocks to Modbus Slave devices by an additional 8 parameters, each triggered on event. Max. 32 Modbus devices.
Modbus/TCP Slave	NA	A communication function block allows the controller to act as a master device and communicate with slave devices via the Ethernet port of the controller. Requires one block per slave device, up to 32 devices maximum. Only one block may be assigned to each slave device. It supports 4 read and 4 write parameters plus provides digital indication of communication integrity.
Modbus/TCP Read	NA	This is a communication function block that expands the read capability of the Modbus/TCP Slave function block to 16 additional data points. Multiple blocks may be connected to the same Modbus/TCP Slave block. The Modbus/TCP read block has no inputs and 16 outputs. Up to 16 registers can be configured as the source of data for the outputs.
Modbus/TCP Write	NA	This is a communication function block that expands the write capability of the Modbus/TCP Slave function block to 8 additional data points. Multiple blocks may be connected to the same Modbus Slave block. The Modbus write block has 8 inputs and no outputs. The Modbus destination for each of the eight inputs can be configured. An enable pin lets the data value be written once per scan. The configuration data for each point will consist of: the address of the destination device on the Modbus link, the register address of the desired data, and the register type: Integer or Float.
XYR5000 Base Station	NA	Provides convenient setup method for accessing XYR5000 transmitter data from XYR5000 Base Stations. Uses a ControlEdge HC900 serial port connection and displaces the Modbus Slave port connection. Provides status of transmitter communications to a base station. Maximum of 1024 total parameters supported from up to 32 remote stations.
XYR5000 Transmitter	NA	The XYR 5000 transmitter function block operates in conjunction with the XYR5000 Base Station to provide process variable and status information from a single XRY5000 wireless transmitter. Up to 100 XYR5000 transmitter blocks may be connected to a single XYR5000 Base Station function block.

XYR6000 Gateway	NA	The XYR6000 Gateway function block is used to provide access to one or more XRY6000 transmitters from the ControlEdge HC900 controller. The number of Gateways connected to a ControlEdge HC900 controller is not limited, but the total number of parameters per controller is limited to 1024. XYR6000 Transmitter function blocks are connected to the output of the Gateway function block to gain access to transmitter data.
XYR6000 Transmitter	NA	The XYR 6000 transmitter function block operates in conjunction with the XYR6000 Gateway to provide process variable and status information from a single XRY6000 wireless transmitter. The number of transmitter blocks connected to a gateway is not limited, but the total number of parameters requested from all Gateways is limited to 1024 parameters. The addressing in the Transmitter function block is dependent on the content of the database export file from the XYR6000 Wireless Builder configuration software.

Other Items (F=Fast Scan Rate, N=Normal Rate)		
Analog Variable	F, N	Connects to a function block's inputs and can be changed from the operator interface or via serial communications addressing. May be enabled by the safety application engineer for writes from the process worksheet into the safety worksheet when used in a non-critical safety function while operating in the "Run-Locked/ Safe".
Digital Variable	F, N	Connects to a function block's inputs and can be changed from the operator interface or via serial communications addressing. May be enabled by the safety application engineer for writes from the process worksheet into the safety worksheet when used in a non-critical safety function while operating in the "Run-Locked/ Safe".
T (Text)	F, N	Allows descriptive data to annotate a specific area of a function block diagram to be entered. Four font sizes, four colors, bold/italics/underline supported. Text may be entered multi-line.
Soft Wire	F, N	For reference only. Soft-wiring method is to double click on a block pin and then clicks on a destination pin to complete soft-wire (or click to change direction en route to destination pin).
Connector	F, N	Connects tagged signals to function block inputs.
Signal Tag	F, N	Allows a name to be assigned to a wire and accessed by the operator interface or via serial communications. Signal Tag can be enabled for Safety Peer Export to use it in peer controller configuration for SIL variants from version 6.300 and above.
Numeric Constant	F, N	A user-specified constant value that can be connected to function block inputs.
Page Connector	F, N	Connects a signal from a worksheet page to another page and across worksheets.

Alarms

An alarm may be assigned to any tag applied to a digital status output of a function block. Each control loop has two alarm status outputs, each corresponding to alarm setpoints of various types (e.g. PV HI, Dev High/Low, etc.). There are specialized alarm blocks for analog alarms with hysteresis adjustment. An expanded function analog alarm block also provides selection of alarm type, an on delay, selective latching, and a disable input to control when the alarm is active.

Alarm assignment is initiated by adding the digital tags to an alarm group from a tag list. Alarm group blocks allow alarm partitioning into groups of 12 alarms. The 30 alarm group blocks allow up to 360 alarms to be defined. Each group may be assigned an alarm acknowledge function which permits external, panel acknowledge via a digital input or via a serial communication write to an internal Variable.

Alarms can be assigned a priority (one of 4 levels - Low, Medium, High, and Emergency) for use in routing a topic and 48 character alarm message electronically to any of three locations via the e-mail of alarms feature, if selected for an individual alarm. Alarm detection is an off-to-on or on-to-off transition, selectable per alarm. The method of acknowledgement is selectable per alarm; Manual Ack selection requires user acknowledgement while Auto Ack provides automatic acknowledgement on return to the non-alarm state.

Assigned alarm group displays show alarm status and permit group acknowledge of active alarms at the operator interface. An alarm detail display is provided for each alarm point which indicates the time and date of last alarm occurrence and offers up to 48 characters of user-specified text for alarm actions or notes. Alarms may also be stored in a log file on the 900 Control Station. A resettable, common alarm output is available from a System block. This output can be directed to a DO or intermediate logic. An acknowledgement from any source can reset this output.

Events

Events are used for user alerts below an alarm priority (a non-alarm process condition) and may be assigned to any digital tag. Up to 64 digital tags may be added to an event list and assigned to:

1. trigger an e-mail for the event condition sent to any of up to 3 locations on occurrence,
2. be logged on the Control Station or
3. be displayed on the status line of the Control Station on occurrence.

Any or all of these three assignments may be selected. Event detection may be on an off-to-on or on-to-off transition, selectable per event.

Communications

ELN Protocol - ELN is a communication protocol used by the Designer software to exchange configuration and dynamic data with the 900 Control Station.

Modbus TCP and Modbus RTU protocol - ControlEdge HC900 Controllers communicate with host systems over an Ethernet Network using Modbus TCP protocol or via serial ports and Modbus RTU protocol. Modbus addresses are pre-assigned to function block parameters and tagged signals in the controller configuration this does not require user setup when Honeywell's fixed Modbus mapping is selected. A listing of available Modbus parameters, by address, is available via Designer software reports. For interfaces that require controller data to be provided in a unique sequence, or in a specific data format, the ControlEdge HC900 controllers provides an array of 1000 Modbus registers that may be configured by the user. Users may configure their own Modbus register mapping by selecting the Custom Modbus Map if the configurations require additional register access.

The address location of data in the array is determined during configuration. Data formats for this function include: Signed 16 bit, Unsigned 16 bit, Signed 32 bit, Unsigned 32 bit, and float 32.

Profibus – The ControlEdge HC900 can access data from Profibus slave devices using a Modbus-to-Profibus gateway device attached to the serial port of the controller. The gateway device is a Profibus Master on the fieldbus network and a Modbus slave to the ControlEdge HC900. The Profibus data is connected into the control strategy using Modbus function blocks. This application has been validated with a ProLinx 5104-MCM-PDPM gateway (from ProSoft® Technology).

Ethernet Peer to Peer Communications - Peer data communications between one ControlEdge HC900 controller and up to 32 other ControlEdge HC900 controllers is supported over Ethernet via UDP protocol for safety and process data sharing. Both digital and analog data exchange are supported using peer data exchange function blocks.

Up to 1024 parameters between peer controllers is supported. No specialized software is required to setup a peer network.

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 controller's host connections.

Modbus RTU Master – The serial ports of ControlEdge HC900 controllers may be setup as a Modbus Master on a multi-drop network of devices, (one master per controller). Modbus Slave function blocks are used to specify the unit address of field devices and the data to be exchanged. A maximum of 32 Modbus Slave function blocks may be configured in a control strategy. Both read and write data operations are supported.

Modbus Read and Modbus Write function blocks expand the capability of a Slave block up to the maximum of 1024 parameters per controller.

Email alarming - ControlEdge HC900 alarms or events can be individually configured to send an e-mail alarm (or event) message to an e-mail address. Alarm priorities are combined with individual alarm and event e-mail enable selections to group messages to be sent. An email message provides the following information:

From: Controller Name
Subject: (Configurable Text)
Body of E-mail:

- Date & Time
- Alarm or Event Tag Name
- Alarm State
- 48 Character alarm or event text

Sequence of events(SOE) - SOE is a mechanism for recording and determining the order (sequence) of digital state changes (on DI channel).
Please refer "51-52-03-31" specification for more details.

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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Technical Information

Honeywell

ControlEdge HC900 Controller Specifications

51-52-03-31, January 2023

Overview

The Honeywell ControlEdge HC900 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 900 Control Station operator Interface that is highly integrated with 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. Program execution environment is protected using an independent watchdog timer.

Easy-to-use Windows-based Designer software, operable over Ethernet or RS485 port (isolated) simplifies controller configuration. The software is available in English, Chinese, Russian, and German language version. It provides advanced monitoring functions for debug, allows run-mode process configuration changes while maintaining process control, uploads the complete, annotated graphic controller configuration, plus supplies an array of reports for enhanced documentation. The ControlEdge 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:

- ControlEdge 900 Platform Modules Specs 51-52-03-41
- Designer Software Specs 51-52-03-43

Applications

Mining & Metals	Furnaces, Kilns, Boilers
Chemicals,	Extruders Autoclaves
Pharmaceuticals	Sterilizers, Dryers
Rail/ Infrastructure	Burner Management,
HVAC/ DataCenters	Combustion Control
Pulp & Paper	Emergency Shutdown
Cement & Glass	Pipeline Monitoring,
Power	Spill Prevention

Features Summary

- Supports Split Rack Redundancy
- Supports Honeywell FDM (Field Device Manager) using HART IP
- Supports HART function blocks (Command 3 and 48) **Note**: UIO Module is required for HART support
- Non-redundant and Redundant Architectures
- Sequence of events support (SOE) **Note**: Supported only in non-redundant UIO configuration.
- Redundant and Non-redundant Safety Universal IO
- PID Control with advanced Accutune III auto-tuning
- Safety peer communication between ControlEdge HC900 controllers
- External watchdog timer with independent clocks that detect spurious CPU lockups
- Adjustable recipe pool memory lets you allocate memory for recipes, SP Profiles, sequences and schedules to meet your needs
- Up to 4608 points with remote I/O
- Boolean Logic programming. Robust assortment of over 100 algorithms

Features Summary, continued ..

- Advanced Floating Point Math Functions.
- Extensive alarm and event monitoring
- Up to 2304 galvanically Isolated, Analog Inputs
- Up to 1008 redundant UIO points
- New I/O voting and output validation function blocks.
- Remote I/O Racks with wire for extended distance.
- Star or Ring topology on IO network using recommended switches
- Scanner and I/O Insert/Remove under power
- LED on/off indicators on digital I/O
- Graphic Function Block Configuration
- Open 10MB or 10/100MB Ethernet interface using Modbus/TCP. Peer-to-peer communications via Ethernet
- E-mail alarm/event messaging on priority
- Ramp/Soak Setpoint Programmers
- Setpoint Schedulers with multiple outputs
- Sequencers with 16 Outputs each
- Modbus read/write parameters assignable to either fixed or custom addresses for access by HMI or supervisory software.
- Modbus TCP Initiator
- Gas flow function blocks per American Gas Association specs. (non-Safety configurations only).
- Calendar block for triggering events
- Non-interfering process/safety worksheets capable of handling process and safety configurations.
- Built in Version Control
- Fast updates - 10 ms digital and UIO (900U02-xxxx) 100ms analog capable

  Note: Low Level AI updates @ 0.5 sec.

Non-redundant Architectures

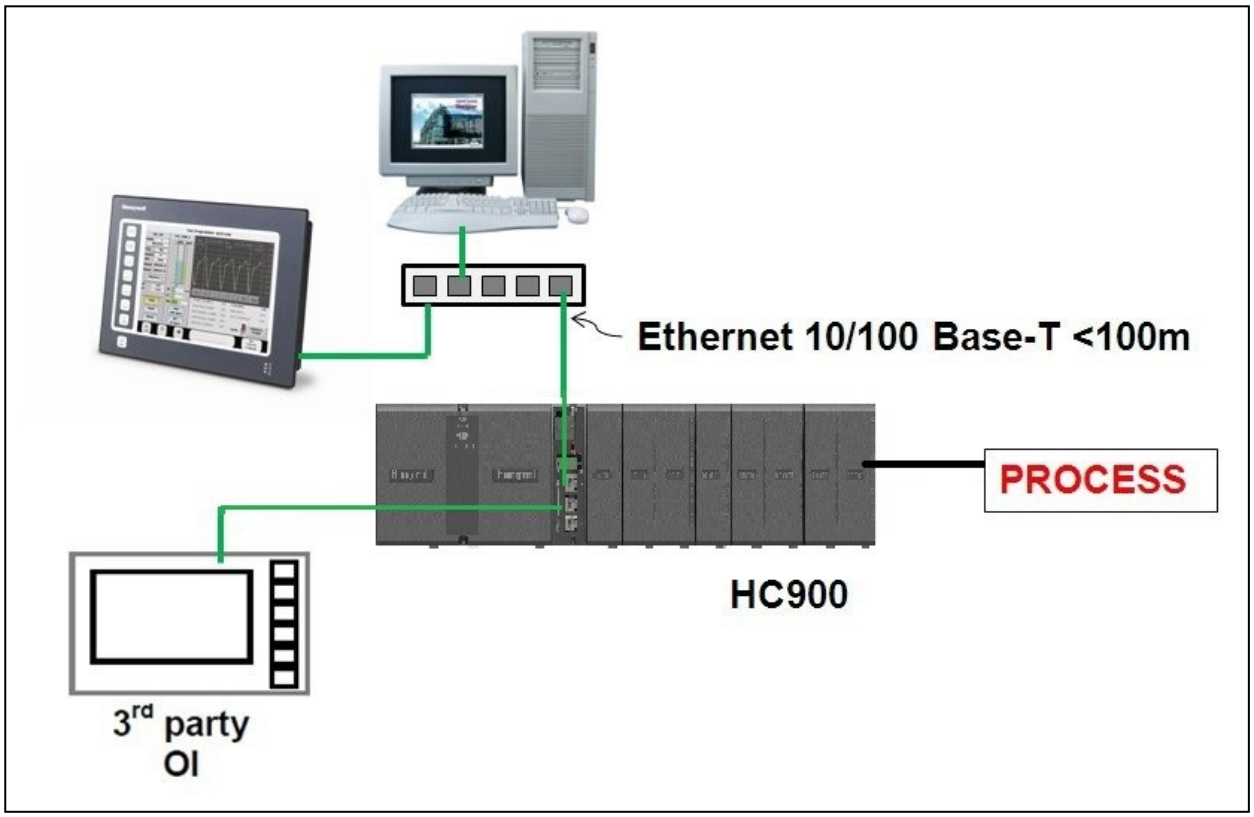


Figure 1 - SINGLE PROCESS/SINGLE RACK- PROCESS

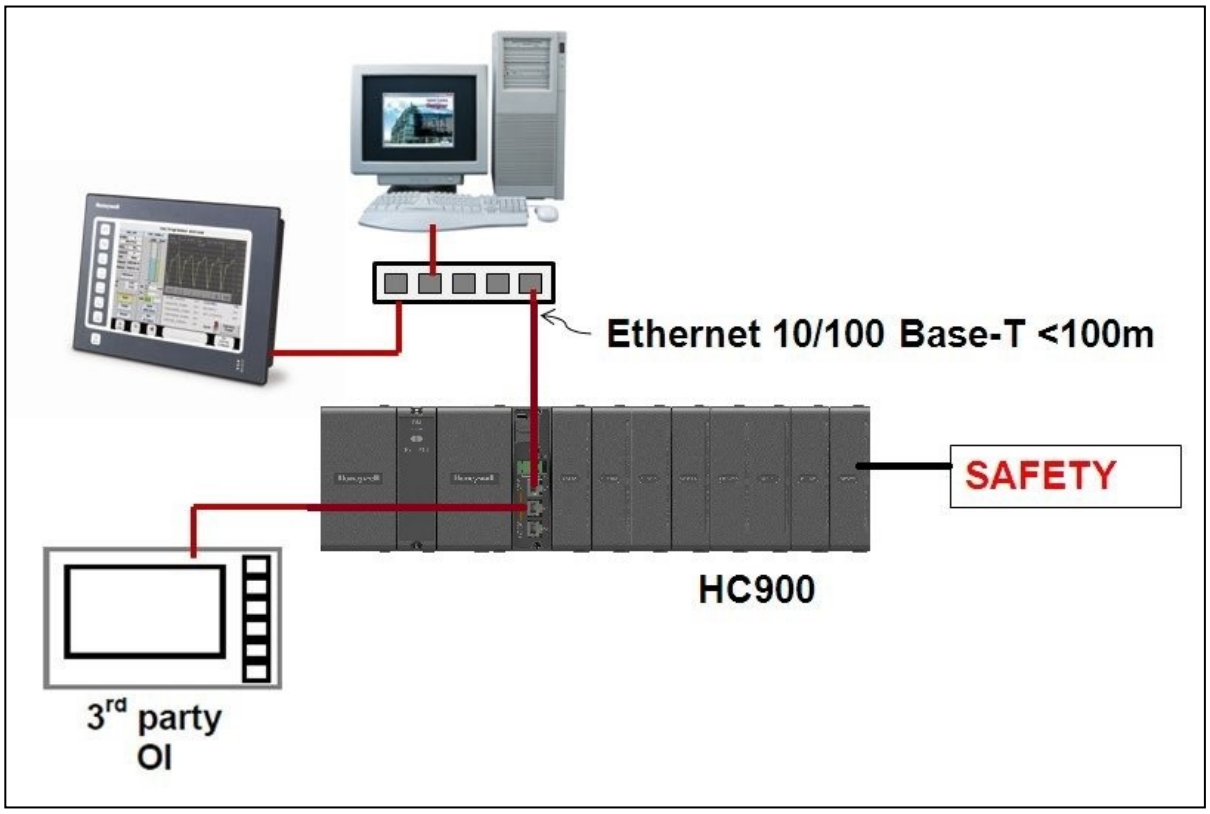


Figure 2 - SINGLE PROCESS/SINGLE RACK- SAFETY

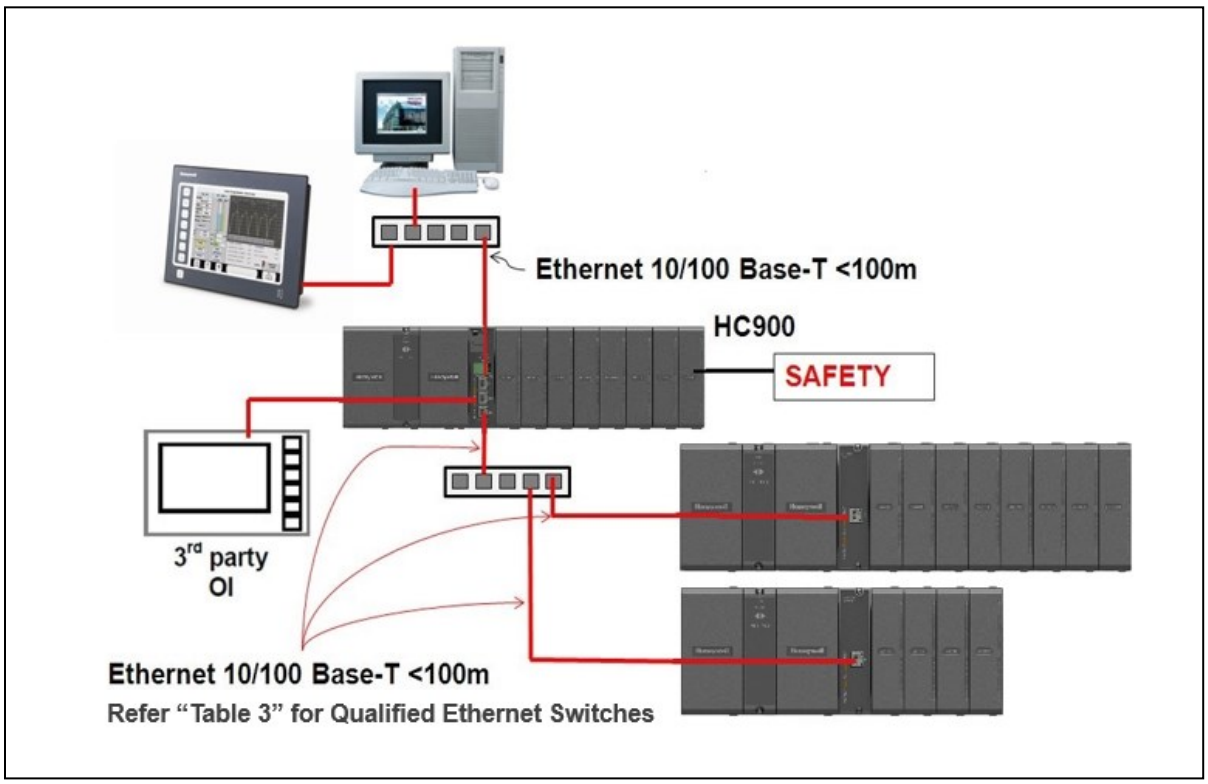


Figure 3 - SINGLE PROCESS/MULTIPLE REMOTE RACKS- SAFETY

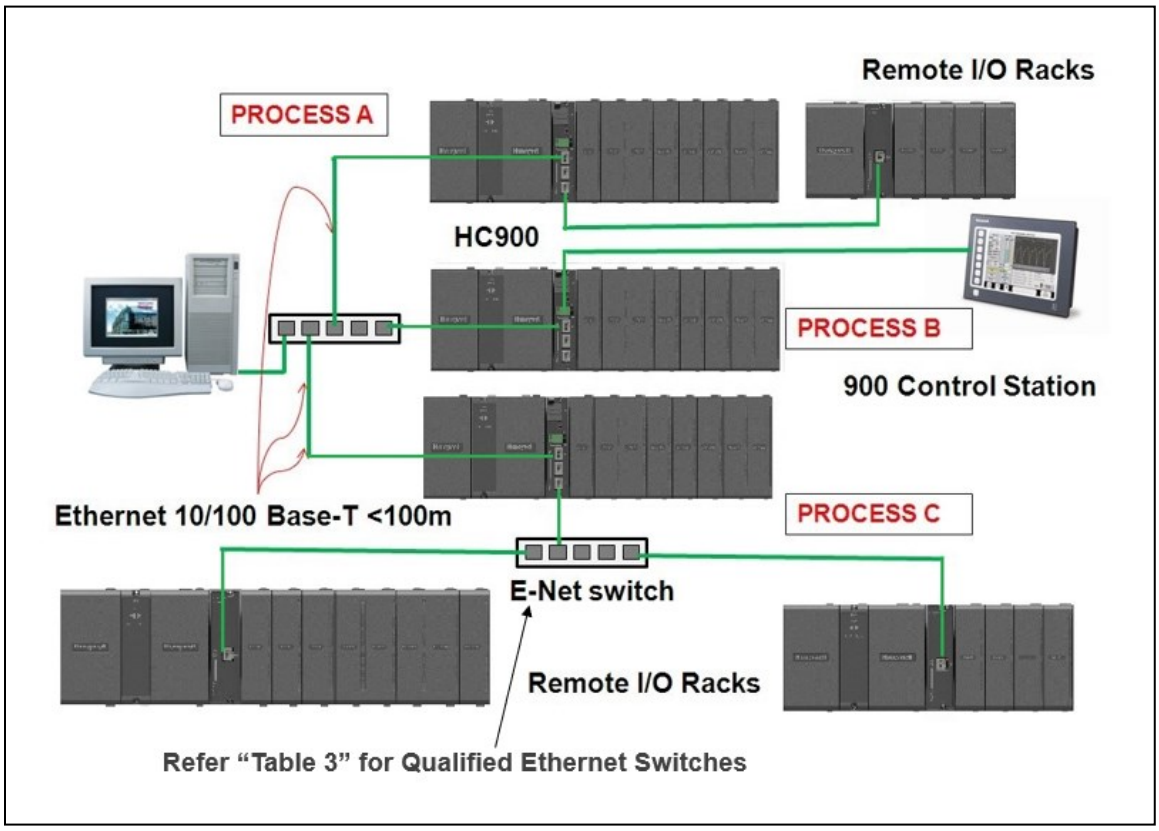


Figure 4 - MULTIPLE PROCESS/MULTIPLE RACKS – PROCESS

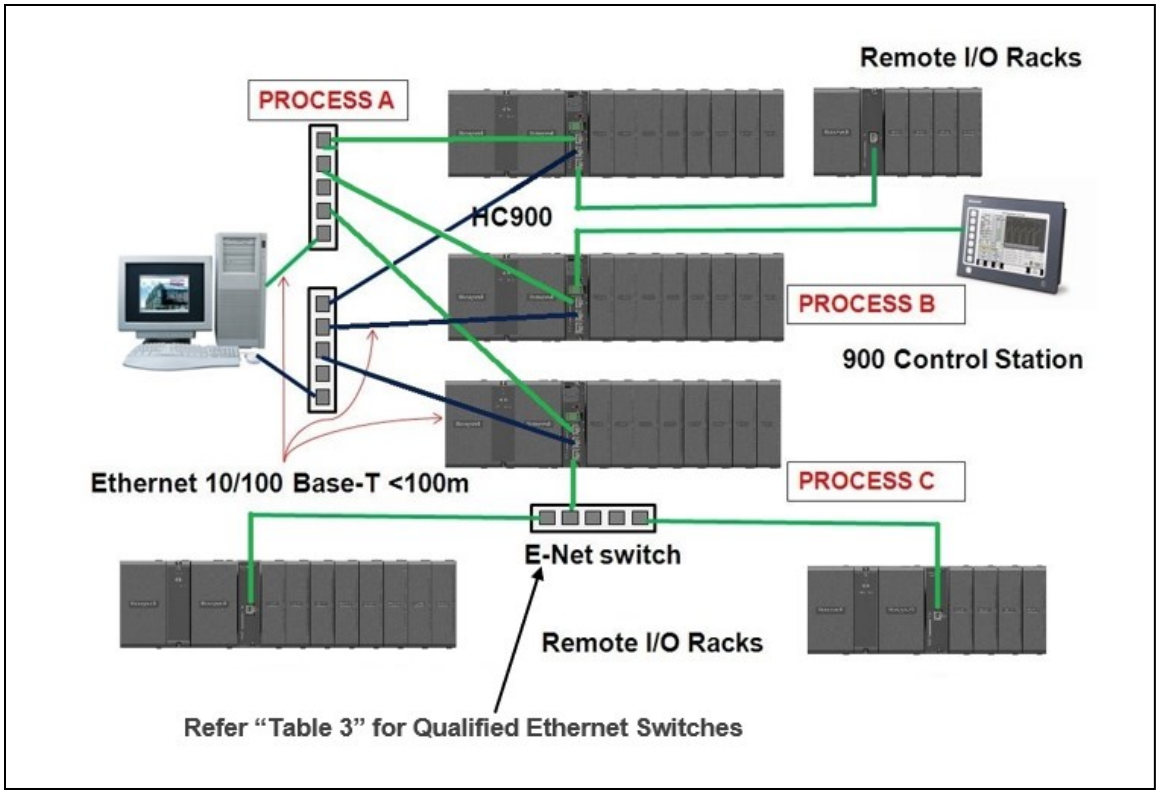


Figure 5 - MULTIPLE PROCESS/MULTIPLE RACKS – RED NETWORKS (STAR TOPOLOGY)

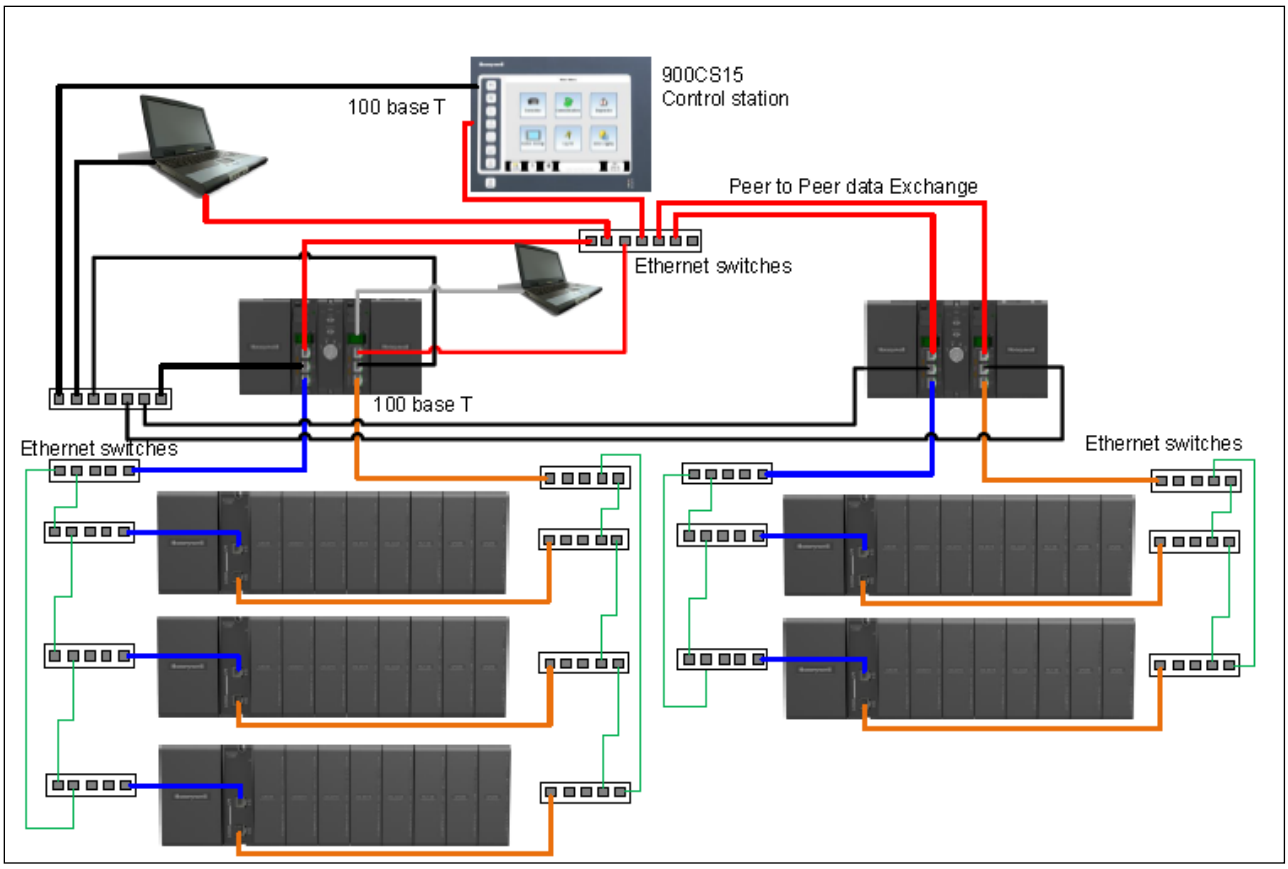


Figure 6 MULTIPLE PROCESS/MULTIPLE RACKS - RED NETWORKS (RING TOPOLOGY)

ControlEdge HC900 Controller

- The rack based ControlEdge HC900 Controller is available in 4 rack sizes with 1, 4, 8 or 12 I/O slots each to support a wide range of requirements.
- Redundant C75 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 ControlEdge HC900 Controller include:
  - C30 and C50 for non-redundant applications.
  - C70 for dual networking.
  - C75 for redundant CPU applications and dual networking.
  - All ControlEdge HC900 CPU modules are based on the e300 32 Bit RISC based PowerPC Architecture. The controller operates out of a battery-backed DDR2 64MB memory for C30 and C50 modules, 128MB for C70 and C75 modules. DDR2 memory on all modules is supported with ECC circuitry to enhance reliability and error detection.
    Program execution environment is protected using an independent watchdog timer.
- All ControlEdge 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 C70 and C75 provide dual Ethernet ports for high network availability installations.
- ControlEdge 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.

- ControlEdge 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. Using proven TL5903 primary batteries to support up to 24 days of continuous power outages
- 5000 SOE event buffering capability

I/O Scanners

ControlEdge 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 is selectable via DIP switch setting.

Program execution environment is protected using an independent watchdog timer.

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 modules: Inputs may be mixed on a module and may include multiple thermocouple types, RTDs, ohms, voltage, current or millivoltage types – all easily assigned using the Designer configuration tool. High point-to-point isolation simplifies installation and saves the expense of external isolation hardware.
- 16-point high level analog input module: each point is configurable for V or mA. Point-to-point isolation.
- 4-point galvanically isolated analog output module: Supports from 0 to 20mA each.
- 8-point analog output module. Galvanically isolated in two groups of 4. Supports 0 to 20mA.
- 16-point (14-point for redundant configuration) Universal I/O module galvanically isolated Input/ Output to chassis. Each point can configured as DI, DO, AI or AO.
- 16-point digital galvanically isolated AC/DC input module.
- 16-point analog output module. Galvanically isolated in four groups of 4. Supports 0 to 20mA.
- 16-point digital galvanically isolated input modules: Contact closure type, DC voltage and AC voltage types.
- 32-point galvanically isolated digital input (sink) module: DC voltage
- 8-point AC or 16 point galvanically isolated DC digital output (sink) modules
- 32-point galvanically isolated digital output (source): DC voltage
- 8-point galvanically isolated high voltage
- 8-point galvanically isolated relay output module: four form C type and four forms A type relays.
- 4 channel Pulse/ Frequency/Quadrature I/O module

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

Insert & removal of I/O under power - For ease of maintenance, the ControlEdge HC900 controller supports removing and inserting 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. Hardware can be replaced without shutting down operations for replacement of CPU or Scanner modules thus reducing downtime and total cost of ownership.

I/O Terminal Blocks – 20-screw Terminal Blocks are available with either barrier style or Euro style screw connections. A module label area is provided for field wiring identification. An available 36-screw Euro Terminal block is required for certain high capacity modules.

Remote I/O - I/O racks may be remotely mounted from the controller via a dedicated Ethernet 10/100Base-T connection at up to 300 meters (984 feet) between the controller and the most remote rack using two Ethernet switches. Use of fiber optic cable extends distance to 40 Kilometers.

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 ControlEdge HC900 controller rack. An extended rack is available that expands the standard 8 and 12 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 C70/C75 CPU
Analog In	Universal: 8 High level: 16 UIO: 16	Universal: 96 High level: 192 UIO: 192	Universal: 1152 High level: 2304 UIO: 1920*	Universal: 1152 High level: 2304 UIO: 1920* (< R710)
Analog Out	4, 8, 16	40	480	480
Analog Out (External power)	8, 16 UIO: 8	192 UIO: 192	2304 UIO: 416*	2304 UIO: 416*
Digital In	8, 16 or 32 UIO: 16	384 UIO: 192	4608 UIO: 1920*	4608 UIO: 2340* (=> R710)
Digital Out	8 AC or 16 DC, 32 DC UIO: 16	384 UIO: 192	4608 UIO: 1920*	4608 RUIO: 1008* (=> R710)
Function Blocks	n/a	400	2000	15000 (5000 for version below 6.6)

* Check “System Planning Tool” to find out the maximum configurable UIO channels.

Redundant Architectures

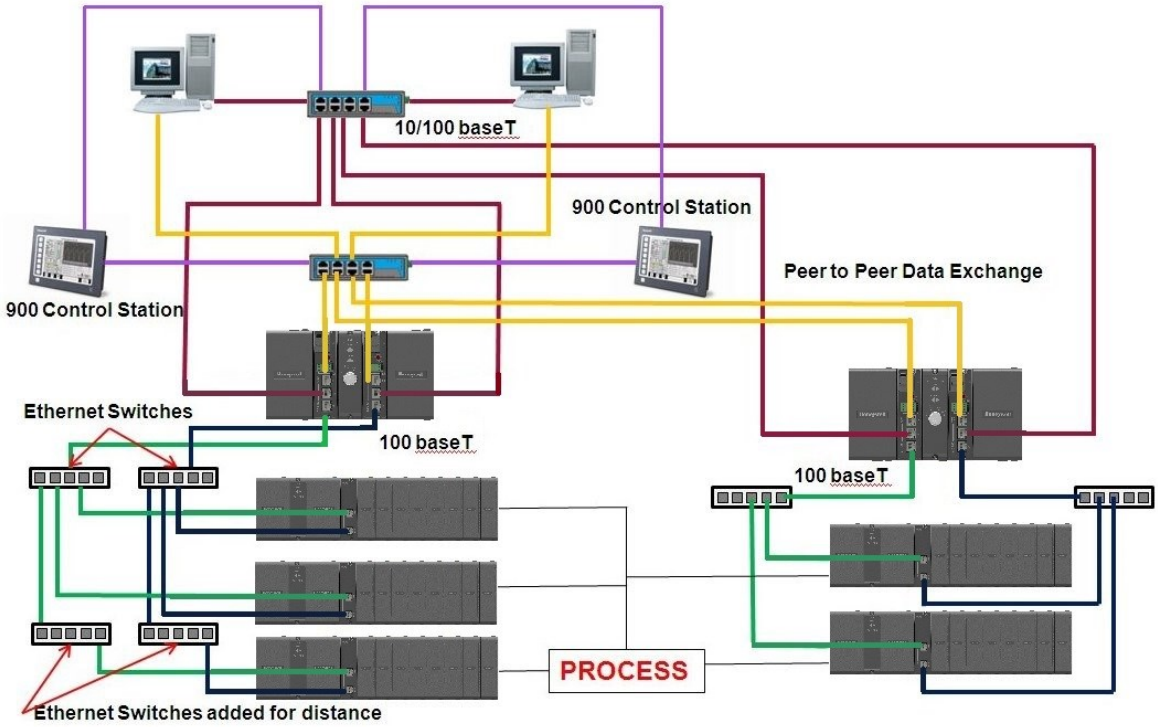


Figure 7 - Multiple Systems / Multiple Racks

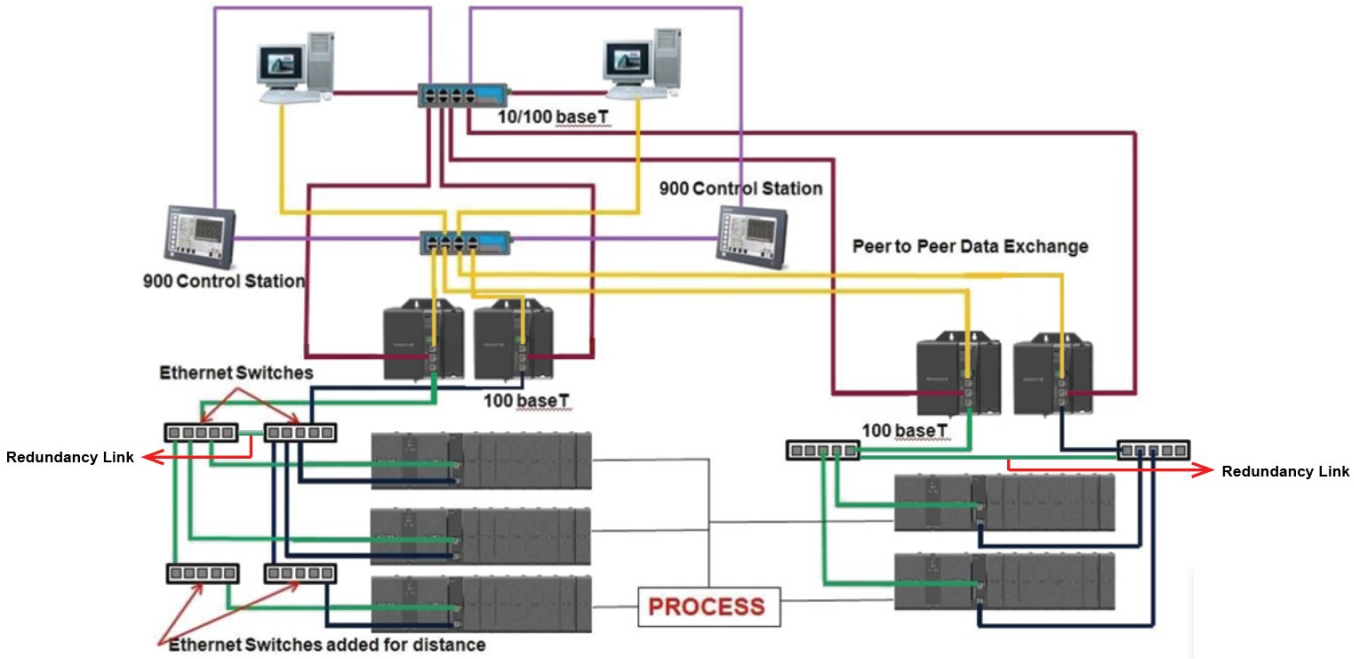


Figure 8 - Multiple Systems / Multiple Split Racks

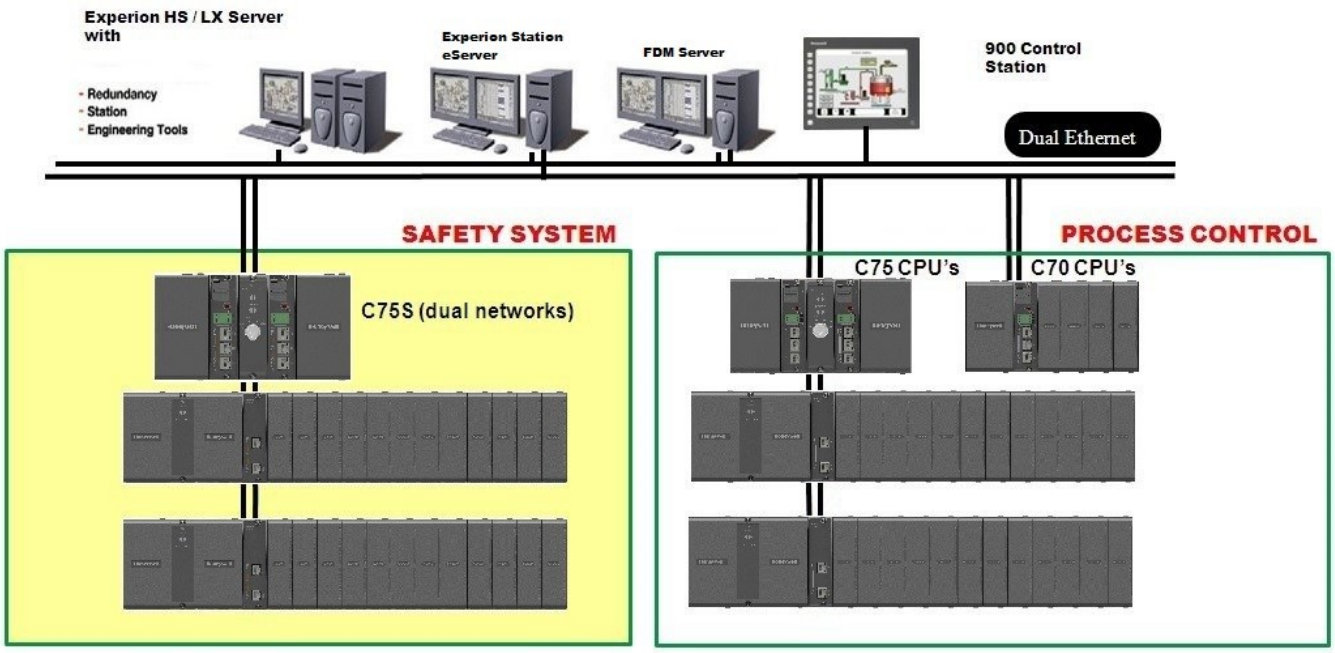


Figure 9 - Safety and Non-Safety in Separate Systems

Redundant Architectures

Redundant Controller

Two redundant C75 CPUs operate in a separately mounted controller rack, each with an independent 900PS1 model power supply. A Redundant Switch Module (RSM) is located in the rack between the two C75 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 12 racks of I/O over a 100 base-T Ethernet physical communication link or fiber optics with an external media converter for greater distance. When more than one I/O rack is used in the system, Ethernet switches are required, one port 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 every scan cycle with all the information needed to assume control in the event of a fault condition.

After power-up of the C75 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,
- Input pin on Redundancy Status function block, or
- Instruction from host communication.

Dual Networks for Host communications are provided on the C75 CPU. Both network ports are continuously active on the Lead controller. Matrikon OPC server is available from Honeywell Matrikon to support dual Ethernet communications and automatically transfer communications.

The C75 network ports may otherwise be used in non-redundant mode where only one of the communication ports is used.

Remote I/O - To extend the distance between the CPU rack and the most distant I/O rack to 300m (984 ft.) up to two Ethernet switches may be used in each I/O connection. Distances up to 40km are possible with fiber optic cable.

Operator Interface – The 900 Control Station Operator Interfaces (900CR series) is supported with the C75 CPU. An Ethernet connection is made to a switch connected to the Ethernet port of each CPU. The operator interface communication to the controller follows the Lead controller assignment.

Status/Diagnostics - An output parameter of the system monitor function block of C75 CPUs provides a digital status of the Reserve controller to allow integration of this information into the control strategy. C75 CPUs also provide diagnostic status on redundancy operation that may be observed using Designer configuration software. A Redundancy status function block is also available to monitor redundant controller operation.

Function Blocks

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 (PPO) 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.

100ms analog capable from version v6.300 and above. **Note:** Low Level AI updates @ 0.5 sec.

Fast Scan: The fastest update rate for fast scan function blocks in a single controller rack is 10ms. The update rate starts at 25ms when remote racks are used and for redundant systems.

Principal Function Blocks – These function blocks are supported by dedicated Widget objects in Station Designer software for configuring 900 Control Station operator interfaces. They have Tag names and other attributes to support on-line user interaction. Principal function blocks can be used any number of times in a configuration.
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 totalizer, free-form math, average, mass flow, function generator, periodic timers based on real-time, carbon potential, RH, Dew Point, signal selection, comparison, gas flow, real time clock, 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.

AI-V – The new AI-V function blocks will allow 1oo2 and 2oo3 voting for inputs and compares its values with one another and reports any deviation if validation between one another fails. Output value is calculated by comparing all inputs channels and selecting best of three.

DI-V - The new DI-V function blocks will allow 1oo2 and 2oo3 voting for inputs voting for inputs and compares its values with one another and reports any deviation if validation between one another fails. Output value is calculated by comparing all inputs channels and selecting best of three.

AO-V – The AO-V block is similar to the AO block but it provides additional functionality which allows users to validate the status of the output using a feedback input channel. The primary function of this block is to validate the feedback signal and provides indication when input fails to match the output due to possible reasons such as field power failure, cable failure, fuse etc. The function block will also check the feedback input signal for input module error, failed input channel and loss of feedback module communications.

DO-V - The DO-V block is similar to the DO block but it provides additional functionality which allows users to validate the status of the output using a feedback input channel. The primary function of this block is to validate the feedback signal and provides indication when input fails to match the output due to possible reasons such as field power failure, cable failure, fuse etc. The function block will also check the feedback input signal for input module error, failed input channel and loss of feedback module communications.

Alarms/Events

Alarms and events represent changes in digital status that require user notification. The ControlEdge HC900 controller supports an internal alarm annunciation system that may be setup to operate via e-mail to a remote computer (see Communications, E-mail Alarming). Up to 360 alarm points per controller may be grouped in 30 groups of 12.

Events are digital status changes that cause messages to be presented on the 900 Control Station operator interface. Controller events 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.

Sequence of Event (SOE)

SOE is a mechanism for recording and determining the order (sequence) of digital state changes (on DI channel). High-resolution SOE uses 1 msec time stamping. SOE display tool (historian or control station) shall map the SOE event properties from signal number in configuration file.

Note:

- SOE is supported only in non-redundant UIO configuration.
- As of now SOE events across controllers may not be correlated properly as there is no time sync across controllers

Configuration

Controller configuration is performed using Designer Configuration software on a PC operating with Windows™ 7 (32-bit and 64-bit), Windows™ 8.1 (32-bit and 64-bit), Windows™ 10 (32-bit and 64-bit), Windows Server 2016, and Windows Server 2019. Configuration files are 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 Designer configuration software. Simply read the configuration from the controller to exactly duplicate the original configuration, including all text descriptions.

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 Designer. The software allows configuration changes while in the Run mode, limiting process disturbances.
Note: Forcing and downloads cannot be made on Safety controllers unless they are switched to the RUN/PROGRAM mode.

I/O Redundancy

CAUTION: For I/O redundancy, prefabricated cable length from RTP to Redundant UIO modules must be same.

- Flexibility in configuration
- I/O Redundancy RTP (Model No – 900RTI-0100)

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 900 Control Station operator interface by name or number, or via a dedicated recipe load function block and user configured logic.

Table 2 Recipe capacities

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

Operator Interfaces

A ControlEdge HC900 controller can support up to three 900 Control Station operator interfaces via Ethernet or Serial communications. The interface is configured with Station Designer software using a database import function to simplify the setup. See specification sheet 51-52-03-102 for more information on this interface.

Note: The old phased-out Control Stations (900CS10-00/ 900CS15-00) will not support import of HC900 software configuration file (*.cde) v7.1 and above. For HC Designer v7.1 and above please migrate to new 900CR series Control Stations with Station Designer v3.1.7100 and above.

Communications

HART IP – The HC900 controller supports industry standard HART (Highway Addressable Remote Transducer) protocol to integrate with asset manager (Currently it is qualified with Honeywell FDM).

HART supports two functionalities:

- HART IP client (FDM) communication
- HART Function Block communication

The controller enables the HART IP client to exchange information with HART field devices connected to the AI/AO channels in the controller via a HART-IP Server. Multiple HART IP clients can be served by the controller at the same time. When the HART IP client builds a HART command request and sends it to the TCP/IP port of the HART-IP server, the HART-IP server responds to the HART IP client with information from the field device. Since it takes time for the controller to communicate with the field devices through onboard or remote I/O cards, a delayed response mechanism is implemented. The TCP /IP port of the HART-IP server is user-configurable and the default port number is 5094. The end user may change the port number if firewall configuration is required.

The controller enables HART function blocks to access to the HART field devices through HART-enabled AI/AO channels. Currently HART command 3, command 48 and command X are implemented.

Remote I/O Rack Port (C50, C70, C75) – An Ethernet port is dedicated to supporting remote I/O racks. This 10/100Base-T Connection on the C50 and C70 CPU supports a single direct connected remote rack or up to 11 remote racks when connected through an external Ethernet switch. The C75 CPU supports a single direct connected rack or up to 12 remote racks using external switches.

User Interface Support – The 900 Control Station interface may be connected via Ethernet or serial communications. Up to three interfaces may be connected to a controller for distances up to 328 feet (100Meters) via Ethernet or 2000 feet (609 meters) between the controller and operator interface. 3rd party user Interface support is provided through an isolated RS485 port connection using Modbus/RTU protocol, or Ethernet with Modbus/TCP protocol.

Ethernet Modbus/TCP Communications – ControlEdge HC900 controllers communicate with their host PC interfaces over an Ethernet 10/100Base-T communication network using the Modbus/TCP protocol, an open protocol interface available for most popular HMI software packages. The controllers Ethernet ports are MDIX and configured to auto negotiate and will default to half duplex if host fails to negotiate. The C30 supports up to 5 host connections while the C50/C70/C75 support up to 10 concurrent host connections over an Ethernet network for control supervision and data acquisition. The 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 ControlEdge 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 ControlEdge HC900 controller and up to 32 other ControlEdge HC900 controllers is supported over Ethernet via UDP protocol for safety/process data sharing. Both digital and analog data exchange are supported using peer data exchange function blocks, up to 2240 (max 44 peer writes per modbus device) parameters between peer controllers. For SIL variants the safety peer function blocks can be used for Safety peer communication along with peer data exchange function blocks. 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 isolated RS485 (2 wire) ports of the ControlEdge HC900 Controller CPU assembly in a Modbus Host or Device mode. The protocol of these ports is user selectable between ELN protocol for use with HC Designer software or Serial Modbus to interface with other compatible devices.

Modbus RTU Device - Isolated RS485 ports may be configured for simultaneous operation as a Modbus device port to allow each to communicate with a single Modbus host.

The Modbus protocol supports read and write access to a default address map of certain function blocks and parameters.

In configurations 4.0 and later, a map of customized addresses, blocks and parameters can be created either by editing the default map or from scratch.

In the default map (fixed), a 4000 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 4000 register array provide compatibility with devices such as 3rd party touch panels. In the custom map, all data formats are adjustable.

Modbus RTU Host - Either of the ports may be configured as a Modbus RTU host, one per controller. Up to 32 devices may be multi-dropped on the isolated RS485 port. Function blocks are available in the ControlEdge HC900 controller to allow the user to specify read and write operations to up to 32 external Modbus compatible modus device devices and up to 1024 data points.

Modbus TCP Initiator – The Ethernet ports may be configured as a Modbus TCP initiator. Function blocks are available in the ControlEdge HC900 controller to allow the user to specify read and write operations to compatible modbus device devices for up to 1024 data points.

Profibus – The ControlEdge HC900 can access data from Profibus modbus device devices using a Modbus-to-Profibus gateway device attached to the serial port of the controller. The gateway device is a Profibus Host on the fieldbus network and a Modbus device to the ControlEdge HC900. The Profibus data is connected into the control strategy using Modbus function blocks. This application has been validated with a ProLinx 5104-MCM-PDPM gateway (from ProSoft® Technology).

E-mail Alarms/Events--ControlEdge 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 –Designer software supports communicating with ControlEdge 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 ControlEdge HC900 controller has been configured using 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 ControlEdge HC900 controller may be via an external modem connected to the controller's using an RS485/RS232 converter. 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 Supervisory Software – Honeywell's Windows 10 version is available when PC-based supervisory control and data acquisition is required. Ethernet network interface to an Experion server is via the controller host Ethernet 100 Base-T port using Modbus/TCP protocol. Client Stations over Ethernet allow multiple user access to a ControlEdge HC900 network. Using the large selection of standard operating display templates in Experion saves development time. When further customization is needed, the full graphic display development environment of Experion may be used to fully animate your process supervisory displays.

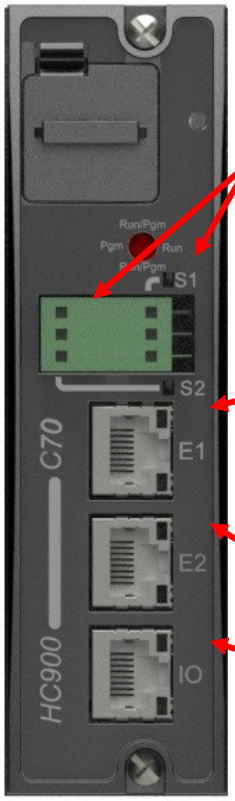
A batch reporting option is offered in Release 500 and 430 which enables batch reports to be created using a standard template. User-entered lot data is supported and up to 50 parameters can be defined for batch logging. The file can be exported in .csv format using a lot number-encoded filename.

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.

ControlEdge 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 10/100Base-T port using Modbus/TCP protocol. A variety of Windows operating environments are supported.

OPC Server – Network communication access to ControlEdge HC900 controllers through third party PC interfaces is simplified with Honeywell's Matrikon OPC server software program. This software supports the Modbus/TCP interface to either redundant or non-redundant ControlEdge HC900 controllers. In redundant applications, Matrikon OPC Server software supports dual Ethernet connections to both C75 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 ControlEdge HC900 via Honeywell's OPC Server for remote supervision, data collection or other supervisory functions.



All Models: Ports S1 & S2 user-selectable type. Configuration port for HC Designer or modem connection. Modbus Host/Device interface to HMI or other serial devices.

All Models: Ethernet 10/100Base-T for host and LAN connection

C70/C75 only: Ethernet 10/100Base-T for dual host and LAN connection.

C50/C70/C75 only: Ethernet 100Base-T for I/O rack connection.

Figure 10 - Communication ports

Capacity

The capacity of the ControlEdge HC900 system is determined by the type of CPU selected, the quantity of I/O racks, the quantity's type of I/O modules, the update rate (scan rate) required, and CPU memory. In most applications, the CPU memory limit has a low probability of limiting capacity.

How many I/O channels?

Number of I/O is limited only by physical space. Namely, the number of racks, the number of modules per rack, and the number of channels in the modules. In general,

Maximum I/O channels = (max. number of I/O racks) x (max. number of modules in each rack) x (max. number of channels per module)

Examples

Maximum C30 I/O = 1 rack x 12 modules x 32 channels per module = 384 I/O channels

Maximum C50, C70, C75 I/O = 12 racks x 12 modules per rack x 32 channels per module = 4608 I/O channels.

Maximum C75 Redundant UIO = 6 Redundant racks (12 racks) x 12 modules per rack x 14 channels per module = 1008 I/O channels.

How many function blocks (loops, programmers, etc.)?

Fixed limits are not imposed on function block types. Your configuration can probably contain as many of each function block as needed. The limit is reached when either

a) Dynamic memory is full or

b) Maximum function block quantity is reached or

c) Configuration memory is full or

d) Over 65,535 block configuration parameters or block inputs used (but not Block Outputs).

These limits are explained below.

a) *Dynamic Memory*

The rule of thumb is: *Max. number of function blocks = Dynamic memory ÷ memory per function block*

The smaller the function block, the more of them can fit in your configuration.

b) Quantity

Memory limitation is not for function blocks. Complex blocks such as PID, Programmer, and Scheduler Sequencer use more memory than simpler blocks like On/Off, Device Control, Auto/Manual Bias. For example, several thousand Auto/Manual Bias blocks would fit in the C30's memory if not for the quantity limit of 400.

Conversely, about 300 Scheduler blocks will consume all the C30's memory despite the higher quantity limit of 400.

Scan Time Consideration

Another consideration when configuring function blocks is scan time and the potential for CPU scan time to become insufficient for the application.

The scan time of a controller increases in fixed increments. As function blocks are added to a configuration, the time needed to execute the total configuration is recalculated. If additional time is needed, the scan time will be increased to the next increment in sequence. (See Specification section for scan time increments)

How many recipes in my pool?

Unlike with function blocks, there is no quantity limit to recipes. The only limiting factor to recipe pool size is available memory. Whatever memory is unused by the rest of your configuration (that is, function blocks) can be allocated for recipes. As long as memory is available, allocate as many recipes as needed.

The rule of thumb is

Max. number of recipes = Recipe memory allocation ÷ memory per recipe

Configuration memory allocation

The configuration memory comprises one allocation for the function block configuration and one allocation for recipes. In general,

Total configuration memory = Configuration + Recipe allocation

Whatever memory has not been allocated to recipes is available for your configuration. By changing the size of the recipe pool allocation, you control the amount of memory available for recipes and therefore configuration. Need a small configuration but many recipes? Allocate more recipe space. Need a large configuration but few recipes? Allocate less recipe space.

Where are usage/capacities presented?

File Properties in Designer displays statistics on usage/availability of:

- Configuration memory (recipes + function block configuration),
- Dynamic memory (function block configuration only)
- Fast scan time,
- Normal scan time,
- Normal CPU% used,
- Fast CPU% used,
- Each component of a configuration (variables, constants, etc.).

Controller Data Storage

The controller may log process data values in the available memory that is not used by the configuration. Up to 250 signal values may be logged in a rotating buffer using three different sample rates with oldest data being replaced with new data after the buffer is full.

Data is extracted from the controller using HC Historian data harvesting software via Ethernet or Serial connection.

Specifications

Features				
	C30/C30S	**C50/C50S**	**C70/C70S**	**C75/C75S**
Controller Design	Modular design with metal rack enclosure, power supply, controller CPU and user selectable I/O module types.			
Rack Mounting and Installation	Surface mounting with 4 screws in the back of the rack. Installation Category II, Pollution Degree 2, IEC 664, UL840 Installation coordination			
Controller I/O support	4, 8, or 12 I/O slots per Rack			None (requires remote I/O racks)
Remote I/O racks	None	1 w/o switch, using Ethernet direct cable. Up to 11 (12 for Redundant) with recommended Honeywell switches (part no. 50008930-001, copper to copper)		
		1 w/o switch, using Ethernet direct cable. Up to 11 (12 for Redundant) with recommended Honeywell switches (Moxa EDS-308 series/EDS-316/EDS-4008-2SSC-LV-T/EDS-4008-2SSC-LV/EDS-4009-3SSC-LV-T, or ORing IES-1080A) for Star topology. **Note**: See "Table 3" for the list of Qualified Ethernet switches.		
		1 w/o switch, using Ethernet direct cable. Up to 11 (12 for Redundant) with recommended Honeywell switches (Moxa EDS-505A/EDS-508A/EDS-4008-2SSC-LV-T/EDS-4008-2SSC-LV/EDS-4009-3SSC-LV-T, or ORing IES-1080A, or RSB20-XX or equivalent, copper to fiber) in Remote IO for Ring topology. **Note**: See "Table 3" for the list of Qualified Ethernet Switches.		
Remote I/O interface type	None	Separate Ethernet 100Base-T port on CPU, RJ-45 connection, and dedicated communications link.		
Remote I/O Distance	None	100 m (328 ft.) – Ethernet cable, controller to remote rack or controller to switch. Up to two switches per connection, 300m (984 ft.), maximum distance. 40km – Single mode fiber optic cable 5km – Multi mode fiber optic cable.		
	Fiber Optics Equipment Recommendations			
	Ethernet Switch	Choose a model which has fiber optic port (single/multi-mode) from the above switch series.		
	Converter	Moxa Media Converter model IMC-101-M-SC/ IMC-101-S-SC with (1) 10/100BaseT(X) to 100BaseFX single/multi-mode fiber port with SC connectors (require 24VDC power)		
	Fiber Cable	Multi-mode, Duplex, 50/125 with SC connectors on both ends Single mode, duplex, 9/125 with SC connector on both ends		
	Copper Ethernet Cable	Shielded Cat5 Ethernet		
I/O Capacity				
Combined Analog and Digital	384	4608		
Analog Inputs	192	2304		

Features				
	C30/C30S	**C50/C50S**	**C70/C70S**	**C75/C75S**
Analog Outputs	40 48 with heat de-rating 192 with external power source	480 576 with heat de-rating 2304 with external power source		

	C30	**C50**	**C70**	**C75**
Rack Size				
4 I/O slot chassis	5.4” (137mm) H” x 10.5” (266.7mm) W x 6.0” * (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 6.0” * (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 6.0” * (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 6.0” * (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 6.0” * (151.7mm) D (rear mounting plate extends height to 6.9” (175.3mm)			
Redundant CPU rack	N/A ** 6.4 (162.6) for 32 DI/DO and 16 AI Modules*			5.4” (137mm) H x 10.3” (261.6mm) W x 6.0” * (151.7mm) D (rear mounting plate extends height to 6.9” (175.3mm)
I/O Wiring				
Type	Removable terminal blocks			
Terminal Block Styles	20 screw: Barrier or Euro-style, tin-plated or gold-plated (for DC connections) 36 screw: Euro style gold plated (Required with certain higher capacity modules)			
Gauge wires	20 screw: Barrier style - #14 to 26 AWG, solid or stranded Euro-style - #14 to 26 AWG, solid or stranded 36-screw: Euro-style - #12 to 26 AWG, solid or stranded			
Shield terminals	Optional brackets mounted top/bottom of rack			
Power (P01)				
Voltage	Universal power, 90 to 264VAC, 47 to 63 Hz			
In Rush Current	40 Amps peak-to-peak for 120 ms at 240VAC			
Input rating	130 VA			
Output rating	60W			
Fuse	Internal non-replaceable fuse. User installed external fuse.			

	C30	C50	C70	C75
Power (P24) Voltage	21 to 29VDC			
In Rush Current	30A for 3ms @29VDC			
Input rating	72.5W			
Output rating	60W			
Fuse	Internal non-replaceable fuse. User installed external fuse.			
Power Supply Hold up time	20milliseconds @115VAC, 60HZ maximum Load			
Normal Scan Time	100ms. Each analog input card has its own A/D converter providing parallel processing.			
Fast Scan Time	25ms for up to~250 fast logic blocks 35ms for up to ~315 fast logic blocks 50ms for up to ~400 fast logic blocks	10ms for up to ~250 fast logic blocks 25ms for up to~500 fast logic blocks 35ms for up to ~780 fast logic blocks 50ms for up to ~1040 fast logic blocks 60ms for up to ~1300 fast logic blocks	10ms for up to ~330 fast logic blocks 25ms for up to~660 fast logic blocks 35ms for up to ~1040 fast logic blocks 50ms for up to ~1380 fast logic blocks 60ms for up to ~1700 fast logic blocks 130ms for up to~3300 fast logic blocks	25ms for up to~500 fast logic blocks 35ms for up to ~780 fast logic blocks 50ms for up to ~1040 fast logic blocks 60ms for up to ~1300 fast logic blocks 130ms for up to~2500 fast logic blocks
System latency - terminal to terminal	Typical 3x scan			
Switchover	0-100ms			
Bumpless Failover	Internal parameters, variables and outputs are maintained during transition.			
Run-Mode Edit Transfer Time	3 normal scan times for all configuration edits not including I/O changes			
Operating Modes	Run (No configuration download in this position). No writes/forces for safety critical configurations. Run/Program (Download allowed) Program (Outputs Off, initialization on download). Offline mode is available via software selection (for AI calibration).			
Maximum user-configurable Function Blocks	400	2000	15000 (5000 for version below 6.6)	
Maximum Control Loops	Quantity based on available memory			
System Blocks (Not user configurable)	100 (not part of configurable blocks), for Alarm Group blocks, System block, Rack Monitor blocks, Communications			
Loop Outputs	Current, time proportional, position proportional, 3-position step (motor positioning), dual output [heat/cool])			

	C30	C50	C70	C75
Control Loop Types	PID A, PID B, Duplex A, Duplex B, Ratio, Cascade, % Carbon, Dewpoint, Relative Humidity, On-Off, Auto/Manual-Bias			
Auto-tuning	Accutune III, fuzzy logic overshoot suppression, applicable to all control loops			
Setpoint 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			
Programmer Events	Assignable to DO or internal status			
Setpoint Profiles	50 segments per profile. Number of stored profiles is user-configurable.			
Setpoint Scheduler	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			
Auxiliary Scheduler Setpoints	Up to 8 setpoints, soak only			
Schedule events	Up to 16, assignable to DO or internal status			
Setpoint Scheduler Schedules	50 segments per schedule. Number of stored schedules is configurable.			
Sequencers	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			
Sequences	Number of stored Sequences is user-configurable			
Recipes (Variables)	Number of stored Recipes (Variables) is user-configurable			
Recipe Parameters	Up to 50 analog or digital Variables — (may include profile numbers)			
Signal Tags (Read only)	Up to 65,535			
Tag Identification	16-character tagname, 16-character descriptor, 6-character units of measure (analog only), 6 character on/off state (digital only). Non-Safety Critical enable.			
Variables (Read/Write)	Up to 6144			
Variable Identification	16-character tagname, 16-character descriptor,6-character units of measure (analog only), 6 character on/off state (digital only)			
Controller Data Storage	• Data types: Signals, Alarms, Events • Storage size: 1.5MB for C30/C50 3MB for C70/C75 • Maximum signals tags: 250 • Maximum points per group: 50 • Selectable storage rates: 3 • Storage rate resolution, 10 sec. to 24hr • Data Access - via HC Historian PC software, manual upload using Ethernet or Serial communications.			

Specifications

Communications				
	C30	**C50**	**C70**	**C75**
Network Communications Ports Number of Ethernet 10/100Base-T connections	1	1	2	2
Ethernet 10/100Base-T, RJ-45 connection	Supports Modbus/TCP Protocol to PC supervisory and data acquisition software packages, OPC server, Modbus/TCP Initiator, Peer to Peer, and Designer configuration software		Supports dual Modbus/TCP ports to PC supervisory and data acquisition software packages, OPC server, Modbus/TCP Initiator (non-redundant), Peer to Peer, and 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).		
	Note: Subnet must be: 255.255.255.0 Note: C70/ C75 IP Addresses must be on different Subnet.			
USB-RS485 Converter	50089787 -501			
RS-485 Ports				
Ports per controller	Two, isolated RS-485 (connector supplied), Honeywell or Modbus RTU protocol.			
Cable type	2-wire plus shield, Belden 9271 or equivalent			
Distance from controller	2000 ft. (600 m.)			
Modbus Device addresses	1 to 247			
Parity (user selectable)	Odd, even, none			
Stop bits (user selectable)	1 or 2			
Speed (user selectable)	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200			
Double Register Format for Modbus RTU Device and Host data (User selectable)	Selectable byte order			
RS-485 Modbus, Device Operation				
Number of ports per controller	Up to two			
Modbus Hosts per port	One			
Principal Function Block Address Range	User selectable starting address range for registers assigned to each principal block type.			

RS-485 Modbus Host Operation	
Number of ports per controller	One (isolated RS485)
Function Block Types	Modbus Device – 4 read and 4 write data points Read (Modbus Device extension block) up to 16 parameters Write (Modbus Device extension) up to 8 parameters (No limit on the number of Read and Write extension blocks per Modbus Device block up to the maximum 1024 parameters per controller.)
Modbus Device devices per controller	Up to 32
Number of read/write Modbus Parameters	Up to 1024 max. per controller
Double Register Format	Selectable per device
Speed	1 second fastest – load dependent
Modbus Host Advanced Application Speed	Recommended for use with gateway devices As fast as 500ms
Ethernet Modbus/TCP Initiator Operation	
Number of ports per controller	One (Models C30 and C50) - Two (Models C70 and C75) isolated RS485
Function Block Types	Modbus Device – 4 read and 4 write data points Read (Modbus Device extension block) up to 16 parameters Write (Modbus Device extension) up to 8 parameters (No limit on the number of Read and Write extension blocks per Modbus Device block up to the maximum 1024 parameters per controller.)
Modbus Device devices per controller	Up to 32
Number of read/write Modbus Parameters	Up to 1024 max. per controller
Double Register Format	Selectable per device
Speed	1 second fastest – load dependent
Peer-to-peer	
10/100Base-T via Network port	Supports UDP protocol and Peer Data Exchange function blocks for peer data exchange. Safety peer data exchange is supported from release 6.300 and above
No. of Peers/Controller	32
Update rate	@Normal cycle for safety peer and 500ms to 5 sec., selectable
Peer Data	Digital and Analog Signal Tags, Variables - up to 2240 (max 44 peer writes per modbus device) parameters
Ethernet	
Ethernet Network Connection	10/100 Base-T, RJ-45
Host Network Protocol	Modbus/TCP
HART	
Protocol Version	5, 6 and 7
Discovery	5 Seconds Discovery Time. Supported device address range is 0 to 15.
HART IP	HART-IP Protocol, Version 7, based on TCP/IP Configurable TCP port number Support single Honeywell Field Device Manager connection.

Maximum distances per Ethernet specifications		
Controller rack to I/O Rack	Ethernet CAT5 cable with RJ-45 connectors Fiber Optic cable with switch	100m /328 ft 40km
Controller 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
Controller 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
Controller to 1042 Operator Interface	Shielded, Twisted pair	610m /2000 ft

Table 3 Qualified Ethernet Switches

Make	Model Number	Features
Moxa	EDS-308	The switches comes with EMC, EMI, and other standards and certifications. For more information, refer to EDS-308/EDS-316/ EDS-505A/EDS-508A Moxa Switch Model datasheet.
Moxa	EDS-316	
Moxa	EDS-505A	
Moxa	EDS-508A	
Moxa	EDS-4008-2SSC-LV-T	These switches are developed according to the IEC 62443-4-1, compliant with the IEC 62443-4-2 industrial cybersecurity standards, EMC, EMI and other standards and certifications. For more information, refer to EDS-4008/EDS-4009 Series MOXA datasheets.
Moxa	EDS-4008-2SSC-LV	
Moxa	EDS-4009-3SSC-LV-T	
ORing	IES-1080A	The switch comes with EMC, EMI, and other regulatory approvals. For more information, refer to IES-1080A ORing Switch Model datasheet.

Approvals	
CE Conformity	This product is in conformity with the protection requirements of the following European Council Directives: **2014/35/EU**, the Low Voltage Directive, and **2014/30/EU**, 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.
ATEX	The apparatus fulfills the requirements for Group II, Category 3 equipment in accordance with Directive 2014/34/EU. Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents: EN IEC 60079-0:2018 EN 60079-7:2015+A1:2018 EN IEC 60079-15:2019
UKCA	Compliance with the Essential Health and Safety Requirements has been assured by compliance with: EN IEC 60079-0:2018 EN 60079-7:2015+A1:2018 EN IEC 60079-15:2019
IECEx	The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

Approvals	
	IEC 60079-0:2017 Edition:7.0 IEC 60079-15:2017 Edition:5.0 IEC 60079-7:2017 Edition:5.1
TUV (SIL2)	ControlEdge HC900 complies with the requirements of the relevant standards and can be used in applications up to SIL2 according to IEC 61508, for low demand applications and high demand applications where the demand rate does not exceed 10 times per year. ControlEdge HC900 is capable of being used in safety applications including (but not limited to) Emergency shutdown (ESD), Burner Management Systems (BMS), Critical process control etc.
ABS PDA Approval	Certificate of Design Assessment - No. 06-HS186538-4-PDA (June 2014.) Certificate of Manufacturing Assessment - No. 06-BA766694-X (York Location) Certificate of Manufacturing Assessment - No. BY1100081X (Pune Location) ControlEdge HC900 control system is NOT to be used for direct propulsion, steering, navigation or safety systems. The controller must be installed in a grounded metal enclosure and must not be used in non-weather protected spaces. Each application is to be approved on a case by case basis.
General Purpose Safety	Compliant with EN61010-1, UL 61010-1, CSA C22.2 No. 1010-1
Hazardous (Classified) Location Safety	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  II 3 G Ex nA IIC T* Gc AMBIENT TEMPERATURE: 0 °C to +60 °C

Module Temperature Classifications	Module Type	"T" Rating	Module Type	"T" Rating
	Redundant CPU Rack (1)	T6	S75 Scanner 2 Port	T4 (1)
	Redundant PS Ext. Rack(1)	T5	Analog Input (8 chan)	T6 (1)
	8 Slot Redundant PS Ext. Rack(1)	T6	Analog Input (16 chan)	T6 (1)
	12 Slot Redundant PS Ext. Rack(1)	T6	Analog Output (4 chan)	T4 (1)
	4 I/O Slot Rack(1)	T6	Analog Output (8 chan)	T4 (1)
			Analog Output (16 chan)	T3C (1)
	8 I/O Slot Rack(1)	T6	Digital Input, Contact type (16 chan)	T5 (1)
	12 I/O Slot Rack(1)	T6	Digital Input, 24 Vdc (16 chan)	T4 (1)
	Power Supply (P01) (1)	T4	Digital Input, 120/240 Vac (8 chan)	T3C(1)@ Ta=60 °C T4 (1)@ Ta=40 °C
	Power Supply (P02) (1)	T4	Digital Input Vdc (32 chan)	T3C@60 °C and T4@40 °C
	Power Supply (P24) (1)	T4	Digital Output, Relay type (8 chan)	T5(1)
	Power Status Module (PSM) (1)	T6	Digital Output, 24 Vdc (16 chan)	T4 (1)
	C30/C50/C70/C75 CPU(1)	T4	Digital Output, 120/240 Vac (8 chan)	T4(1)
	Redundancy Switch Module (RSM) (1)	T6	Digital Output Vdc (32 chan)	T6 (1)
	S50 Scanner 1 Port(1)	T4	Pulse/Frequency/Quadrature (4 chan)	T5

(1) Modules – included in IEC-61508 certification

Specifications

Environmental Conditions				
Ambient Temperature	Reference	Rated	Extreme	Transportation & Storage
°F °C	77+/-5 25+/-3	32 to 140 0 to 60	32 to 140 0 to 60	-40 to 158 -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		
* Applies up to 40°C				

Dimensions

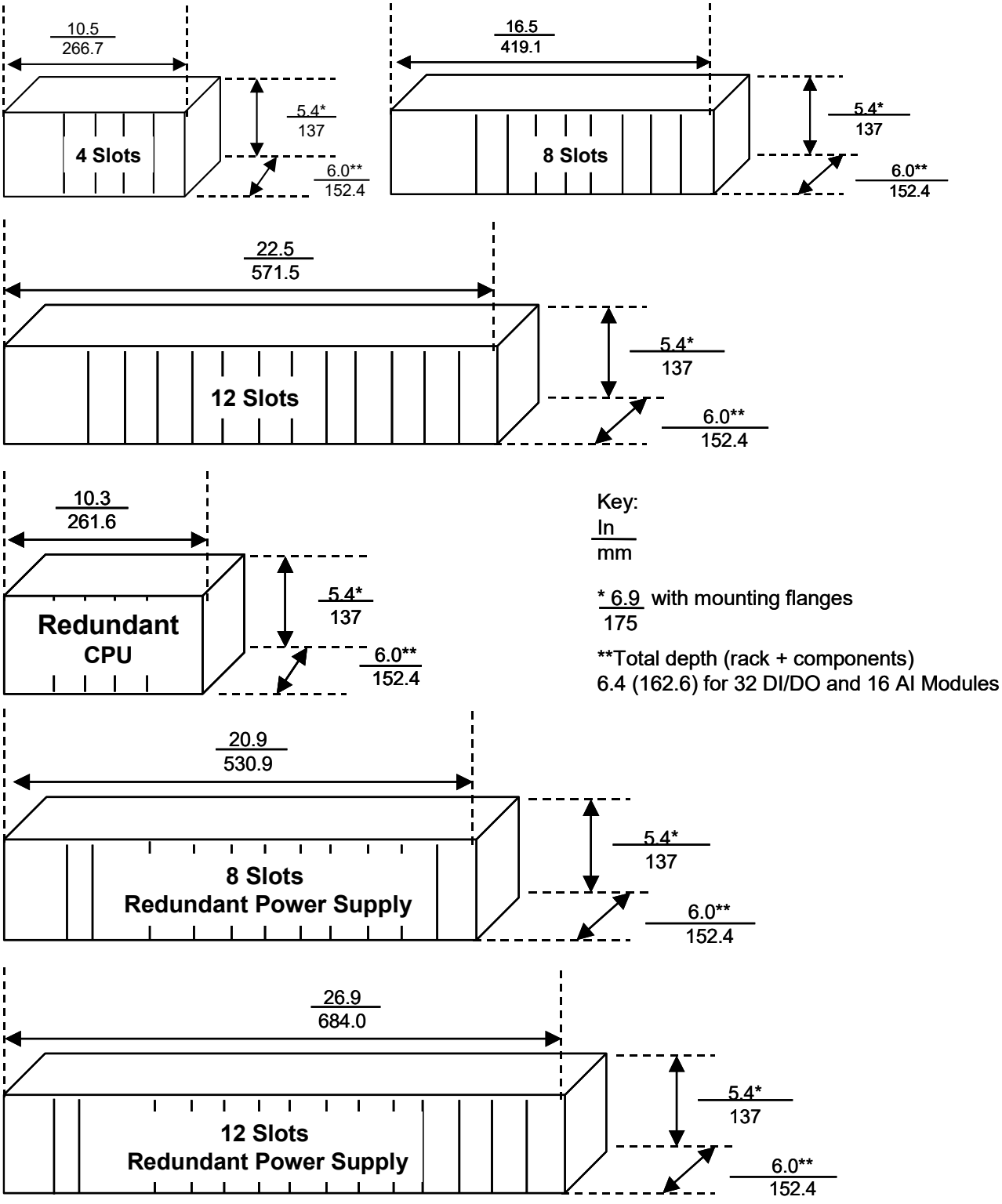


Figure 11 - ControlEdge HC900 Controller Dimensions

Warranty/Remedy

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.

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

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(TAC) hfs-tac-support@honeywell.com

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Honeywell Limited
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Specifications are subject to change without notice.

For more information
To learn more about ControlEdge HC900 Controller,
visit https://process.honeywell.com/
Or contact your Honeywell Account Manager

Process Solutions
Honeywell

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Honeywell House, Skimped Hill Lane
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51-52-03-31
January 2023

Technical Information

Honeywell

ControlEdge HC900 IO Modules Specifications

51-52-03-41, January 2023

Overview

The Honeywell ControlEdge HC900 Controller is an advanced loop and logic controller offering a modular design sized to satisfy the control and data acquisition needs of a wide range of process equipment.

I/O Modules

The following I/O modules are available to create a custom control solution.

- 16 Channel Universal IO Module Galavanically isolated Input/Output to chassis (p.31)
- 8-point universal analog input modules: Galvanic isolation point to chassis inputs may be mixed on a module and may include multiple thermocouple types, RTDs, ohms, voltage or mill voltage types – all easily assigned using the Process Control Designer configuration tool. High point-to-point galvanic isolation simplifies installation and saves the expense of external isolation hardware (p.9).
- 16-point high level analog input module: each point is configurable for V or mA. Galvanically isolated point to chassis. Galvanically isolated point to point (p.13). 250-ohm shunt resistors can be added per channel.
- 4-point galvanically isolated analog output module. Galvanically isolated point to chassis supports from 0 to 20mA each (p.15).
- 8-point analog output, galvanically isolated in 2 groups of 4 points. Galvanically isolated point to chassis. Supports from 0 to 20mA each (p.16).
- 16-point analog output, galvanically isolated in 4 groups of 4 points. Galvanically isolated point to chassis. Supports from 0 to 20mA each (p.17).
- 16-point digital input modules: Contact closure type, DC Voltage, AC Voltage and AC/DC voltage types (p.18). Galvanically isolated in groups of 8 channel to chassis
- 32-point digital input module: DC voltage. Galvanically isolated point to chassis. Galvanically isolated in 2 groups of 16 points (p.2218).
- 8-point AC or 16-point DC digital output modules (sinking type). Galvanically isolated point to chassis. Galvanically isolated in 2 groups of 8 points (p.21).
- 32-point digital output: DC voltage (sourcing type). Galvanically isolated point to chassis. Galvanically isolated in 2 groups of 16 points (p.27).
- 8-point relay output module: four form C type and four form A type relays. Galvanically isolated point to chassis. Galvanically isolated relay to relay (p.23).
- 4 channel Pulse/Frequency/Quadrature I/O module. Galvanically isolated point to chassis (p.28).

Insert and Removal of I/O under Power

For ease of maintenance, the ControlEdge HC900 controller supports removing and inserting I/O modules from the module rack without removing power from the controller. Each module is sensed for validity by the controller and auto-configured on insertion.

Other Modules

In addition to I/O, the following modules are available.

- Scanner 1 module, single port (p.35)
- Scanner 2 Module, dual port (p.36)
- Universal AC Power Supply, 60W (p.7)
- Power Supply 24VDC, 60W (p.7)
- Redundant Switch Module (p.37)
- Power Status Module (p.37)

Failsafe

All ControlEdge 900 Platform I/O modules support a user specified failsafe value (analog) or state (digital) that the module outputs or inputs will assume if communication between the controller and the module is interrupted. Output modules are also disabled if the controller fails to start. Module diagnostics are not initiated if the control strategy does not call for the inputs or outputs on the modules to execute.

Failsafe is restricted to de-energize in safety applications.

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. Four types of RTPs are available: analog inputs, relay outputs, redundant I/O and other I/O modules. Three cable lengths are also available to match hardware to installation variations. Analog inputs RTPs include transmitter shunt resistors and transmitter power terminals with individual circuit fuses. The Relay Output RTP includes a fuse and power disconnect switch for each output. All the three types of RTP panels also switch power to allow module removal and installation under controller power. See page 38.

Terminal Blocks

20-screw Barrier style and Euro style terminal blocks are available for use with all ControlEdge HC900 I/O Modules. Red terminal blocks are used for high voltage connections for added safety while black terminal blocks are used for low voltage connections. A 36-terminal Euro style block is available with the 16 AI, the 8 and 16 AO as well as the 32 DC DI and 32 DC DO module types. See page 31.

Specifications for modules

I/O Module Attributes	
Remove & Insert under power	Standard. Modules are automatically sensed and configured on insertion. Field power shall be disconnected before removing field terminal blocks.
LED Channel State indicators	Via light pipes at front of module, one state LED for each digital I/O point – green indicates ON, logic side
LED Module Status indicator	Via light pipe, one per module, tri-color to represent module status, Green = OK, Red = Fault (# of flashes indicates fault), Amber = Override (Force)
I/O Labels	Color-coded, on module door, removable, with write-on area to label I/O
Processor	Micro-controller per module for parallel processing
Terminal Boards	20 screw: Barrier or Euro style, tin-plated or gold-plated (for DC connections) 36 screw: Euro style gold plated (Required with certain higher capacity modules)
Keying	Hardware keying matches each module to its terminal block with its field wiring.
Environmental and Vibration Specifications	
Mounting Standard 35mm wide DIN Rail	 Provides connection of field wiring to controller I/O within an enclosure only.
Dimensions	4.38” (111.1 mm) x 3.70” (94.0mm) x 2.60” (66.0mm) (L x W x H)
Vibration Amplitude Acceleration Vibration	5Hz to 15.77Hz, 2.03mm (0.08”) amplitude (peak to peak) 15.77 to 250Hz, 1.0-g Sweeping, at rate of .33 octave/min.
Tray material Tray and end caps Flammability	 Polyvinyl Chloride (PVC) UL94-V0
Environmental Temperature Relative Humidity Harsh Environment ** ROHS** ** Except PSU module	 Operating: 0 deg. C (32F) to 60 deg. C (140F) Storage: -40 deg. C (140F) to 70 deg. C (158F) Operating: 10% to 90% Non-condensing Storage: 5% to 95% Non-condensing All the modules including CPU, Scanner, RTP, Backplane, RSM/PSM, and Backplanes have conformal coating that is suitable for operation in G3 level of harsh environment. Power Supply Units (PSU) do not have conformal coating. Entire system is compliant to RoHS 2 directive, except PSU.

Certifications CE	EN61326-1:2013, EN61326-3-1:2008, EN55011:2009/A1,2010, EN61010-1:2010
UL	Certificate: E201698 UL Listed- Process Control Equipment, Electrical UL 61010-1 2nd Edition
ATEX	Certificate: HON 08.0201 II 3 G Ex nA IIC T* Gc EN 60079-0: 2011; EN 60079-15: 2010 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents: EN IEC 60079-0:2018 EN 60079-7:2015+A1:2018 EN IEC 60079-15:2019
UKCA	Compliance with the Essential Health and Safety Requirements has been assured by compliance with: EN IEC 60079-0:2018 EN 60079-7:2015+A1:2018 EN IEC 60079-15:2019
IECEx	The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards: IEC 60079-0:2017 Edition:7.0 IEC 60079-15:2017 Edition:5.0 IEC 60079-7:2017 Edition:5.1
CSA	Certificate: 1367757 Class I, Division 2, Groups A, B, C D; T* CAN/ CSA C22.2 No. 0-M91; CAN/ CSA C22.2 No. 94-M94; CAN/ CSA C22.2 No 1010.1-92; CAN/ CSA C22.2 No 1010.1B-97; CSA C22.2 No. 213-M1987
FM	Certificate: 3011798 Class 1, Div. 2 Groups A, B, C, D; T* FM 3600: 2010; FM 3611: 2004; FM 3810: 2005 * Module Temperature: Classifications T3 to T6
Cables High voltage Low voltage	 Lengths: 1.0, 2.5, 5.0 meters. Cable power is limited to 24 Amps per module at 60C (140 degrees F) and 32 Amps at 54C (129 degrees F). Lengths: 1.0, 2.5, 5.0 meters.
I/O module Compliance	
CE Conformity	This product is in conformity with the protection requirements of the following European Council Directives: **2006/ 95/ EC**, the Low Voltage Directive (evaluated to EN61010-1:2010) **2004/108/EC**, the EMC Directive (evaluated to EN61326-1:2013). Conformity of this product with any other European Council Directive(s) shall not be assumed.
General Purpose Safety	Compliant with EN61010-1, UL61010-1 2nd Edition, CSA C22.2 No. 1010-1
Hazardous (Classified) Location Safety	FM Class 1, Div. 2, Groups A, B, C, D Class 1, Zone 2, IIC

Module Type	Temperature Classification
Controller (C30, C50, C70, C75)	T4
Safety Module Controller (C30S, C50S, C70S and C75S)	T4
Power Supply (P01, P24)	T4

Power Status (PSM))	T6
Scanner (1 or 2 Port)	T4
Safety Scanner (1 or 2 Port)	T4
Redundant Switch (RSM)	T6
Analog Input (Universal 8 channel)	T6
Analog Input (High Level 16 channel)	T6
Analog Output (4 Channel)	T4
Analog Output (8 channel)	T4
Analog Output (16 channel)	T3C
Digital Input, Contact type (16 Channel)	T5
Digital Input, 24 Vdc (16 channel)	T4
Digital Input, 120/240 Vac (16 channel)	T3C@ Ta = 60 deg. C T4 @ Ta = 40 deg. C
Digital Input, 120/240 Vac (16 channel 125 Vdc)	T3C@ Ta = 60 deg. C T4 @ Ta = 40 deg. C
Digital Input Vdc (32 channel)	T3C@ Ta = 60 deg. C T4 @ Ta = 40 deg. C
Digital Output, Relay type (8 channel)	T5
Digital Output, 24 Vdc, (16 channel)	T4
Digital Output, 120/240 Vac (8 channel)	T4
Digital Output Vdc (32 channel)	T6
Pulse/Frequency/Quadrature (4 channel)	T5
Universal IO Module (900U02)	T4

Dimensions and Weight

Item	Module Number	Dimension	Weight
4 I/O slot Rack[1,2]	900R04-0300	137mm H* x 266.7mm W x 151.7mm D 5.4” H* x 10.5” W x 6.0” D	2104g
8 I/O slot Rack[1,2]	900R08-0300	137mm H* x 419.1mm W x 151.7mm D 5.4” H* x 16.5” W x 6.0” D	3126g
8 I/O slot Rack with redundant power support[1,2]	900R08R-0300	137mm H* x 530.9mm W x 151.7mm D 5.4” H* x 20.9” W x 6.0” D	4422g
12 I/O slot Rack[1,2]	900R12-0300	137mm H* x 571.5mm W x 151.7mm D 5.4” H* x 22.5” W x 6.0” D	4072g
12 I/O slot Rack with redundant power support[1,2]	900R12R-0300	137mm H* x 683.3mm W x 151.7mm D 5.4” H* x 26.9” W x 6.0” D	5252g
Redundant CPM Rack[1,2]	900RR0-0300	137mm H* x 261.6mm W x 151.7mm D 5.4” H* x 10.3” W x 6.0” D	1751g
CPU, ControlEdge 900	900C30-0460/ 900C30S-0460	137mm H x 38.1mm W 5.4" H* x 1.5" W	350g
	900C50-0460/ 900C50S-0460	137mm H x 38.1mm W 5.4" H* x 1.5" W	360g

	900C70-0460/ 900C75-0560/ 900C70S-0460/ 900C75S-0560	137mm H x 38.1mm W 5.4" H* x 1.5" W	400g
Scanner, ControlEdge 900	900S50-0460/ 900S50S-0460	137mm H x 38.1mm W 5.4" H* x 1.5" W	360g
	900S75-0460/ 900S75S-0460	137mm H x 38.1mm W 5.4" H* x 1.5" W	400g
SIL UIO	900U02-0100	134mm H x 33.1mm W 5.3” H* x 1.3” W	260g
Universal AI -RTD, TC, V, 8 Ch	900A01-0202	137mm H x 35.6mm W 5.4” H* x 1.4” W	210g
Analog Input hi level, 16 Ch	900A16-0103	137mm H x 35.6mm W 5.4” H* x 1.4” W	397g
Analog Output, 0 to 20mA, 4 Ch	900B01-0301	137mm H x 35.6mm W 5.4” H* x 1.4” W	408g
Analog Outputs 0 to 20mA, 8 Ch	900B08-0202	137mm H x 35.6mm W 5.4” H* x 1.4” W	400g
Digital Input 120/240 VAC, 16 Ch	900G03-0202	137mm H x 35.6mm W 5.4” H* x 1.4” W	210g
Digital Input 24VDC, 32 Ch	900G32-0301	137mm H x 35.6mm W 5.4” H* x 1.4” W	175g
Digital Input, Contact type, 16 Ch	900G01-0202	137mm H x 35.6mm W 5.4” H* x 1.4” W	354g
Digital Input, 120/240 VAC-125VDC, 16 Ch	900G04-0101	137mm H x 35.6mm W 5.4” H* x 1.4” W	400g
Digital Output - 120/240 VAC, 8 Ch	900H03-0202	137mm H x 35.6mm W 5.4” H* x 1.4” W	230g
Digital Output – 24VDC, 32 Ch	900H32-0302	137mm H x 35.6mm W 5.4” H* x 1.4” W	180g
Digital Output, Relays, 8 Ch	900H01-0202	137mm H x 35.6mm W 5.4” H* x 1.4” W	425g
Pulse/Freq, (4chan)	900K01-0201	137mm H x 35.6mm W 5.4” H* x 1.4" W	360g
Power Supply 120/240VAC, 60W	900P01-0501	137mm H x 72.6mm W 5.4” H* x 2.86” W	820g
Power Supply 24VDC, 60W	900P24-0501	137mm H x 72.6mm W 5.4” H* x 2.86” W	792g
SIL - Power Supply 120/240VAC, 60W	900P01-0601	137mm H x 72.6mm W 5.4” H* x 2.86” W	650g
SIL - Power Supply 24VDC, 60W	900P24-0601	137mm H x 72.6mm W 5.4” H* x 2.86” W	650g
Power Status Module, Redundant	900PSM-0200	137mm H x 35.6mm W 5.4” H* x 1.4” W	448g
MOXA Network Switch (8 ports)	50008930-001	135mm H x 53.6mm W x 105mm D 5.31” H* x 2.11” W x 4.13” D	790g
MOXA: Network switch, 16 Port Multi-mode	50008930-002	135mm H x 80.1mm W x 105mm D 5.31” H* x 3.15” W x 4.13” D	1140g
MOXA: IMC-101-M-SC Fiber Optic convertor	50135395-001	135mm H x 53.6mm W x 105mm D 5.31” H* x 2.11” W x 4.13” D	630g
MOXA Network Switch (8 ports), Single mode	50008930-004	135mm H x 53.6mm W x 105mm D 5.31” H* x 2.11” W x 4.13” D	790g
MOXA: Network switch, 16 Port Single mode	50008930-003	135mm H x 80.1mm W x 105mm D 5.31” H* x 3.15” W x 4.13” D	1140g
MOXA: IMC-101-S-SC Fiber Optic convertor, Single mode	50135395-002	135mm H x 53.6mm W x 105mm D 5.31” H* x 2.11” W x 4.13” D	630g
Ethernet Switching Hub, 16 ports, Multi-Mode, G3	50008930-008	135mm H x 53.6mm W x 105mm D 5.31” H* x 2.11” W x 4.13” D	1140g
Ethernet to Multi-Mode Fiber Converter, G3	50135395-003	135mm H x 53.6mm W x 105mm D 5.31” H* x 2.11” W x 4.13” D	630g

Note:

1. Surface mounting with 4 screws in back of rack. Installation Category II, Pollution Degree 2, IEC 60664, UL840 Installation coordination.
2. Rear mounting plate extends height to 6.9” (175.3mm).

Power Supply

P01 Power Supply (900P01-xxxx)

The P01 power supply provides 5VDC and 24VDC to satisfy the power requirements of a rack with a controller and local I/O, a rack with a scanner, and remote I/O. The 60-watt capacity allows for almost any mix of I/O modules in one rack. See Module Specifications starting on page 6. A tool-secured door covers the high voltage connections; test jacks behind the door allow for quick verification of proper operation. An internal non-replaceable fuse limits supply current under certain fault conditions.

P24 Power Supply (900P24-xxxx)

The P24 power supply provides 5VDC and 24VDC to satisfy the power requirements of a rack with a controller and local I/O, a rack with a scanner and remote I/O or a redundant controller rack. The 60-watt capacity requires minimal de-rating of the available ControlEdge HC900 I/O modules. A tool-secured door covers the voltage connections. An internal non-replaceable fuse limits supply current under certain fault conditions.

	P01 Power Supply (900P01- xxxx)	**P24 Power Supply (900P24-xxxx)**
Wiring	Screw type terminals, Wire gauge #12-22 AWG	Screw type terminals, Wire gauge #12-22 AWG
Operating Voltage	Universal Power, 90-264VAC, 47-63 Hz	21-29VDC
Input Rating	130VA	72.5W
Output Rating	60W	60W
In Rush Current	7 Amps peak-to-peak for 150 ms at 240 VAC	In-rush current: 30A for 3ms @29VDC
Fuse	Internal, non-replaceable	Internal, non-replaceable
Test jacks	5 volt, 24 Volt	None
Hold up time	20milliseconds @ 115VAC, 60HZ maximum Load	

See next section for how to choose an AC power supply.

How to choose an AC Power Supply

Module	ControlEdge HC900 Hardware Power (Watts)	Field Power (Watts)	Total Power (Watts)
Controller C30 and C30S	6.0	0.0	6.0
Controller C50 and C50S	6.0	0.0	6.0
Controller C70 and C70S	7.1	0.0	7.1
Controller C75 and C75S	7.8	0.0	7.8
Redundancy switch module (RSM)	0.1	0.0	0.1
Power Status Module (PSM)	0.1	0.0	0.1
Scanner 1 Port (S50/S50S)	3.9	0.0	3.9
Scanner 2 Port (S75/S75S)	5.0	0.0	5.0
Analog Input (Universal)	0.8	0.0	0.8
Analog Input (High level)	1.6	0.0	1.6
Analog Output (4 points)*	5.1	0.0	5.1
Analog Output (8 pts. internal 24V)***	9.4	0.0	9.4
Analog Output (8 pts. external 24V)***	1.1	8.3	9.4
Analog Output (16 pts. internal 24V)***	18.3	0.0	18.3
Analog Output (16 pts. external 24V)***	1.7	16.6	18.3
Contact Input	1.6	0.0	1.6
Relay Output	3.0	0.0	3.0
16 pt DC In (@ 24V)	0.7	2.6	3.3
16 pt DC In (@ 32V)	0.7	5.1	5.7
32 pt DC In (@ 24V)	1.1	3.1	4.2
32 pt DC In (@ 32V)	1.1	5.1	6.2
16 pt DC Out	1.7	1.2	2.9
32 pt DC Out	1.2	1.8	3.0
AC In (@120V)	0.7	1.9	2.6
AC In (@240V)	0.7	7.7	8.3
AC/DC In	0.7	7.7	8.3
AC Out	1.1	12.0	13.1
PFQ**	6.7	0.1	6.8
Universal IO (16 Pts)	2.45	4.5	6.95

*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.

Analog Input Module (900A01-xxxx)

The Universal Analog Input module supports up to 8 user-configurable inputs on a per point basis for thermocouple, RTD, Resistance, V, mV, mA or slidewire. Point-to-point isolation and back-plane isolation are provided. Modules perform analog to digital conversion in synchronization with CPU control execution, eliminating data interchange latency. All analog input modules are processed in parallel, eliminating scan time increases as modules are added.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED when input channels are forced and a red status LED when module diagnostics exist. A user-selectable failsafe value is supported on a per channel basis. A warning signal is provided for thermocouple inputs to indicate maintenance is needed prior to a sensor failure. A sensor failure signal is also provided.

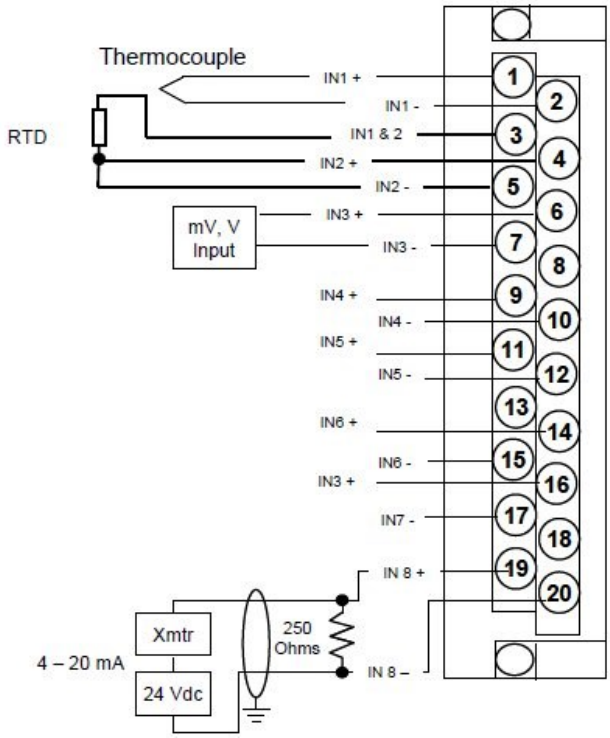


Table 1 - Analog Input Specifications	
Inputs per module	8 (isolated)
Input types	mV, V, T/C, RTD, ohms, mA, slidewire assigned to any channel
Signal Source	See Table 2 on page **Error! Bookmark not defined.** for range types. Thermocouple with cold junction compensation RTD, PT100 3 wire, 40 ohms balanced maximum Thermocouples: 100 Ohms/Leg 100 (except Low), 500 & 1000 RTD: 100 Ohms/Leg 100 YIS: 100 Ohms/Leg 100-Low RTD & 10 ohm Cu: 10 Ohms/Leg Slidewire 100 to 6,500 Ohms: 10% of total res./leg
Input Impedance	10 megohms for T/C and mV inputs; >1 megohm for volts and 250 ohms for mA inputs
Galvanic Input Isolation	400 VDC point to point, 1K VDC to logic RTDs are isolated in pairs (I_{RTD} is common to two inputs).

Table 1 - Analog Input Specifications	
Noise Rejection	Series Mode >60dB. Common Mode >130dB at 120VAC.
Burnout	T/C, mV, V (except for ranges below) configurable to upscale, downscale, defined value, or none. *Volt:* –500 mV to 500 mV; –1 V to 1 V; –2 V to 2 V; –5 V to 5 V; 0 V to 10 V; –10 V to 10 V; inherent to zero volt *RTD:* Inherent upscale *mA:* Inherent downscale
Over-range limit	+/- 10% for linear ranges (volts). +/-1% for non-linear ranges (T/C, RTD).
T/C Break Detection	Via current pulse
Faulty thermocouple detection	If greater than 100 ohms, a warning status is provided as an output for the AI block
Accuracy	Factory configured accuracy = ± 0.1 % of range (± 0.2 % of range for 0V to 10V and -10V to 10V) Cold junction accuracy = ± 0.7 °C Field calibration accuracy = ± 0.05 % of range *Reference conditions:* Temperature = 25 °C ± 3 °C (77 °F ± 5 °F) Humidity = 45 % to 55 % RH non-condensing Line voltage = Nominal ± 1 % Source resistance = 0 ohm Series mode and common mode = 0 V Frequency = Nominal ± 1 % **Note**: In the case of temperature sensing using a thermocouple, forced heating or cooling on the module affects the temperature of the terminal block surface and the air around it, this change in temperature further impacts the factory configured accuracy. User is recommended not to expose the module to the forced airflow.
Temp. Effect on Accuracy	± 0.01% of full scale per degree Celsius maximum
A/D Converter	One per module
A/D Resolution	15 Bits
Reference Junction Sensing	Via 2 RTDs at top/bottom of module
Update rate	500ms (Analog to Digital Converter per module)
Long term Stability	0.1% per year
Calibration	Data is stored in non-volatile memory Redundant Factory Calibration Individual Channel Field Calibration
Diagnostics	Monitoring of Factory Calibration, Field Calibration, 24 VDC supply, and configuration.
Channel Configuration Data	Stored in non-volatile memory
Power supply loading	5V; 40mA max 24V; 25mA max

Table 2 – Analog Input Reference Accuracy				
Input Type	**Range**		**Reference Accuracy**	
Thermocouple inputs	**°F**	**°C**	**°F**	**°C**
B T/C	0 to 105	-18 to 41	NA	NA
	105 to 150	41 to 66	55.0	30.6
	150 to 500	66 to 260	30.0	16.7
	500 to 1000	260 to 538	8.0	4.5
	1000 to 3300	538 to 1815	4.0	2.3
E T/C	-454 to -202	-270 to -130	25.0	14.0
	-202 to 1832	-130 to 1000	2.3	1.3
E (low) T/C	-200 to 1100	-129 to 593	2.0	1.2
J T/C	0 to 1600	-18 to 871	1.2	0.6
J (low) T/C	20 to 770	-7 to 410	1.0	0.5
J T/C	-292 to 32	-180 to 0	1.0	0.5
K T/C	0 to 2400	-18 to 1316	2.0	1.2
K (low) T/C	-20 to 1000	-29 to 538	1.6	0.8
K T/C (mid)**	0 to 1800	-18 to 982	1.8	1.0
K T/C	32 to 2192	0 to 1200	2.0	1.2
Ni-NiMo (NNM68)	32 to 500	0 to 260	2.0	1.2
	500 to 2500	260 to 1371	1.5	0.8
Ni-NiMo (low)	32 to 1260	0 to 682	1.3	0.7
NiMo-NiCo (NM90)	32 to 500	0 to 260	2.0	1.2
	500 to 2500	260 to 1371	1.5	0.7
NiMo-NiCo (low)	32 to 1260	0 to 682	1.3	0.7
N T/C	0 to 2372	-18 to 1300	2.0	1.2
N T/C	0 to 1472	-18 to 800	1.4	0.9
N T/C	32 to 2192	0 to 1200	2.0	1.2
R T/C	0 to 500	-18 to 260	5.0	2.8
	500 to 3100	260 to 1704	2.2	1.2
S T/C	0 to 500	-18 to 260	4.5	2.5
	500 to 3100	260 to 1704	2.2	1.2
T T/C	-300 to 700	-184 to 371	4.0	2.3
	-100 to 700	-73 to 371	2.0	1.2
T (low) T/C	-200 to 500	-129 to 260	1.0	0.5
W_ W_{26}	-4 to 600	-20 to 2320	27.0	15.0
	600 to 3600	316 to 1982	4.0	2.3
	3600 to 4200	1982 to 2316	4.2	2.4
W_5 W_{26} T/C *	0 to 600	-18 to 316	3.5	2.0
	600 to 3600	316 to 1982	3.0	1.7
	3600 to 4200	1982 to 2316	3.5	2.0
W_5 W_{26} (low) T/C*	0 to 2240	-18 to 1227	2.5	1.4

*W_5W_{26} is also known as type “C” Thermocouple.

** Type K thermocouple (mid-range) has a working range from 75 to 1800 °F, 25 to 982 °C. Input measurements below 75°F or 25°C may cause the input to default to the programmed failsafe value. Use type K low or full ranges if measurements are required outside the mid- working range.

RTD	°F	°C	°F	°C
Platinel	-94 to 1382	-70 to 750	3.0	1.7
Platinel (low)	32 to 2516	0 to 1380	1.5	0.8
100 Pt. (high) RTD***	–300 to 1500	–184 to 816	1.8	1.0
100 Pt. (mid) RTD***	-300 to 1200	-184 to 649	1.4	0.8
100 Pt. (low) RTD***	-300 to 600	-184 to 316	0.9	0.5
500 Pt. RTD***	-300 to 1200	-184 to 649	0.9	0.5
1000 Pt RTD*****	-40 to 500	-40 to 260	0.8	0.4
100 JIS	-328 to 932	-200 to 500	1.3	0.7
100 JIS (low)	0 to 212	-18 to 100	0.5	0.3
Cu10	-4 to 482	-20 to 250	2.0	1.0
YSI405	50 to 100	10 to 37.8	0.05	0.03

Input Type	Range	Reference Accuracy
Ohms, 200	0 to 200	+/- 0.4 ohms
Ohms, 500	0 to 500	+/- 1.0 ohms
Ohms, 1000	0 to 1000	+/- 2.0 ohms
Ohms, 2000	0 to 2000	+/- 4.0 ohms
Ohms, 4000	0 to 4000	+/- 8.0 ohms
Milliamperes	4 to 20 mAdc	± 0.2% F.S. (mA)****
	0 to 20 mAdc	± 0.2% F.S. (mA)****
Millivolts	0 to 10 mVDC	± 0.17% F.S. (mV)
	0 to 50 mVDC	± 0.1% F.S. (mV)
	0 to 100 mVDC	± 0.1% F.S. (mV)
	-10 to 10 mVDC	± 0.2% F.S. (mV)
	-50 to 50 mVDC	± 0.1% F.S. (mV)
	-100 to 100 mVDC	± 0.1% F.S. (mV)
	-500 to 500 mVDC	± 0.1% F.S. (mV)
Volts	1 to 5 VDC	± 0.1% F.S. (mV)
	0 to 1 VDC	± 0.1% F.S. (mV)
	0 to 2 VDC	± 0.1% F.S. (mV)
	0 to 5 VDC	± 0.1% F.S. (mV)
	0 to 10 VDC	± 0.2% F.S. (mV)
	-1 to 1 VDC	± 0.1% F.S. (mV)
	-2 to 2 VDC	± 0.1% F.S. (mV)
	-5 to 5 VDC	± 0.1% F.S. (mV)
	-10 to 10 VDC	± 0.2% F.S. (mV)
Slidewire	≤ 250 ohms	
	250 to 1250 ohms	
	1250 to 4000 ohms	
	4000 to 6500 ohms	
Carbon	0 to 1250 mVDC	± 0.1% F.S. (mV)
Oxygen	-30 to 510 mVDC	± 0.1% F.S. (mV)

*** Conforms to IEC751, DIN 0.00385 Ohm/ Ohm/ DegC

****Tolerances for these input types include that of the external Dropping Resistors.

***** DIN 0.00375 Ohm/Ohm/ DegC

Calibration standards are based on ITS-90; except Ni-NiMo is based on IPTS-68.

High Level Analog Input Module (900A16-xxxx)

The High-Level Analog Input module supports up to 16 user-configurable inputs on a per point basis for Voltage or current. Point-to-point isolation and back-plane isolation are provided. Modules perform analog to digital conversion in synchronization with CPU control execution, eliminating data interchange latency. All analog input modules are processed in parallel, eliminating scan time increases as modules are added.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED when input channels are forced and a red status LED when module diagnostics exist. A user-selectable failsafe value is supported on a per channel basis.

The module supports field calibration. Each of the inputs has its own integrated 250-ohm shunt resistor which is activated through DIP switches.

Requires Euro style 36-terminal terminal block.

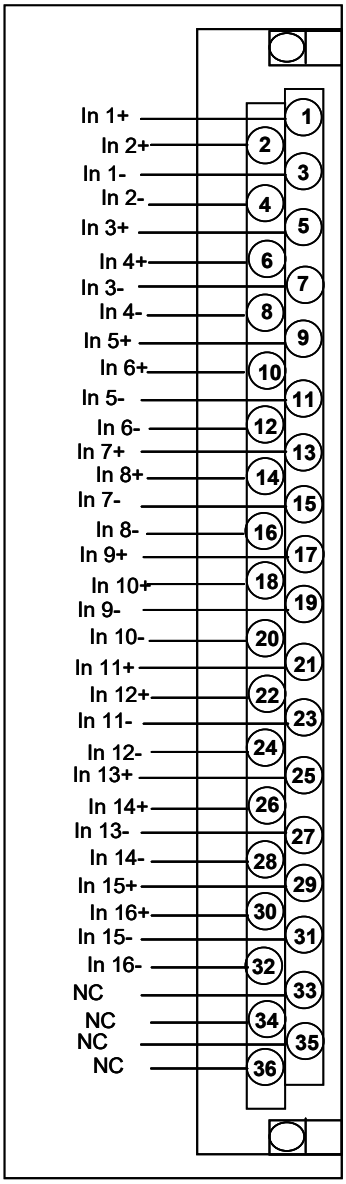


Table 3 – High Level Analog Input Specifications	
Inputs per module	16 (isolated)
Input types	V, mA
Signal Source	See **Table 4** on next page for range types.
Input Impedance	>1 megohm for volts and 250 ohms for mA inputs
Galvanic Input Isolation	400 VDC point to point, solid state switching; 1K VDC to logic.
Noise Rejection	Series Mode >31dB Common Mode >90dB at 120VAC
Over-range limit	+/- 10% for linear ranges (volts).

Table 3 – High Level Analog Input Specifications	
Accuracy	Factory configured accuracy = ± 0.1 % of range. Field calibration accuracy = ± 0.05 % of range *Reference conditions* Temperature = 25 °C ± 3 °C (77 °F ± 5 °F) Humidity = 45 % to 55 % RH non-condensing Line voltage = Nominal ± 1 % Source resistance = 0 ohm Series mode and common mode = 0 V Frequency = Nominal ± 1 %
Temp. Effect on Accuracy	±0.01% of full scale per degree Celsius maximum
A/D Converter	One per module
A/D Resolution	±15 Bits
Update rate	100ms (Analog to Digital Converter per module)
Long term Stability	0.1% per year
Calibration	Data is stored in non-volatile memory Redundant Factory Calibration Individual Channel Field Calibration
Diagnostics	Monitoring of Factory Calibration, Field Calibration, 24 VDC supply, and configuration.
Channel Configuration Data	Stored in non-volatile memory.
Power supply loading	5V ; 75mA max 24V ; 50mA max

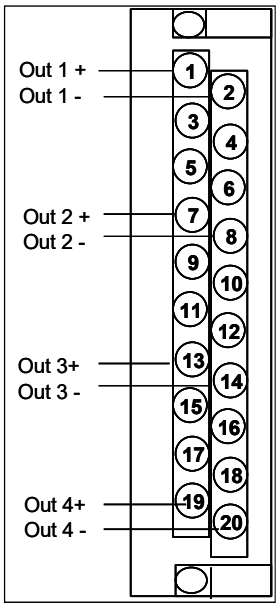
Table 4 - High Level Analog Input Reference Accuracy		
Input Type	**Range**	**Reference Accuracy**
Milliamperes	4 to 20 mAdc	± 0.15% F.S. (mA)**
	0 to 20 mAdc	± 0.15% F.S. (mA)**
**Tolerances for these input types include that of the internal Dropping Resistors.		
Volts	0 to 1VDC	± 0.1% F.S. (mV)
	0 to 2 VDC	± 0.1% F.S. (mV)
	0 to 5 VDC	± 0.1% F.S. (mV)
	0 to 10 VDC	± 0.1% F.S. (mV)
	1 to 5 VDC	± 0.1% F.S. (mV)
	-1 to 1 VDC	± 0.1% F.S. (mV)
	-2 to 2 VDC	± 0.1% F.S. (mV)
	-5 to 5 VDC	± 0.1% F.S. (mV)
	-10 to 10 VDC	± 0.1% F.S. (mV)

Analog Output Module (900B01-xxxx)

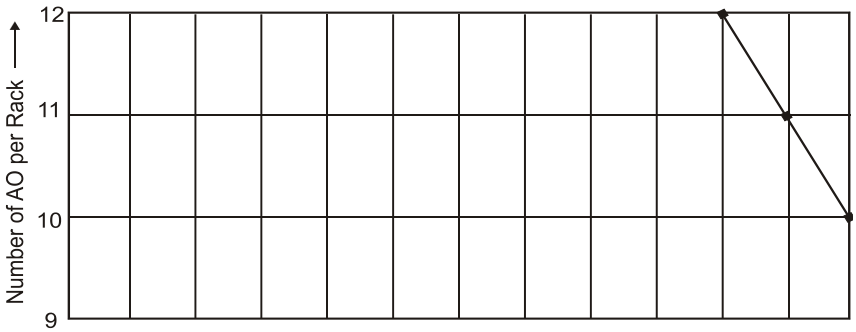
The Analog Output module provides 4 isolated 0 to 21.8 mA outputs that may be scaled by the user to any span within this range on a per output basis.

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostics exist. A user specified failsafe value is supported to allow predictable operation in the event communication between the module and the controller is interrupted.

Outputs are updated synchronous with control execution. A user specified rate of change limit may be applied to each output when needed.



Outputs per module	4 (isolated)
Current	0 to 21.8 mA, range selectable
Load resistance	750 ohms max
Galvanic Isolation	500VDC Channel to Channel.
Galvanic Isolation from logic	600 VDC
Accuracy	0.1% full scale at reference conditions
Modules per rack	10 max, up to 12 with product ambient temperature de-rating (see figure below)
Minimum current sensing	> 3.5 mA per output
Calibration Data	Data is stored in non-volatile memory. Redundant Factory Calibration, with automatic rejection of Bad version. Individual Channel Field Calibration
Diagnostics	Monitoring of Factory Calibration, Field Calibration, Configuration, and +24 VDC power supply.
Output Verification	Feedback to controller that indicates output current flowing.
D/A Resolution	12 bits
Power Supply Loading	5V ; 40mA max 24V ; 200mA max



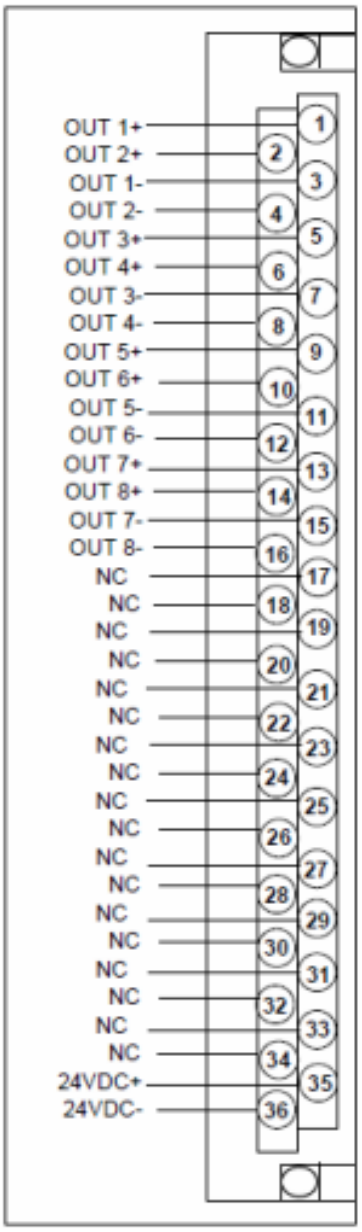
P01 Power Supply De-rating for AO Modules

Analog Output Module (900B08-xxxx)

The Analog Output module provides eight 0 to 21.0 mA outputs that may be scaled by the user to any span within this range on a per output basis. Outputs are isolated in groups of 4 with no isolation between outputs in a group. All points are isolated from controller logic.

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostics exist. A user specified failsafe value is supported to allow predictable operation in the event communication between the module and the controller is interrupted.

Outputs are updated synchronous with control execution. A user-specified rate of change limit may be applied to each output when needed. Requires Euro style 36-terminal terminal block.



Outputs per module	8, isolated in 2 groups of 4 outputs (1-4, 5-8)
Current	0 to 21.0 mA, range selectable
Load resistance	750 ohms max
Galvanic Isolation	500VDC group to group. Groups 1-4, 5-8
Galvanic Isolation from logic	500 VDC
Accuracy	0.1% full scale at reference conditions
Modules per rack	4 max when powered from internal 24V backplane power
Minimum current sensing	>0.5mA per output
Calibration Data	Data is stored in non-volatile memory. Redundant Factory Calibration, with automatic rejection of Bad version. Individual Channel Field Calibration
Diagnostics	Monitoring of Factory Calibration, Field Calibration, Configuration
Output Verification	Feedback to controller to indicate output current is flowing.
D/A Resolution	13+ bits (1 part in 13332)
Power Supply Loading	5V ; 225 mA max 24V ; 350 mA max
Terminal Block	36 Position – Euro style, (Model 900TCK-0001)

A DIP switch on the module selects the use of 24V from Rack PS (internal) power or external loop power via a separate 24V DC power source. The as-shipped (default) switch setting is external power.

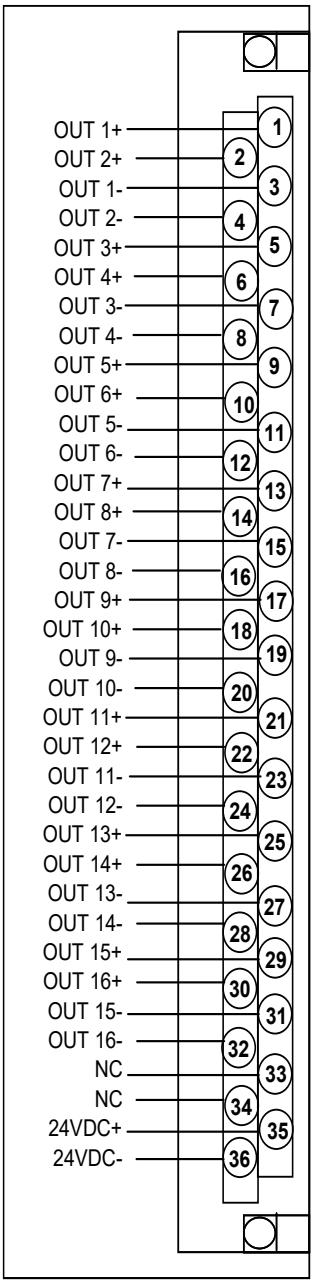
External Power Source requirements:

Voltage	Vin: 18 to 36 Vdc
Current	350 mA per module

Analog Output Module (900B16-xxxx)

The Analog Output module provides 16, 0 to 21.0 mA outputs that may be scaled by the user to any span within this range on a per output basis. Outputs are isolated in groups of 4 with no isolation between outputs in a group. All points are isolated from controller logic.

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostic exist. A user specified failsafe value is supported to allow predictable operation in the event communication between the module and the controller is interrupted.
Outputs are updated synchronous with control execution.
A user-specified rate of change limit may be applied to each output when needed. Requires Euro style 36-terminal terminal block.



Outputs per module	16, isolated in 4 groups of 4 outputs (1-4, 5-8, 9-12, 13-16)
Current	0 to 21.0 mA, range selectable
Load resistance	750 ohms max
Galvanic Isolation	500VDC group to group. Groups 1-4, 5-8, 9-12, 13-16.
Galvanic Isolation from logic	500 VDC
Accuracy	0.1% full scale at reference conditions
Modules per rack	2 max when powered from internal 24V backplane power.
Minimum current sensing	> 0.5mA per output
Calibration Data	Data is stored in non-volatile memory. Redundant Factory Calibration, with automatic rejection of Bad version. Individual Channel Field Calibration
Diagnostics	Monitoring of Factory Calibration, Field Calibration, and Configuration.
Output Verification	Feedback to controller to indicate output current is flowing.
D/A Resolution	13+ bits (1 part in 13332)
Power Supply Loading	5V ; 350 mA max 24V ; 700 mA max
Terminal Block	36 Position – Euro style, (Model 900TCK-0001)

A DIP switch on the module selects the use of 24V from rack PS (internal) power or external loop power via a separate 24V DC power source. The as-shipped (default) switch setting is external power.

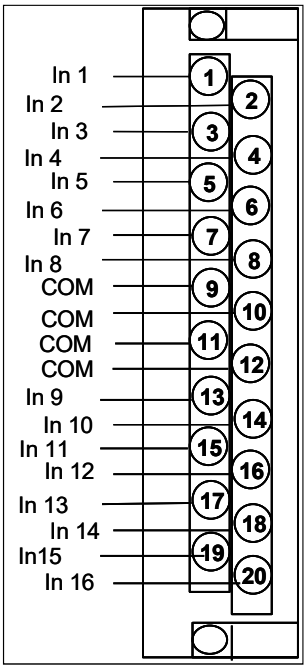
External Power Source requirements:

Voltage	18 to 36 Vdc
Current	700 mA per module

Digital Input Module – Contact Closure Type (900G01- xxxx)

The Contact Closure Digital Input Module is self-powered, providing 15VDC to external switching hardware to close the input loop. A closed external circuit causes current flow to the input to establish an ON state. Logic in the controller allows this state to be inverted when necessary. Four common terminals are provided to simplify field wiring.

There is a green LED state indicator for each channel to indicate when a digital input is ON. A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

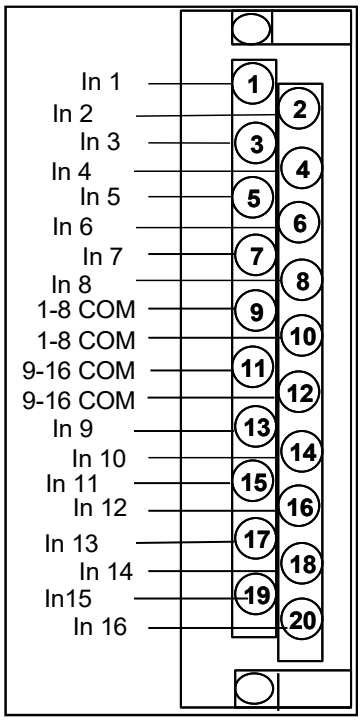


Inputs per module	16 (single-ended)
Voltage Supplied by controller	15 VDC nominal
Maximum contact resistance	1000 ohms
Galvanic Isolation	Isolation - Between Field wiring (input or output) and Module (Microcontroller or Backplane).
OFF to ON response time*	4 ms max
ON to OFF response time*	6 ms max
Switching current	2.6 mA nominal
Power supply loading	5V ; 130 mA max 24V ; 40 mA max

*excluding controllers scan time and excluding transmission time from module to backplane

Digital Input Module - DC Voltage type (900G02-xxxx)

The DC Digital Input module provides two groups of 8 inputs, each with a pair of terminals for connection to common. DC power applied between the common terminal and an input cause the input to turn ON. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON. A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Logic in the controller allows the state to be inverted when necessary.



Inputs per module	16 (sinking)
Input Voltage Range	10 VDC to 32 VDC
Peak Voltage	32 VDC
AC Frequency	N/A
Galvanic Isolation	2 groups of 8 inputs (42.4VDC max.)
ON Voltage Level	9.5 VDC minimum
OFF Voltage Level	3.5 VDC maximum
Input Impedance	2.6 K ohms nominal
Input Current	2.3 mA @ 12 VDC 6.9 mA @ 24 VDC nominal
Minimum ON Current	1.0 mA
Maximum OFF Current	0.7 mA
OFF to ON response time*	4 ms max
ON to OFF response time*	4 ms max
Power Supply Loading	5V; 130mA max 24V; 0mA

*excluding controllers scan time and excluding transmission time from module to backplane

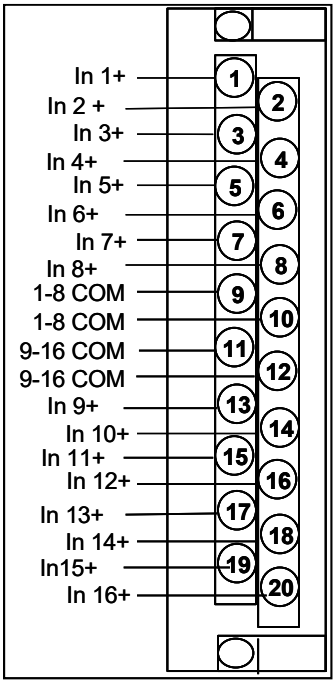
Digital Input Module – AC Voltage type (900G03-xxxx)

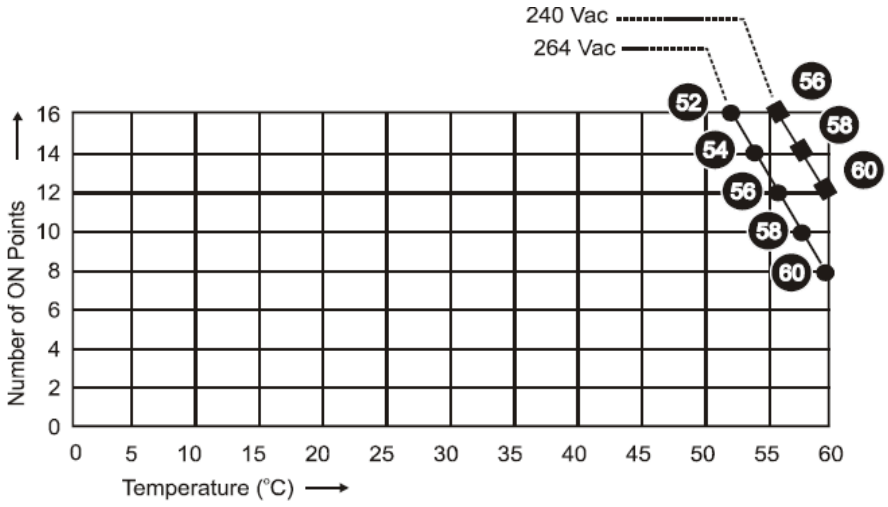
The AC Digital Input modules are externally powered and accommodate two circuit voltages for up to 8 inputs each. Two common terminals are provided for each circuit. AC power applied between the common terminal and an input cause the input to turn ON. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON. Logic in the controller allows the state to be inverted when necessary.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

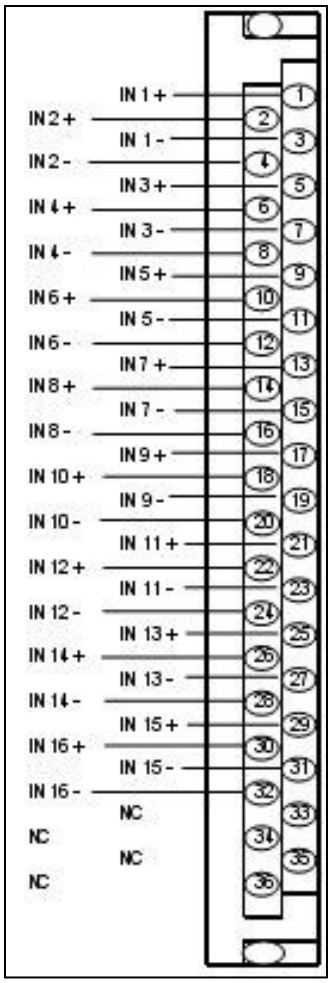
Inputs per module	16 (sinking)
Input Voltage Range	80 VAC to 264 VAC
Peak Voltage	264 VAC
AC Frequency	47 Hz to 63 Hz
Galvanic Isolation	2 groups of 8 inputs (350VAC max.)
ON Voltage Level	75 VAC
OFF Voltage Level	20 VAC
Input Impedance	48 K ohms nominal
Input Current	1 mA nominal @ 120 VAC, 60 Hz 2 mA nominal @ 230 VAC, 50 Hz
Minimum ON Current	0.3 mA
Maximum OFF Current	0.2 mA
OFF to ON response time*	4 ms + 1.5 line cycles maximum
ON to OFF response time*	4 ms + 2 line cycles maximum
Power Supply Loading	5V; 130mA max 24V; 0mA

Active input De-rating table for ACDI





Digital Input Module – AC DC Voltage type (900G04-xxsx)



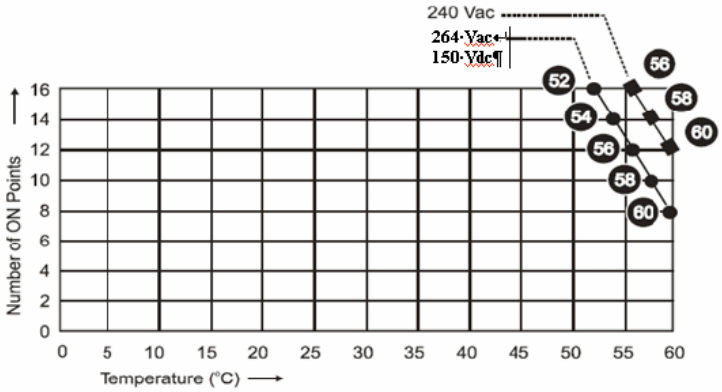
The AC/DC Input Module provides sixteen individually isolated, inputs that are powered externally. Two terminals are provided for each circuit. AC or DC power applied between the input terminals cause the inputs to turn On. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.. Logic in the controller allows the state to be inverted when necessary.

Requires Euro style 36-terminal terminal block.

Parameter	AC Application	DC Application
Inputs per Module	16	16
Input Voltage Range	80 VAC to 264 VAC	80 VDC to 125 VDC
Peak Voltage	264 VAC	150 VDC
AC Frequency	47 Hz to 63 Hz	NA
Galvanic Isolation	Input to Input & Input to Chassis (350VAC max)	Input to Input & Input to Chassis (350VAC max)
On Voltage Level	75 VAC	75 VDC
Off Voltage Level	20 VAC	30 VDC
Input Impedance	48 k ohms nominal	48 k ohms nominal
Input Current	1 ma nom. @120 VAC, 60 Hz 2 ma nom. @240VAC, 50 Hz	2 ma nom. @125 VDC
Minimum On Current	0.3 mA	0.3 mA
Maximum Off Current	0.2 mA	0.2 mA
Off to On response time*	6 ms + 1.5 line cycles max.	6 ms + 2 line cycles max.
On to Off response time*	6 ms + 2 line cycles max.	6 ms + 2 line cycles max.
Power Supply Loading	5 V, 130 mA max. 24V 0 mA.	5 V, 130 mA max. 24V 0 mA.

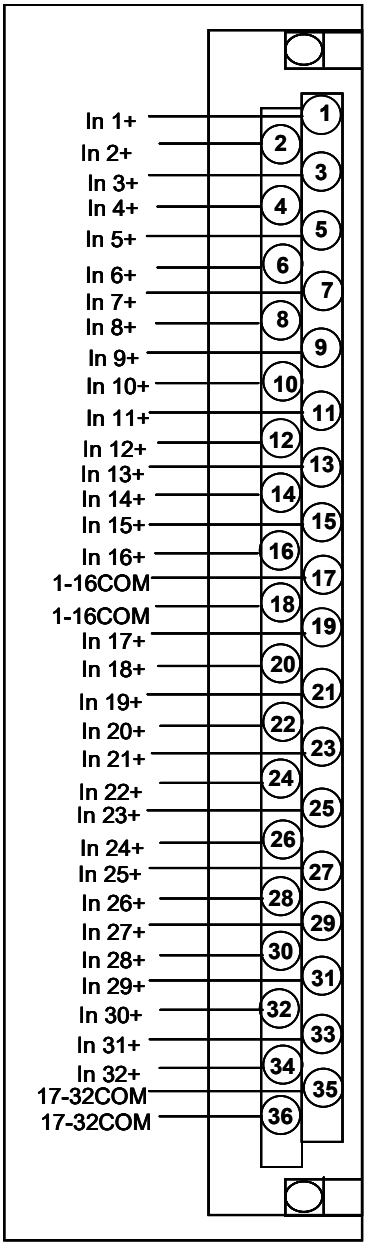
* Nominal times excluding controllers scan time and excluding transmission time from module to backplane. DC application must include controller line filter setting of 50/60 Hz Active input De-rating table for AC/DC DI



32 Point Digital Input Module - DC Voltage type (900G32-xxxx)

The DC Digital Input module provides 32 inputs separated in to 2 groups of 16 channels each. Each group has a pair of screw terminals for the COM connection. DC power applied between the common terminal and an input cause the input to turn ON. There is a green LED state indicator for each channel on the module to indicate when a digital input is ON. A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Logic in the controller allows the state to be inverted when necessary.

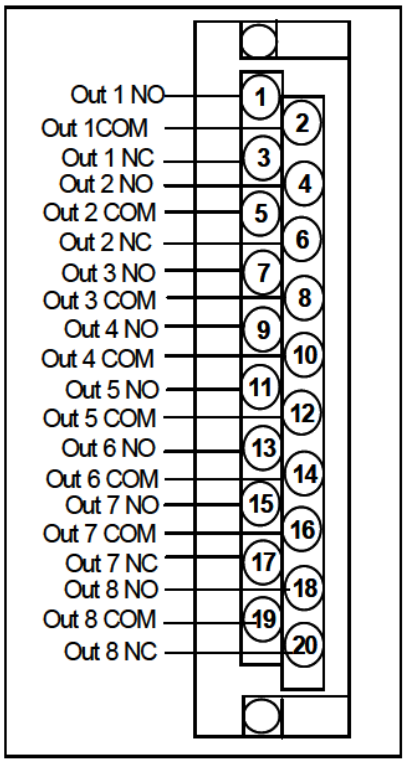
Requires Euro style 36-terminal terminal block



Inputs per module	32 (sinking)
Input Voltage Range	10 VDC to 32 VDC
Peak Voltage	32 VDC
AC Frequency	N/A
Galvanic Isolation	2 groups of 16 inputs (30VDC max.)
ON Voltage Level	9.5 VDC minimum
OFF Voltage Level	3.5 VDC maximum
Input Impedance	6.9 K ohms nominal
Input Current	1.7 mA @ 12 VDC 3.5 mA @ 24 VDC nominal
Minimum ON Current	1.0 mA
Maximum OFF Current	0.7 mA
OFF to ON response time*	5 ms max
ON to OFF response time*	5 ms max
Power Supply Loading	5V; 215mA max 24V; 0mA

*excluding controllers scan time and excluding transmission time from module to backplane

Relay Output Module (900H01-xxxx)



PRECAUTION: **A circuit that will be carrying a current continuously for long periods without relay switching operation (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts). Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself. For circuits such as these, please use a magnetic-hold type latching relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a failsafe circuit design that considers the possibility of contact failure or disconnection**.

The Relay Output Module provides eight individual galvanically isolated, electromechanical relay outputs. Four of the outputs are Form-C, and the other four are Form-A. Outputs are not fused in the Relay module. Install a fuse for each output at the field device that is appropriate for the load and the wire used.

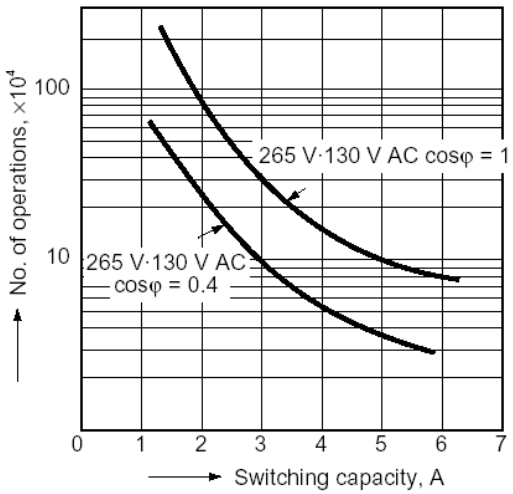
There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

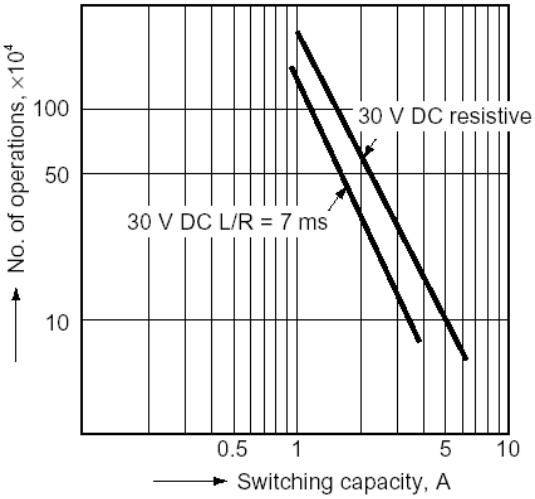
A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

8 Relays per module	4 form A, 4 form C
Output Device	Electromechanical relay
Voltage	120/240 VAC, 30 VDC
Current Rating	4A @ 240VAC or 30VDC resistive load 0.5 A @ 240VAC or 30VDC incandescent lamp load
Galvanic Isolation	Relay Output Contact to Relay Output Contact Relay Output Contact to Logic
Max. Leakage Current	1 mA @ 350 VDC
De-rating	Max. outputs at max. load – none Max. modules per rack - none
OFF to ON response time*	11 ms max
ON to OFF response time*	8 ms max
Power Supply Loading	5V; 110mA max 24V; 100mA max
Expected life (min. operations)	Mechanical at 180 cpm: 5 x 10E7 Electrical: 10E5

*excluding controllers scan time and excluding transmission time from module to backplane

Life expectancy curves (1a1b type)



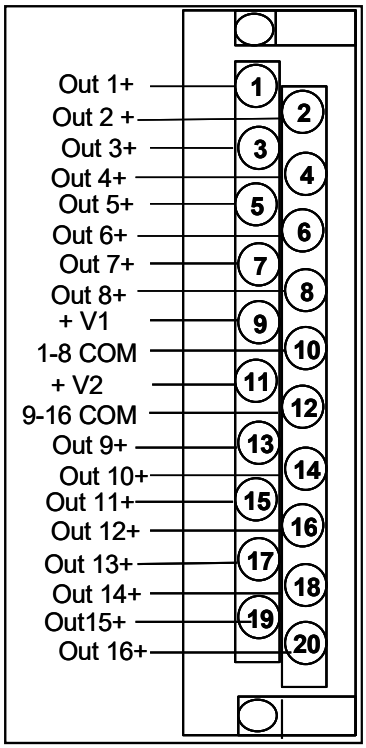


Digital Output Module – DC Type (900H02-xxxx)

The DC Digital Output module provides 16 outputs separated in to 2 groups of 8 channels each that are powered externally. Each group has a pair of screw terminals for +V and COM connections. The outputs are low side switching (current sinking) type. Overload protection is built into each output; when tripped the power must be recycled to reset the module.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist..



Outputs per module	16 (current sinking, low side)
Galvanic Isolation	2 groups of 8 outputs
Operating Voltage	6.5 to 32 VDC (5.0 to 6.5 V @ <0.5A per channel)
Output Type	Intelligent power switch (IPS)
Peak Voltage	34 VDC
AC Frequency	N/A
ON Voltage Drop	0.3VDC @ I A load
Overload Protection	Electronic high current and high temperature limiting, resets after cycling field power
Maximum Load Current	1 A per point, 8A max. per module, resistive load 0.5 A per point incandescent lamp load (5 mH max)
Maximum Leakage Current	0.15mA @ 32 VDC
Maximum Inrush Current	4 A for 10 ms
Minimum Load	0.0 mA
OFF to ON response time*	6 ms
ON to OFF response time*	6 ms
Fuses	Electronic limiting
Power Supply Loading	5V; 340mA 24V; 0mA

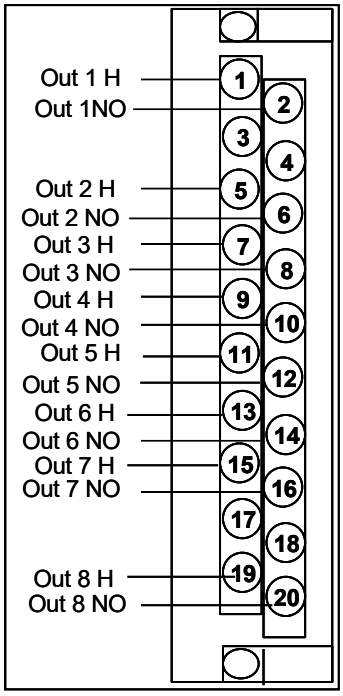
*excluding controllers scan time and excluding transmission time from module to backplane

Digital Output – AC Type (900H03-xxxx)

The AC Digital Output module provides 8 isolated zero switching Triac solid-state outputs. A shorting comb is available for use with barrier type terminal blocks to simplify connections to a common voltage source for all outputs. Each output has a MOV for transient over-voltage protection and a field-replaceable fuse.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist..



Outputs per Module	8
Galvanic Isolation	Per output to output, output to logic
Operating Voltage	85 VAC to 240 VAC
Output Type	Triac (zero switching voltage)
Peak Voltage	250 VAC
AC Frequency	47 Hz to 63 Hz
ON Voltage Drop	<2.0 VAC (>0.1 A) <3.0 VAC (<0.1 A)
Transient Over voltage Protection	MOV
Maximum Load Current	2 A per point, 8 A max. per module, resistive load
Maximum Leakage Current	4 mA (240 VAC, 60 Hz) 1.2 mA (100 VAC, 60 Hz) 0.9 mA (100 VAC, 50 Hz)
Maximum Inrush Current	15 A for 10 ms
Minimum Load	50 mA
OFF to ON response time*	3 ms + 0.5 line cycle max
ON to OFF response time*	3 ms + 0.5 line cycle max
Fuses	1 per output, 3.15 A Time-lag. Replacement part: Littelfuse 37413150410
Power Supply Loading	5V; 220mA max 24V; 0mA

*excluding controllers scan time and excluding transmission time from module to backplane

32 Point Digital Output Module – DC Type (900H32-xxxx)

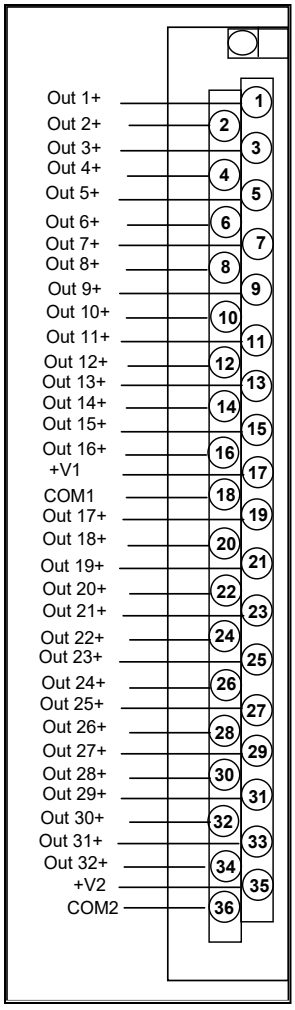
The DC digital Output module provides 32 outputs separated in to 2 groups of 16 channels each that are powered externally. Each group has a pair of screw terminals for +V and COM connections. The outputs are high side switching (current sourcing) type. Over current protection is provided for all outputs in 4 groups of 8 channels each. In case of short circuit for any output channel, that whole group of 8 is switched off. Power cycling is not required to reset the module.

There is a green LED state indicator for each channel on the module to indicate when a digital output is ON.

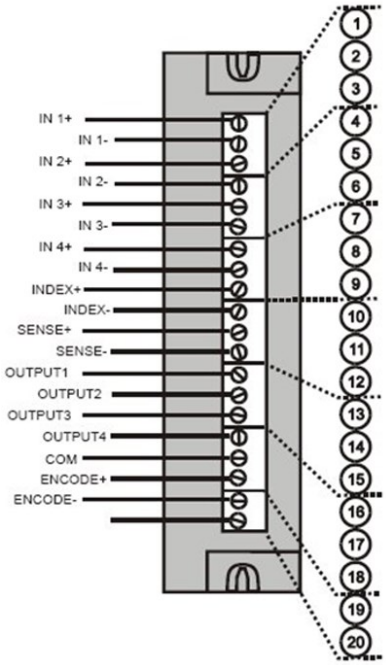
A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist. Requires Euro style 36-terminal terminal block.

Outputs per module	32 (current sourcing, high side). Note: Outputs 17 through 32 may not be used for TPO (Time Proportioning Output), PPO (Position Proportioning Output) or TPSC (Three Position Step Output) output types.
Galvanic Isolation	2 groups of 16 outputs
Operating Voltage	10.5 to 32 VDC
Output Type	High side driver
Peak Voltage	32 VDC
AC Frequency	N/A
ON Voltage Drop	0.15 VDC @ 0.5 A load
Overload Protection	Active Current Limiting is integrated into the output driver as 4 groups of 8 channels each. Power cycling is not required to reset the module after a fault condition.
Maximum Load Current	0.5 A per point, 6 A max per channel group 12 A max. per module, resistive load 0.25 A per point incandescent lamp load (5 mH max)
Maximum Leakage Current	0.15mA @ 32 VDC
Maximum Inrush Current	2 A for 10 ms
Minimum Load	0.0 mA
OFF to ON response time*	6 ms
ON to OFF response time*	6 ms
Fuses	Electronic limiting
Power Supply Loading	5V; 235mA 24V; 0mA

*excluding controllers scan time and excluding transmission time from module to backplane



4 Channel Pulse/Frequency/Quadrature Module - DC Voltage type (900K01-xxxx)



Note: For Quadrature input Differential mode, connect wires using reverse polarity (+ to -) on Input 1, Input 2 and Index.

The 4 Channel Pulse/Frequency/Quadrature Module provides four different functionalities in the form of Pulse Input, Frequency measurement, Quadrature encoder input and Pulse Output. Each of these channels can be configured for any one of these four functions; with the exception that quadrature encoder input (A and B pulses) can be applied to only Channels 1 and 2 respectively. When configured for quadrature, the other two channels will still be available for use. The Pulse Output functionality uses the digital output available on the module for outputting pulses.

A green blinking status LED on the module indicates when the module is being scanned. An amber blinking status LED indicates when channels are forced and a red status LED when module diagnostics exist.

Input Voltage Range	0 VDC to 24 VDC
Inputs per module	4
Outputs per module	4
Digital Output type	Open collector, 5 to 24V, 30mA max, used for fast signaling
Power Supply Loading	5V; 110mA max 24V; 250mA max (with Encoder) 24V; 100mA max (without Encoder)

Pulse Input Specifications

Input Voltage Range	0 VDC to 24 VDC
ON Voltage Level	3.0 VDC minimum
OFF Voltage Level	1.0 VDC maximum
Input Impedance	25K ohm
Frequency	10 KHz maximum
Minimum Pulse Width	3 µsec
Pulse Counter	32 bits
Preset Value	User may configure a preset count value within the range of 32 bit counter
Preset Action	Settable as ON or OFF in HC Designer
Digital Output	If preset action ON, output turns ON for 1 second. If preset action OFF, output latches ON, and remains ON until counter reset command.
Counting based on Preset	When the count equals preset value: • If preset action ON, counter is reset and immediately resumes count. • If preset action OFF, counter is not reset and counts beyond preset value.
Counter HOLD	When the HOLD input to the pulse input function block is ON in HC Designer, the counter holds its current value.
Counter RESET	The counter may be reset only via its function block in HC Designer, when an OFF to ON transition occurs on the ^RST input in Monitor mode.
Counter Flags	The OVERFLOW flag gets set when the module counter overflows. This flag can be reset only with the ^CLFG command sent through HC Designer. Also, the PREI flag is set when the digital output of the module turns ON.

4 Channel Pulse/Frequency/Quadrature Module - DC Voltage type (900K01-xxxx) (cont'd)

Frequency Input Specifications

Input Voltage Range	0 VDC to 24 VDC
ON Voltage Level	3.0 VDC minimum
OFF Voltage Level	1.0 VDC maximum
Input Impedance	25K ohm
Frequency	10 Hz minimum 100 KHz maximum
Minimum Pulse width (frequency ranges)	Settable only through HC Designer: 500 µsec (10 Hz to 500 Hz) 50 µsec (10 Hz to 5 KHz) 2.5 µsec (10 Hz to 100 KHz)
Digital Output	ON if input frequency out of range, else OFF

Quadrature Input Specifications

Channels Used	Only channels 1 and 2 can be used for quadrature pulses A and B respectively. Index pulse is provided in addition.
Input Voltage Range	Differential: -6 VDC to +6 VDC Single-ended: 0 VDC to 24 VDC
ON Voltage Level	Differential: 0.2 VDC minimum Single-ended: 3.0 VDC minimum
OFF Voltage Level	Differential: -0.2 VDC maximum Single-ended: 1 VDC maximum
Common Mode Voltage	+/- 12VDC
Input Sensitivity	+/- 200mV
Hysteresis	+/- 50mV
Module powered encoder	5V DC, 0.50A
Frequency	200 KHz maximum
Minimum Pulse Width	2.25 µsec
Quadrature Counter	32 bits signed
Quadrature Modes	For variable resolution there are three count modes for the Pulse/Quadrature input: X1: rising edges of signal A are counted (increment); falling edges of signal A (decrement) X2: rising & falling edges of signal A are counted X4: rising & falling edges of signals A & B are counted
Quadrature LEDs	Two LEDs indicate UP and DOWN direction of counting.

4 Channel Pulse/Frequency/Quadrature Module - DC Voltage type (900K01-xxxx) (cont'd)

Pulse Output Specifications

Channels Used	Any one of the channels can be used for Pulse Output. However, the use of a particular channel for outputting pulses will render the particular input channel unusable for either of pulse, frequency or quadrature input.
Digital Output Type	Open Collector, 5 to 24V, 30 mA max
Frequency Range	25 Hz – 10 KHz
Duty cycle	Always 50%
Pulse Output Duration	Selectable CONTINUOUS or NUMBERED PULSES.

Safety Universal Input /Output Module (900U02-xxx)

CAUTION: For I/O redundancy, prefabricated cable length from RTP to Redundant UIO modules must be same.

Each channel of the module can be soft configured as AI, AO, DI or DO. Features supported by UIO are:

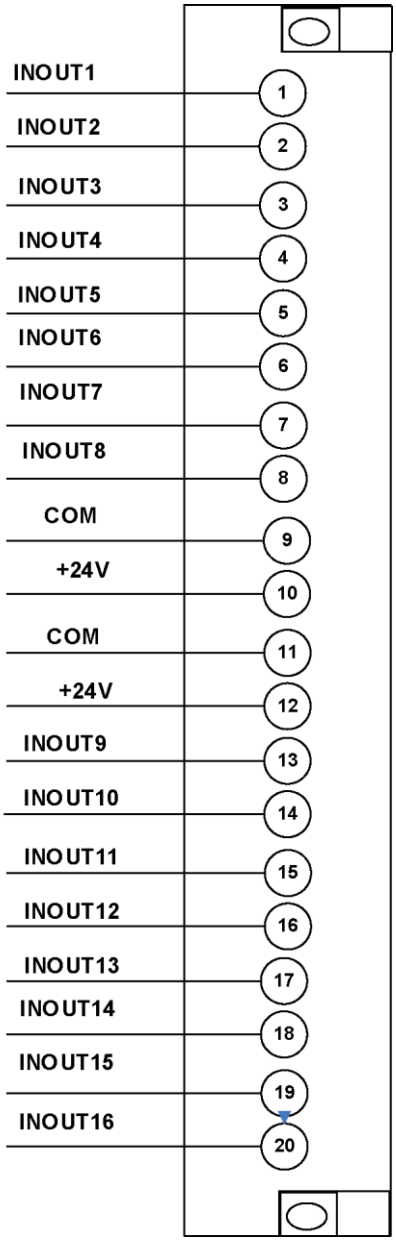
- Channels soft configurable as AI, AO, DI or DO (All channel are sourcing type)
- SOE (Sequence of Events) with resolution of 1 mS (supported only in non-redundant UIO configuration).
- Simplified wiring for SIL-2 applications due to single module solution

  Note: The SIL-2 UIO has inbuilt advanced diagnostics such as, SIL certified microcontroller and critical voltage monitoring. Due to its higher reliability, for SIL-2 UIO there is no need to do 2oo1 or 2oo3 for wiring of IOs for SIL-2 application. For more details refer safety manual (51-52-25-153) and PFD calculation sheet
- Line Monitoring for all configurations
- Short circuit protection for DO
- Per channel Safety Shutdown eliminates need for external master relay
- *HART Supported
- * Single or Redundant Power Capability to Module

A green blinking status LED on the module indicates when the module is being scanned. A red status LED when module or channel diagnostics exist.
For channels configured as Digital input a closed external circuit causes current flow from UIO to establish an ON state. Logic in the controller allows this state to be inverted when necessary.
Analog outputs can only be configured on channels 9 to 16. The Analog Output provides 4 to 20 mA outputs that may be scaled by the user to any span within this range on a per output basis.
Digital Outputs provide over current protection .. In case of short circuit for any output channel, that channel is switched off. Power cycling is not required to reset the module.
For channels which are configured as output (AO/DO) a user specified failsafe value is supported to allow predictable operation in the event of a communication loss between controller and IO module.
Requires 20 pin-terminal terminal block.
Note: Field calibration is not required for UIO channels.

* HART functionality is not supported for Channel 6 of UIO module with hardware revision below D.

The module hardware revision can be found on the backside (light pipe side) of the UIO module.



Universal IO channel can be soft configured as AI, AO, DI or DO. Details of each IO type are listed in tables below.

Item	Specification
Channels	**Non-redundant UIO configuration**:16[1] Channels **Redundant UIO configuration**: 14 Channels
24V Field Supply Voltage	24V DC(Typical)[2,3] 22V DC(Min) 27V DC(Max)
Load	Max 4.2 Amps per module 500 mA per channel
Isolation	1.5 kVDC Module to Rack (Logic Side) 1.5 kVDC Module to Module
Update Rate	10ms
ESCP (Electronic Short Circuit Protection per channel)	620 mA re-settable
Fuse (per channel)	Internal, non-replacable (1 Amp)
Field Supply Fuse	Internal, electronic fuse (10 Amps)

Detail Specifications – Analog Input

Parameter	Specification
Input type	Current (2, 3, or 4 wire devices). Sink type input transmitters are supported. HART supported.
Input Channels	16 Maximum per module (line monitored)
A/D Converter Resolution	16 Bit
Input Range	4-20 mA (cut-off limits: 3-22 mA)
Crosstalk, dc to 60 Hz (channel-to-channel)	58dB
Input Impedance	250 Ω nominal
Maximum Input Voltage (any input referenced to common, no damage)	0 - 30V
Hardware accuracy	0.1% of full-scale (23.5 ± 2°C) 0.2% of full-scale (23.5 ± 2°C) (For Redundant) 0.17% of full-scale (0 to +60°C) 0.34% of full-scale (0 to +60°C) (For Redundant)
Transmitter Field Power Conditioning	Current limited to 24 mA
Input Filter	First-order low-pass 1 kHz

Detail Specifications – Analog Output

Parameter	Specification
Output Type	4-20 mA current loop. HART supported.
Output Channels	8 Maximum per module [1] (with line monitoring) Assignable as channels 9 to 16
Accuracy	<0.5% of Full Scale (25°C) including linearity, entire operating temperature. <1% of Full Scale (25°C) including linearity, entire operating temperature (for Redundant).
Output Ripple	=< 125 mV peak-to-peak at power line frequency, across 250 Ohm load
Output Readback Accuracy	0.17% of full scale
Output Current Linearity	± 0.1% of Full Scale nominal
Resolution	12 Bit
Directly Settable Output Current Range	2.4 mA to 21 mA
Maximum Resistive Load	750[4] Ohms
Minimum Resistive Load	250 Ohms
Maximum Output Compliant Voltage (24 V supply = 22 VDC through 28 VDC)	14 VDC
Maximum Open Circuit Voltage	24 VDC
Maximum Load capacitance	< 1 uF

Detail Specifications – Digital Input with Open Wire Detectiion (OWD)

Parameter	Specification
Open Voltage	**24V**
Short Circuit Current	7 mA
Open Contact	15 kΩ > 0.1 W [A]
Closed Contact	5 kΩ > 0.25 W [B]
Short circuit detection	I > 6 mA +/-5 %
Closed contact detection	2.8 mA < I < 6 mA +/-5 %
Open contact detection	0.9 mA <= I <= 2.8 mA +/-5 %
Lead Breakage Detection	I < 0.9 mA +/-5 %
Input filter	First-order low-pass 1 kHz
Note A: At 24 VDC, equates to 8.57 KΩ > R > 4 KΩ (where R = total loop resistance) Note B: At 24 VDC, equates to 26.7 KΩ > R > 10 KΩ	

Detail Specifications – Digital Input without Open Wire Detection (OWD)

Parameter	Specification
Open Voltage	24 VDC
Closed contact detection	I > 2.81 mA [C]
Open contact detection	I < 1.8 mA [D]
Input filter	First-order low-pass 1 kHz
Note C: At 24 VDC, equates to R < 8.57 KΩ (where R = total loop resistance) Note D: At 24 VDC, equates to 26.7 KΩ > R > 10 KΩ	

Detail Specifications – Digital Output

Parameter	Specification
Output Channels	16 Maximum per module (with line monitoring) [2]
Output Type	Solid state source, short circuit protected
Load Current	Redundant Mode - 4mA (min) to 0.5A (max) [5] Non-Redundant Mode - 1mA (min) to 0.5A (max) 4.0A Maximum per module
On-State Voltage	24 V (typ), load current @ 0.5 A
Off-State Voltage	0 VDC (max) Open Load
Off-State Leak Current	< 0.1 mA
Maximum Load Inductance	< 10 H
Maximum Load Capacitance	< 1 uF
Lamp Load	< 3 Watt (Verify Inrush Current requirement of Lamp Load)
Inrush Current	1 A for 10 uS
DO read back current Accuracy	DO Current : 3-10 mA +/- 1 mA 11-100 mA +/- 5 mA 101-500 mA +/- 20 mA
Short Circuit Protection	Internal Electronic (750 mA)

Note:

1. 900U02 modules may not be installed such that the 900U02 is between two 900B16 modules. 900B16 may only be installed in one adjacent slot.
2. Field power to be supplied by a local power supply providing tertiary protection from zone B severity levels. Generally characterized by short wiring, isolation, surge suppressors etc.
3. For Marine applications ABS Type approved power supplies are required for field supply voltage.
4. Field supply voltage should be maintained higher than 22.5 V for AO higher AO loads (> 750 Ohms).
5. Redundant Mode - UIO 10mA (min) to 0.5A (Max) for UIO (900U02) firmware version 3.02 and below.

Terminal Blocks (900TEK-xxxx, 900TBK-xxxx, 900TER-xxxx, 900TBR-xxxx)

ControlEdge HC900 I/O modules use terminal blocks with various features available.

Terminals are available in Barrier style and Euro style. The Barrier style terminal block provides a floating washer to accommodate two different size conductors. The Euro style offers a more compact terminal design providing more room within the terminal block cavity for conductors.

All terminal blocks support customer wiring entering the block from the top or bottom when mounted in the controller. A locking swing out door provides easy access for wiring and covers potential high voltage connections during operation.

For low voltage terminals accepting thermocouple inputs, cold junction compensation is provided by the AI modules.

Terminal blocks are secured to the rack assembly with screws. These screws provide vibration immune terminal connections during operation and also serve as jacking screws when removing modules to minimize the extraction force required.

The rear of the Terminal block provides keying to prevent accidental terminal block insertion into incorrect module slots. Labels are provided to ider ıe module type by name and color, offer wiring instructıons and provide an area for customer identification of field circuits. Shorting combs are available for use with Barrier terminal blocks to connect common signal pairs together or to jumper together common signals on AC and Relay output modules.

Shield terminal strips are also available to terminate the shields of shielded cables at the controller.

Sample terminal blocks
(L) 20-terminal high voltage Barrier
(R) 36-terminal Euro

Number of terminals	20	36*
Type	Terminal blocks removable under instrument power. (Field power disconnected)	Terminal blocks removable under instrument power. (Field power disconnected)
Gauge Wires	Barrier and Euro: #14 to 26 AWG, solid or stranded	Euro: #12 to 26 AWG, solid or stranded
Terminal color	High voltage: Red Low Voltage: Black	Black
Contacts	High Voltage: Tin Coated Low Voltage: Gold Plated	Gold plated
Contact Style	Post and socket	Post and socket
Door Access	Tool accessible	Tool accessible
Cold Junction compensation for thermocouples	Yes (provided by AI module)	N/A—thermocouples not used
*Required with the following I/O modules: 16 HL AI, 8 AO, 16 AO, 32 DI, 32 DO and 16 AC/DC DI.		

Terminal styles
(top) Barrier
(middle) Euro
(bottom) 36-terminal Euro

I/O Scanner Module (900S50x-xxxx)

The I/O Scanner 1 module resides in a remote I/O rack along with the I/O modules. The Scanner 1 and the controller are connected to each other's I/O port (see the photo on the right side of this page). The scanner collects data from the Input modules populated in its remote rack and communicates the information to the controller. Output data is sent from the controller to the Scanner 1 module which in turn sends the data to appropriate output module. Data exchanges are synchronous with the controller scan time to maintain deterministic operation. Diagnostic status of I/O modules is also monitored and reported to the controller when detected. The Rack address of a Scanner 1 is set via DIP switches on the Scanner 1's circuit board. Connection to the controller uses IEEE 802.4 Ethernet 100base-TxPhysical Layer. An external Ethernet switch is required when multiple I/O scanners are used with a single controller. Scanner 1 modules do support removal and insertion under power.

Process Scanner (left) Safety Scanner (right)

Type	I/O Scanner
Status indicators	Scanner: Module status Red/Green LED indicates mode or error Expansion I/O port: Green and Yellow LEDs indicate receive/transmit
Power supply loading	5V; 770 mA max

I/O Scanner 2 Module (900S75x-xxxx)

The I/O Scanner 2 module resides in a remote I/O rack along with its I/O in a Redundant Controller System. The Scanner 2 has two I/O connections I/O A is connected to CPU-A and I/O B is connected to CPU-B in the Redundant Controller rack. The scanner 2 collects data from the Input modules populated in its remote rack and communicates the information to the Lead controller. Output data is sent from the Lead controller to the Scanner 2 module which in turn sends the data to appropriate output module. Data exchanges are synchronous with the controller scan time to maintain deterministic operation. Diagnostic status of I/O modules is also monitored and reported to the controller when detected.

The Rack address of a Scanner 2 module is set via switches on the module. Connection to both of the redundant controllers is made using both ports, each conforming uses IEEE 802.4 Ethernet 100base-TxPhysical Layer. An external Ethernet switch is required when multiple I/O scanners are used with a single controller. Scanner modules do support removal and insertion under power.

Process Scanner (left) Safety Scanner (right)

Type	I/O Scanner
Status indicators	Scanner: Red/Green LED indicates mode or error I/O A Port: Green and Yellow LEDs indicate receive/transmit I/O A Port: Green and Yellow LEDs indicate receive/transmit
Power supply loading	5V; 770mA max

Redundant Switch Module (RSM) (900RSM-xxxx)

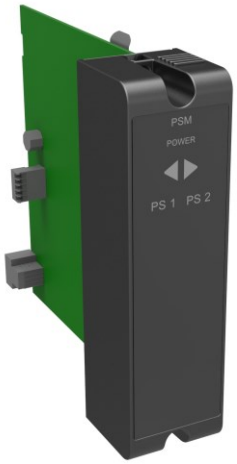
The Redundant Switch Module resides in a ControlEdge HC900 Redundant controller rack and interfaces with both CPUs of a redundant system and indicates which CPU is functioning as the Lead controller and which is the Reserve. A key switch on the module sets the mode of both the Lead and Reserve controllers, guaranteeing synchronization of CPUs. A momentary contact position of the key switch allows the user to switch the Lead control function from CPU-A to CPU-B or vice versa.

The RSM module supports insertion and removal under power.

Type	Redundant CPU Status and Mode control Module
Lead/Reserve indication	Green arrow LEDs
Mode Switch	Removable key (2 keys supplied) , three stationary positions, one momentary
Power Supply Loading	5V; 22mA max

Power Status Module (PSM) (900PSM-xxxx)

The Power Status Module resides in a local or remote I/O rack containing redundant power supplies. The PSM and second power supply are contained in a rack extension assembly adjacent to the power supply slot position. The PSM module is positioned in a dedicated slot between the two power supplies.



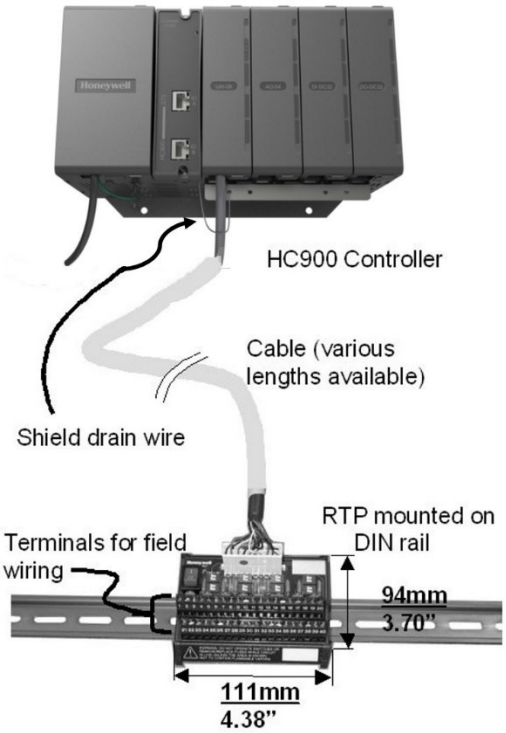
Redundant power and the PSM may be used with a Controller rack with local I/O, a Scanner 1 rack with remote I/O controller racks of non-redundant systems and a Scanner 2 rack with remote I/O racks of redundant systems.

Directional indicators on the module indicate when both voltage sources of the power supply are operating properly.

Type	Redundant Power Supply Status indicating Module
Status indication	Green directional indicators using LEDs
Power Supply Loading	5V; 22mA max

Remote Terminal Panels

DIN rail mounted Remote Terminal Panels (RTPs) are available for use with pre-wired cables to reduce installation time and labor expense. Three types of RTPs are available: for analog inputs, for relay outputs, and for other I/O modules. Three cable lengths are also available to match hardware to installation variations. Analog input RTPs include transmitter shunt resistors and transmitter power terminals with individual circuit fuses. The Relay Output RTP includes a fuse and power disconnect switch for each output. All RTP panels switch field power to allow module removal and installation under controller power. All RTPs are qualified as non-interfering for SIL-2 application.



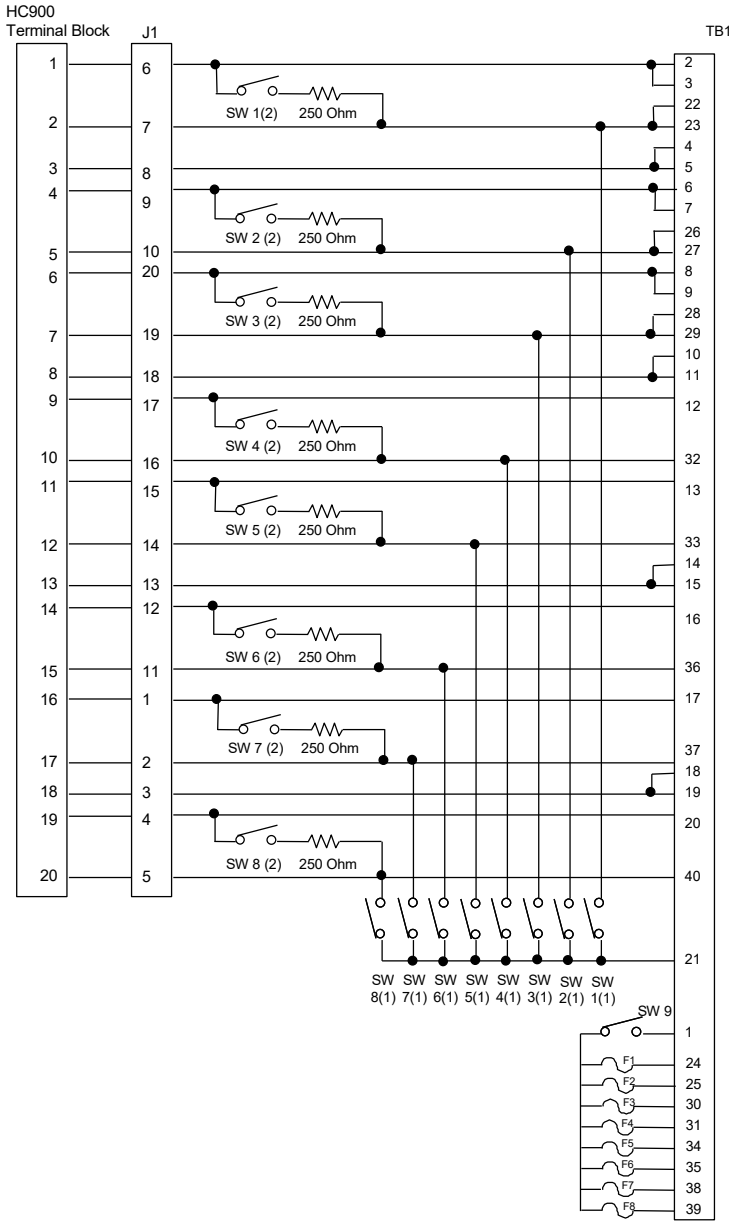
Mounting Standard 35mm wide DIN Rail	 Provides connection of field wiring to controller I/O within an enclosure only.
Dimensions	4.38” (111.1 mm) x 3.70” (94.0mm) x 2.60” (66.0mm) (L x W x H)
Cables High voltage Low voltage	 Lengths: 1.0, 2.5, 5.0 meters. Cable power is limited to 24 Amps per module at 60C (140 degrees F) and 32 Amps at 54C (129 degrees F). Lengths: 1.0, 2.5, 5.0 meters.

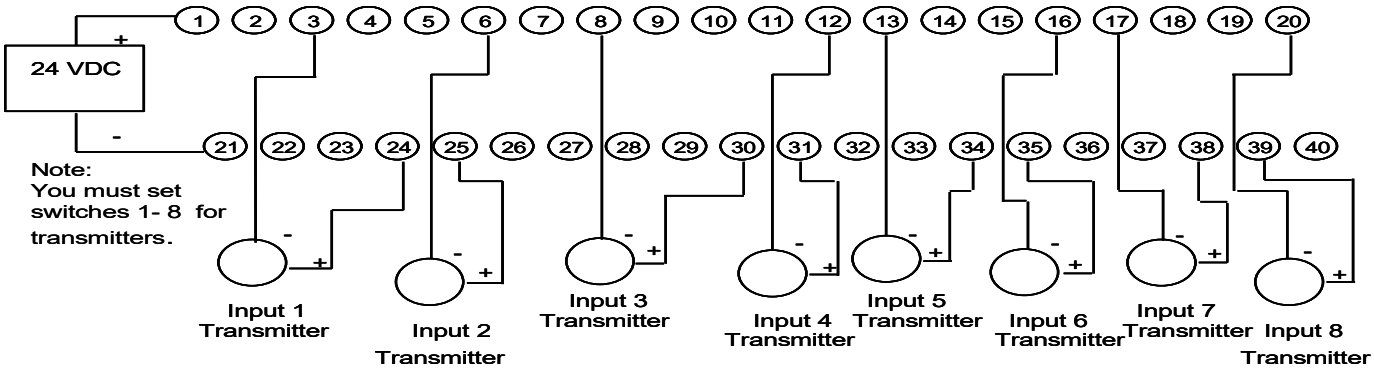
Remote Terminal Panel for Analog Input Modules (900RTA-xxxx)

The Analog Input RTP integrates some of the typical externally connected components such as switch selectable shunt resistors for current loops and common power supply terminals with individual fuses for powering two-wire transmitters. A power switch is provided to disconnect power from all transmitters for I/O module maintenance.

The RTP also minimizes the need for multiple wires under a single screw connection by expanding the connectivity of the shared terminals of the I/O module.

The analog input RTP cannot be used for thermocouple inputs.



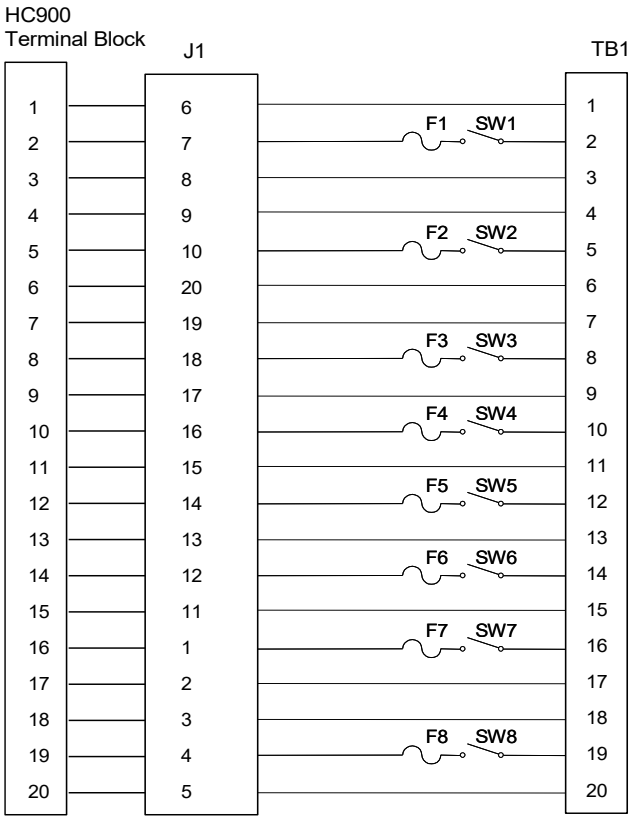


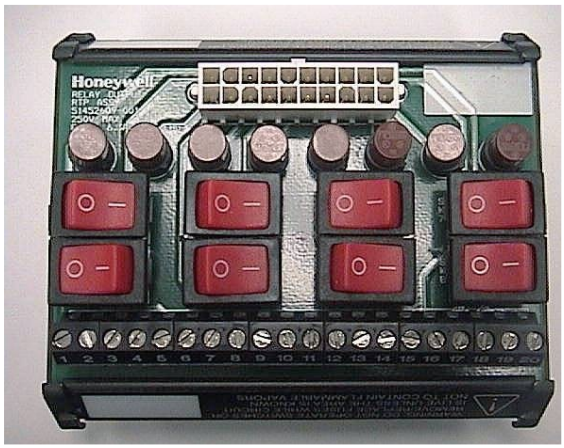
Remote Terminal Panel for Analog Input Modules (900RTA-xxxx) (cont'd)

Analog input Module	Excludes Thermocouple Input types. Accuracy De-rating (Module + RTP) 100 ohm Plat. RTD = +/- 0.14% of range JIS RTD = +/- .22% of range 10 ohm Cu. RTD = +/- .67% of range 200 ohm = +/- 0.17% of range 0 – 10 mV = +/- 0.14% of range
Transmitter power	Common supply terminals – selectable per circuit. Fuse per circuit - 80mA, time lag type
Shunt Resistor	Selectable per circuit 250 Ohms, 0.05% - 15ppm

Remote Terminal Panel for Relay Output Modules (900RTR-xxx)

The RTP for Relay Output modules provides individual fuses for each output. A load disconnect switch is also provided for each output to support maintenance of the relay module under instrument power.



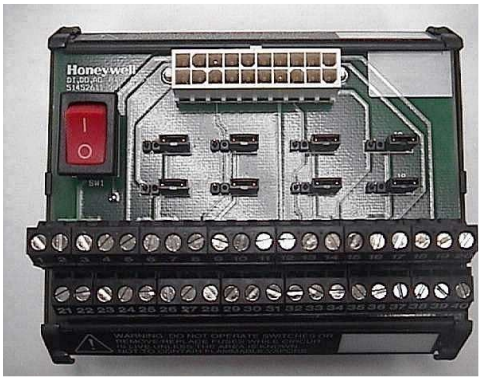


Relay Output RTP	Used with Relay Output Module	Relay common disconnect per circuit Fuse per circuit – 6.3A, time lag type 24A maximum per RTP

Remote Terminal Panel for Other ControlEdge HC900 Modules (900RTS-xxxx)

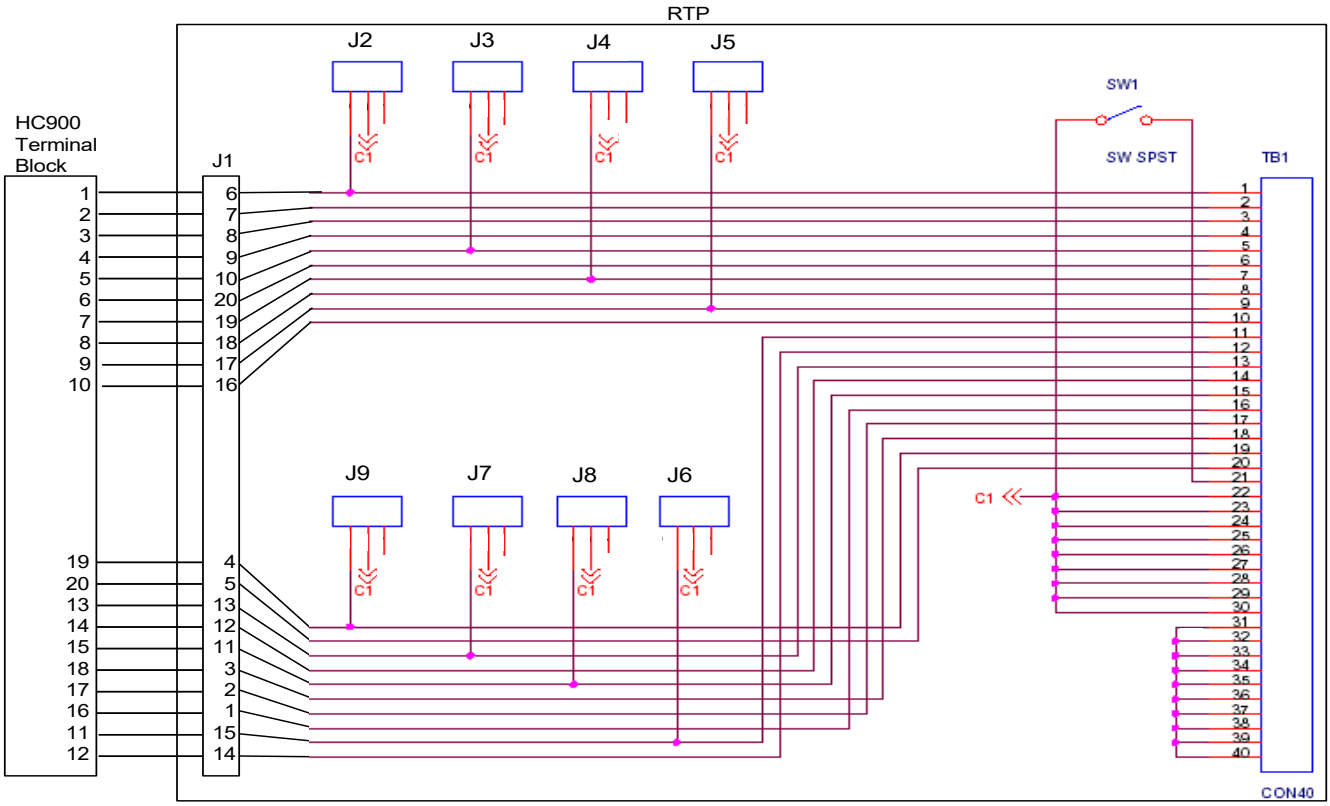
Remote Terminal Panel(s) may be used with the following ControlEdge HC900 I/O Modules:

- 16 channel safety UIO module
- 16 Point Digital Input Module, Contact Type
- 16 Point Digital Input Module, AC & DC Types
- 8 Point Digital Output Module, AC type
- 16 Point Digital Output Module, DC type
- 4/8/16 Point Analog Output Module
- 16 Point Digital Input Module, AC/DC types not available



Jumpers on the Remote Terminal Panel may be positioned to accommodate the above input and output modules. A switch on the module is used to disconnect field power from I/O modules to facilitate maintenance of the module under instrument power.

.



Below table list the relationship between all I/O modules and their related terminal block or RTP:

I/O Module	Terminal Block (Euro)	Terminal Block (Barrier)	RTP	RTP required per module	RTP Cable
900U02-0100 (Non-Redundant)	900TEK-0200	900TBK-0200	900RTS-0001	1	900RTC-H2xx 900RTC-L2xx
900U02-0100 (Redundant)	N/A	N/A	900RTI-0100	1	900RTC-H2xx
900A01-0202	900TEK-0200	900TBK-0200	900RTA-L001	1	900RTC-L2xx
900A16-0103	900TCK-0200	N/A	900RTS-0001	2	900RTC-34xx
900B01-0301	900TEK-0200	900TBK-0200	900RTS-0001	1	900RTC-L2xx
900B08-0202	900TCK-0200	N/A	900RTS-0001	1	900RTC-BAxx
900G03-0202	900TER-0200	900TBR-0200	900RTS-0001	1	900RTC-H2xx
900G32-0101	900TCK-0200	N/A	900RTS-0001	2	900RTC-34xx
900G01-0202	900TEK-0200	900TBK-0200	900RTS-0001	1	900RTC-L2xx
900G04-0101	900TCK-0200	N/A	N/A	N/A	N/A
900H03-0202	900TER-0200	900TBR-0200	900RTS-0001	1	900RTC-H2xx
900H32-0102	900TCK-0200	N/A	900RTS-0001	2	900RTC-34xx
900H01-0202	900TER-0200	900TBR-0200	900RTR-H001	1	900RTC-H2xx
900K01-0201	900TEK-0200	900TBK-0200	N/A	N/A	N/A

UMS-SCA

Below table lists the supported IO hardware of IO modules/SCA modules

IO modules/SCA modules	SIL2 UIO (Redundant)	SIL2 UIO (Non-Redundant)
CC-UPTA01	✓	✓
CC-UGAI01	✓	✓
CC-UGAO01	✓	✓
CC-UGDA01 & CC-UDXA01	✓	✓
CC-UDIR01	✓	✓
CC-UDOR01	✓	✓
CC- UAIA01	✓	✓
CC- UAOA01	✓	✓
FC-UGAI01	✓	
FC-UGAO01	✓	
FC-UGDA01	✓	
FC-UDIR01	✓	
FC-UDOR01	✓	
FC-UDOF01	✓	

Below table list the cable model numbers

SIL2 UIO Non-Redundant	900UMC-T006/900UMC-T010
SIL2 UIO Redundant	900UMC-R006/900UMC-R010

For more details on UMS for ControlEdge Systems, refer guide, "**Installation and User's Guide for Signal Conditioning Assembly**" or **Doc. No. 51-52-25-162**.

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

ASIA PACIFIC

Honeywell Process Solutions,
(TAC) hfs-tac-support@honeywell.com

Australia
Honeywell Limited
Phone: +(61) 7-3846 1255
FAX: +(61) 7-3840 6481
Toll Free 1300-36-39-36
Toll Free Fax:
1300-36-04-70

China – PRC - Shanghai
Honeywell China Inc.
Phone: (86-21) 5257-4568
Fax: (86-21) 6237-2826

Singapore
Honeywell Pte Ltd.
Phone: +(65) 6580 3278
Fax: +(65) 6445-3033

South Korea
Honeywell Korea Co Ltd
Phone: +(822) 799 6114
Fax: +(822) 792 9015

EMEA

Honeywell Process Solutions,
Phone: + 80012026455 or
+44 (0)1344 656000

Email: (Sales)
FP-Sales-Apps@Honeywell.com
or
(TAC) hfs-tac-support@honeywell.com

AMERICA'S

Honeywell Process Solutions,
Phone: (TAC) 1-800-423-9883 or
215/641-3610
(Sales) 1-800-343-0228

Email: (Sales)
FP-Sales-Apps@Honeywell.com
or
(TAC) hfs-tac-support@honeywell.com

Specifications are subject to change without notice.

For more information
To learn more about ControlEdge HC900 Controller,
visit https://process.honeywell.com/
Or contact your Honeywell Account Manager

Process Solutions
Honeywell

3940 Virginia Avenue,
Cincinnati, Ohio 45227

Honeywell Control Systems Ltd
Honeywell House, Skimped Hill Lane
Bracknell, England, RG12 1EB

Shanghai City Centre, 100 Jungi Road
Shanghai, China 20061

https://process.honeywell.com/

51-52-03-41
January 2023

Technical Information

Honeywell

Controller Designer Software Specifications

51-52-03-43, May 2022

Description

Controller Designer software for the ControlEdge HC900 Controller is an easy-to-use Windows-based application that is operable over Ethernet, a serial port or modem connection to simplify controller configuration. Designer software supports English, Chinese (Mandarin), Russian, and German language. When used with the C70 series CPUs with dual Ethernet capability, Controller Designer software supports verification of both communication ports and may be used with either port.

It provides advanced monitoring functions for debug, allows RUN/PGM-mode configuration changes, uploads the complete, annotated graphic controller control strategy, plus supplies an array of reports for enhanced documentation.

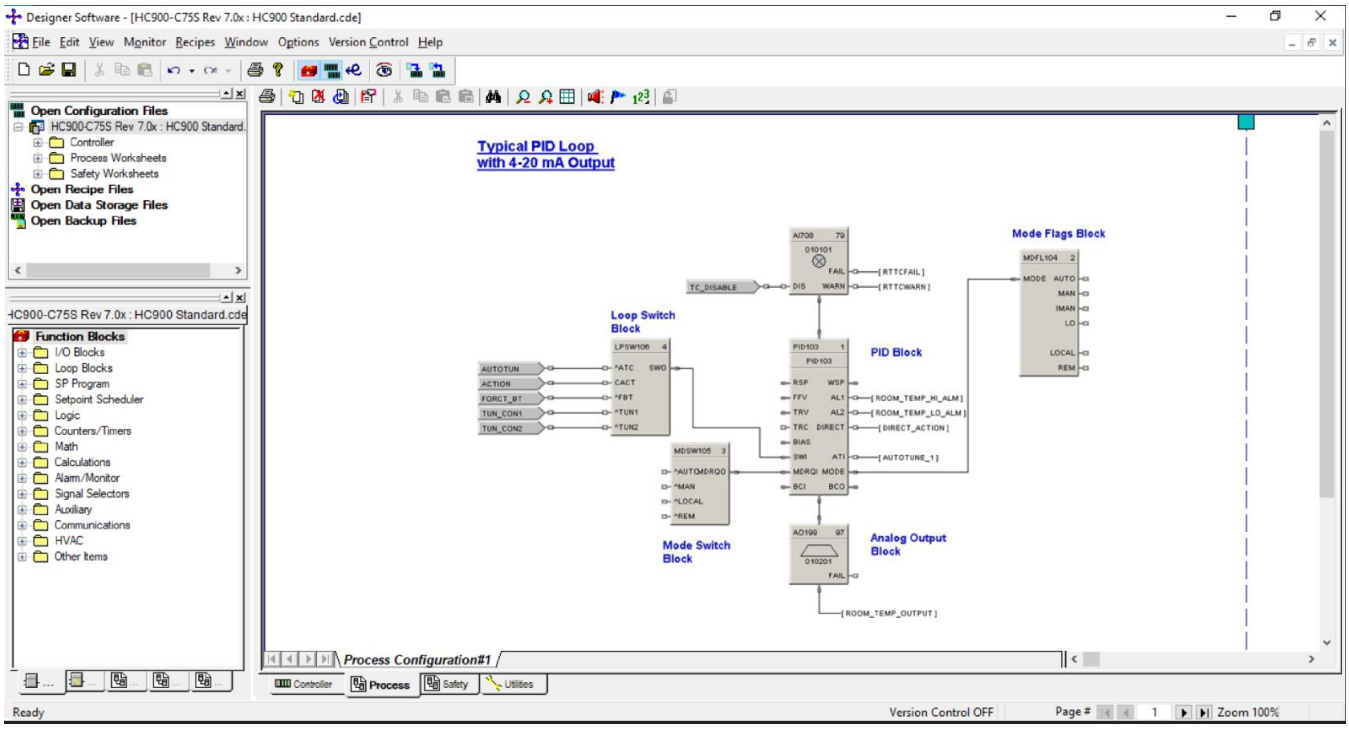


Figure 1 - Controller Designer Software

Features

- Graphic drag and drop, soft-wire configuration
- Supports configuration edit downloads in RUN mode
- Version Control System
- User Library Creation
- Configures:
    - Controller
    - Peer-to-peer data exchange (Peer and safety peer communication)
    - Recipes, SP profiles,
    - SP Schedules, Sequences
    - Alarms, events, e-mail alarms/events
    - Modbus Serial and Modbus TCP Master communications
    - HART communication and Function Blocks (Command 3 and 48)
- Graphic function block configuration and annotations
- Allows graphic configuration partitioning for Process and Safety
- Extensive on-line monitoring features including:
    - User defined and pre-defined watch windows
    - Power flow indication
    - Function block pin values
    - Multiple function block access
    - Signal trace-back to source
- 5 Zoom levels for detail viewing
- On-line diagnostic windows for analyzing controller, I/O, network host and controller peer connections
- Supports Ethernet, RS 485 direct connection to access controller
- Supported OS:
    - Windows™ 7 (32 and 64 bit OS)
    - Windows™ 8.1 (32 and 64 bit OS)
    - Windows 10 (32 and 64 bit OS)
    - Windows Server 2016
    - Windows Server 2019

The ControlEdge HC900 Controller Designer provides separate functional tabbed worksheets for:

- Controller hardware setup
- 559 Operator interface setup
- Function block configuration for Process
- Function block configuration for Safety
- Utilities, communication ports setup and other diagnostic support.
- Custom Modbus Map

The user-friendly graphic function block development environment allows partitioning of the control strategy into up to 160 (40 for version below 6.6) “worksheets” of 20 pages each.

This allows the configuration to be organized according to Process and Safety function, providing faster configuration access, and improved documentation. In addition, OEMs may apply additional security to specific worksheets to prohibit access to proprietary operations while allowing their customers to modify unprotected worksheets. For maximum security, the default password access feature for worksheets may be disabled.

Function Blocks are selected from a categorized list, dropped on a selected worksheet page, and soft-wired to other blocks directly or via tag references. Index numbers allow users to read or write data within the block when the data type is not brought to an output pin of the object. Editing tools such as box copy and paste speed development. You may also copy and paste portions of strategies from other configurations. The Undo feature provides a convenient method to reverse incorrect or undesired actions.

Configuration Management

The controller configuration file may be imported directly into Station Designer software for configuring 900 Control Station operator interfaces. Maintaining controller and operator interface configuration files that match the actual configuration being executed in the controller is a simple task with Controller Designer’s configuration upload capability. When a PC with Controller Designer software is in communication with the controller, the Upload feature reads the configuration from the controller’s memory and back-builds an exact configuration file in the PC, including all text annotations used to describe functional areas. This file can then be saved to disk as a back-up and downloaded when needed to simplify maintenance.

Note: The old phased-out Control Stations (900CS10-00/ 900CS15-00) will not support import of HC900 software configuration file (*****.cde) v7.1 and above. For HC Designer v7.1 and above please migrate to new 900CR series Control Stations with Station Designer v3.1.7100 and above.

New versions of Controller Designer software may be used to develop configurations for older controller versions. Configurations developed for early firmware versions of ControlEdge HC900 Controllers are automatically converted to be compatible with newer controller versions when saved as the desired version level. All controllers in the ControlEdge HC900 product line are supported with the same software. Configurations

developed with Control Builder software version 5.0 for UMC800 Controllers may also be converted for use with ControlEdge HC900 controllers.

Configuration Edits-RUN Mode

Configuration changes such as block additions or substitutions and soft-wiring can be transferred to the controller during the RUN/PRGM mode, avoiding initialization. All outputs and status are held during a minimal transfer time after which processing continues at the start of a scan. Changes with I/O module updates require additional time. The amount of time the outputs will be held, typically several seconds, is presented to the user at the time of download along with options to proceed.

Configuration changes downloaded to the controller while the controller is in the Program mode, or if cold start is selected while in the Run mode, all controller outputs are turned off and a re-initialization of the controller database is executed.

Configuration File Properties

Configuration file properties are maintained during configuration development identifying the date of initial file creation and the date of the last file modification. Areas are provided to include a configuration name and the name of the author. During configuration, a Statistics summary (Figure 2) indicates the amount of controller resources used by the configuration and the amount of resources available. Security is provided via password entry to limit access to the entire configuration or to only user specified configuration worksheets.

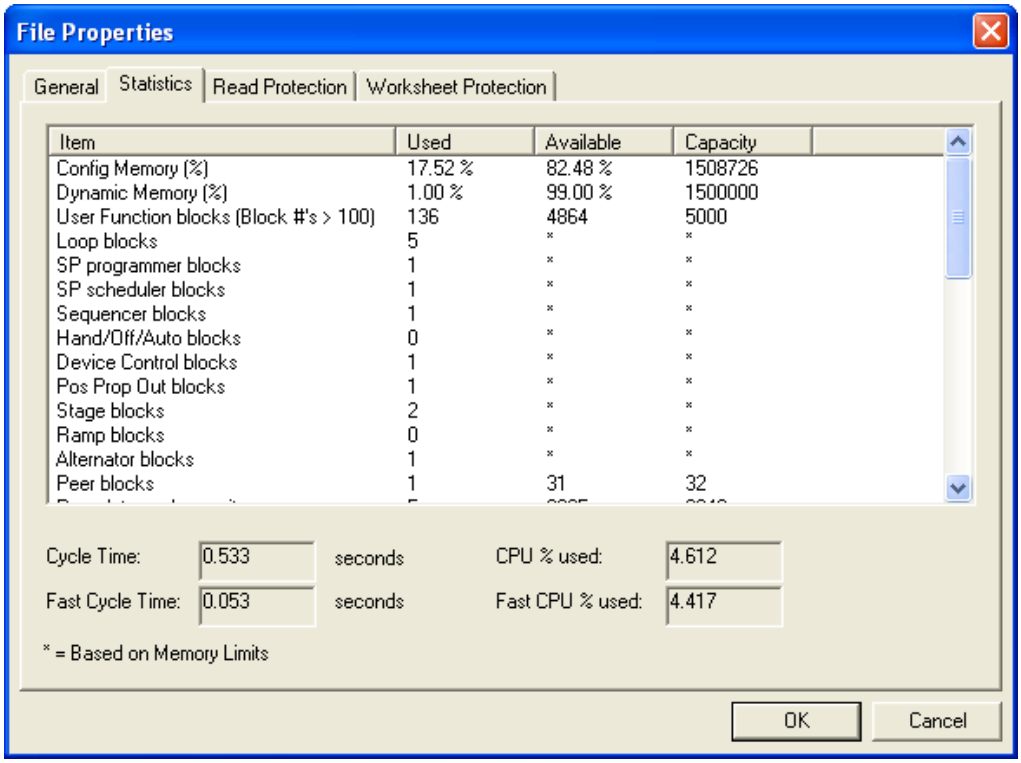


Figure 2 - File properties

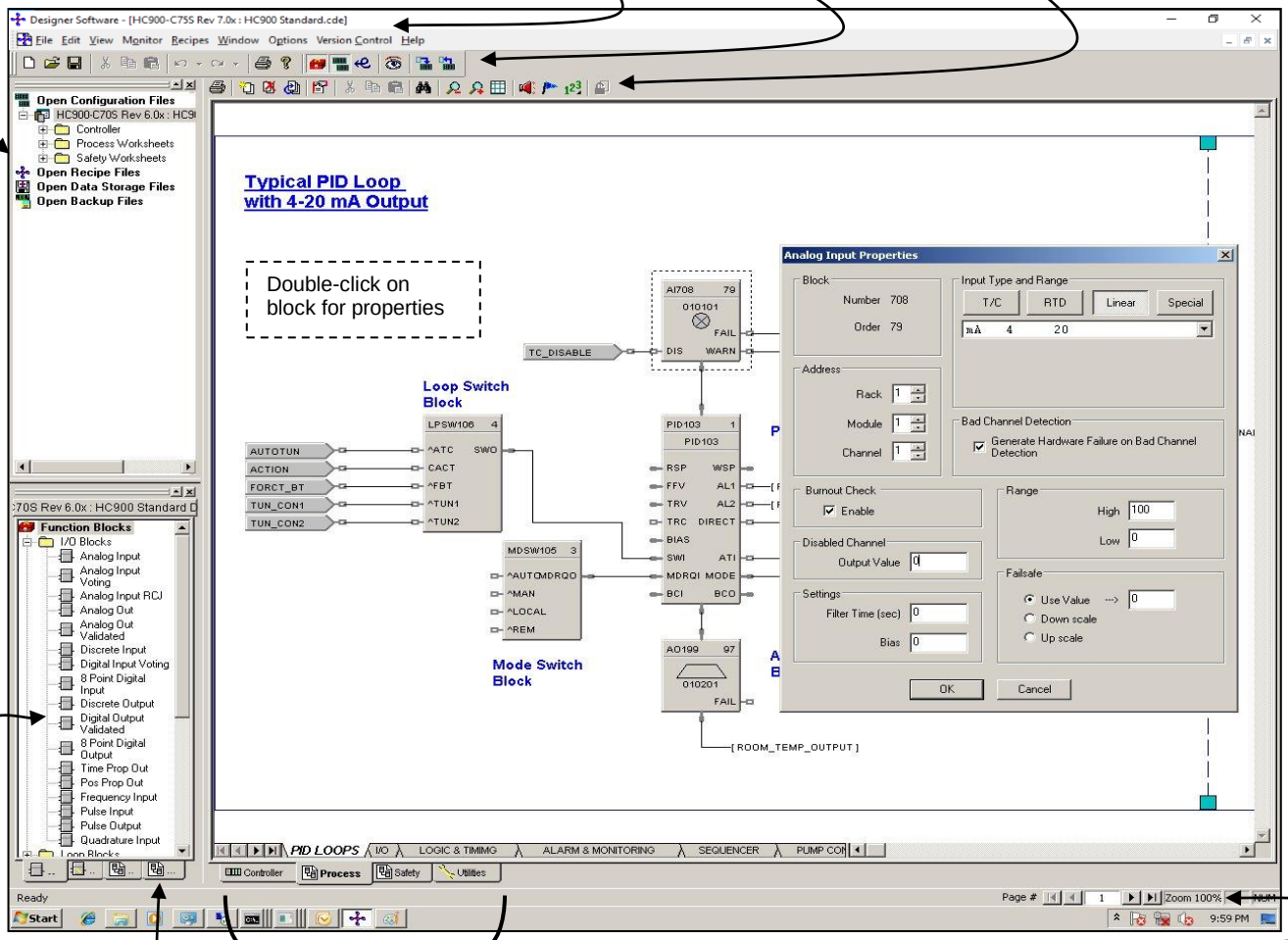
Edit mode Overview

File Browser shows all open files (configurations, recipes, data storage, and backup)

Main Menu

Main Tool Bar

Function-related Tool Bar

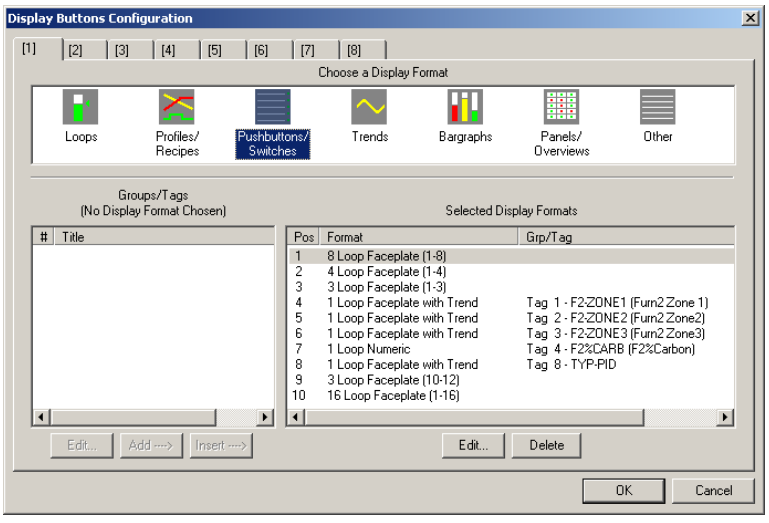


Status Bar

Functional Tabs (left to right) (see page 23 for details):
Controller - lists I/O used, e-mail alarms
Display - format select, tag assignment, F-key assignment (limited to versions prior to 6.0)
Function Blocks - graphic configuration (shown above)
Modbus Map – shows custom Modbus addresses
Utilities - setup for ports, data storage, time, calibration and diagnostics

Config tab lists all configured blocks, click on any block to find.

Worksheet Toolbox lists available Function Blocks and software tools, categorized by tabs Normal/Fast Scan & by block type.



On-Line Monitoring Features

Controller Designer on-line monitoring tools allows quick analysis of configuration problems. Tools include:

1. **Multiple function block monitor access on a single display from multiple worksheets.** Most internal parameters are available for read/write plus block outputs may be forced including I/O and logic blocks. Principle blocks such as PID, Setpoint Programmer and Sequencers have dialog boxes to allow operation and test. Stored profiles or sequences may also be selected on-line.

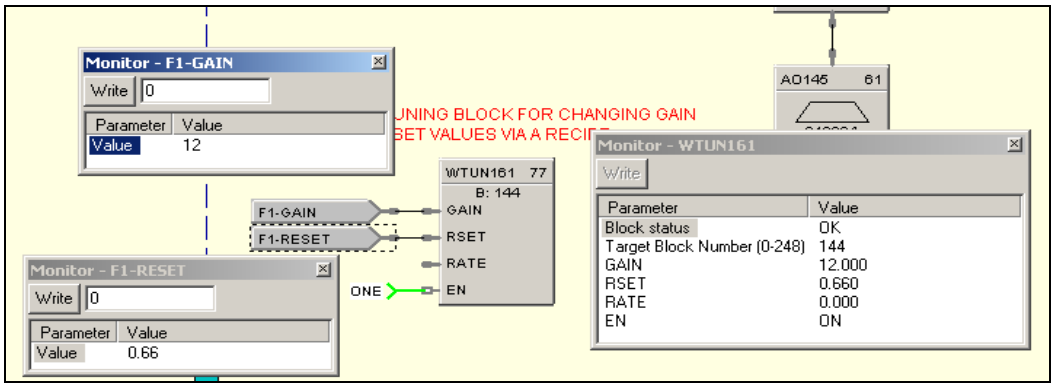


Figure 3 - Multiple function block monitoring

2. **Logic Power Flow indication**. You can choose solid green = ON/dotted red = OFF or solid red = ON/dotted green = OFF to indicate power flow.

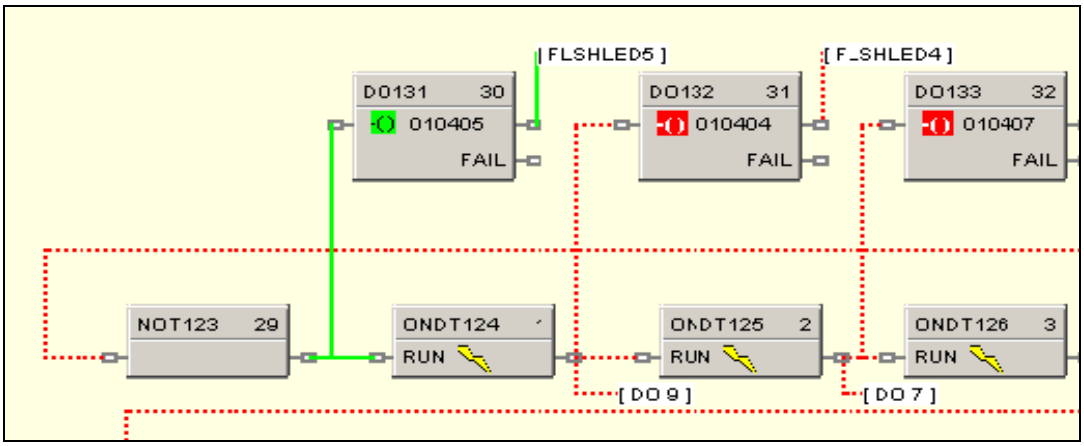


Figure 4 - Logic power flow

On-Line Monitoring Features (cont'd)

3. **User-selected Watch Window.** Allows access to digital and analog I/O, Signal Tags, Variables), and custom display data groups by tab selection. A custom Watch Window may also be created by selecting parameters from the configuration diagram. Write capability from Watch Windows is supported. Variables on the safety worksheet must be enabled and restricted to non-critical safety functions for writing while operating in the safe mode. Writes are then enabled utilizing the associated Write Variables function (WVAR) located on the process worksheet.

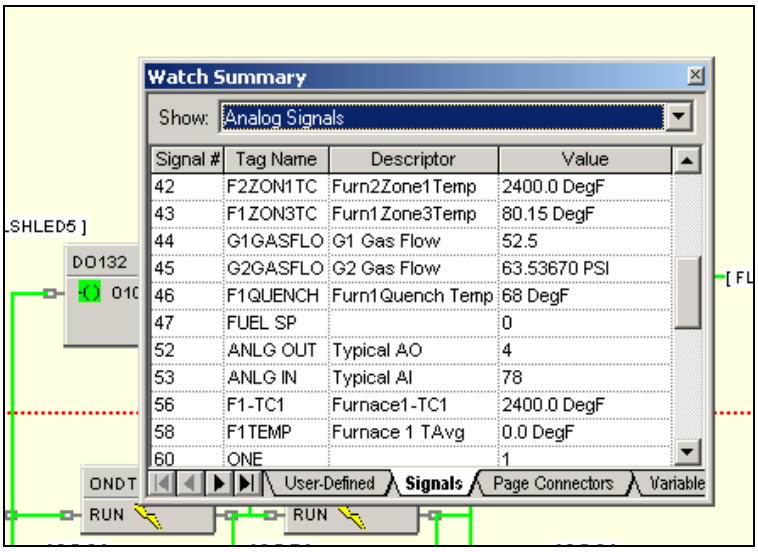


Figure 5 - User defined watch window

4. **Dynamic function blocks input and output values.** Provided when monitoring the function blocks of the configuration diagram, the dynamic value presentation may be limited to a single pin, a single function block, or it may encompass the entire display window.

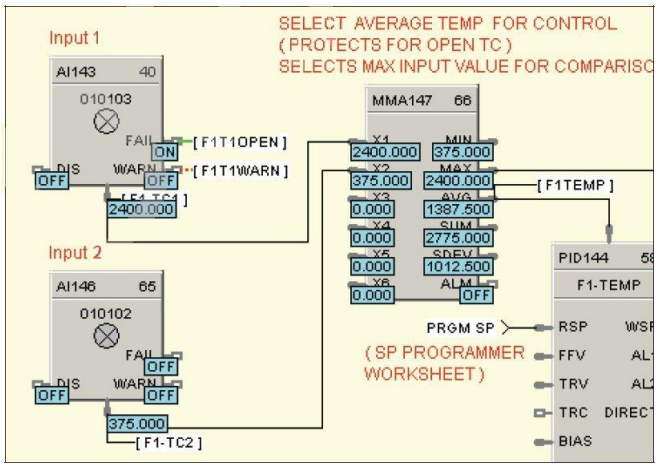


Figure 6 - Dynamic function block values

5. **Signal Trace-back for any function block input.** Used to find the signal source for quick identification of potential errors.
6. **FIND**. A FIND function allows location of multiple instances of specific tags across all worksheets.

On-Line Monitoring Features (cont'd)

7. **Recipe Management**. A separate Recipe Management feature allows creating, editing, copying and exporting recipes, profiles, schedules and sequences to allow transferring this information between configurations and controllers.
8. **Diagnostic Monitoring.** Provided in the Utilities section of the software to view controller status, I/O rack status and communication port diagnostics status for both serial and network ports. A search function to locate/force/unforce function blocks is also provided.

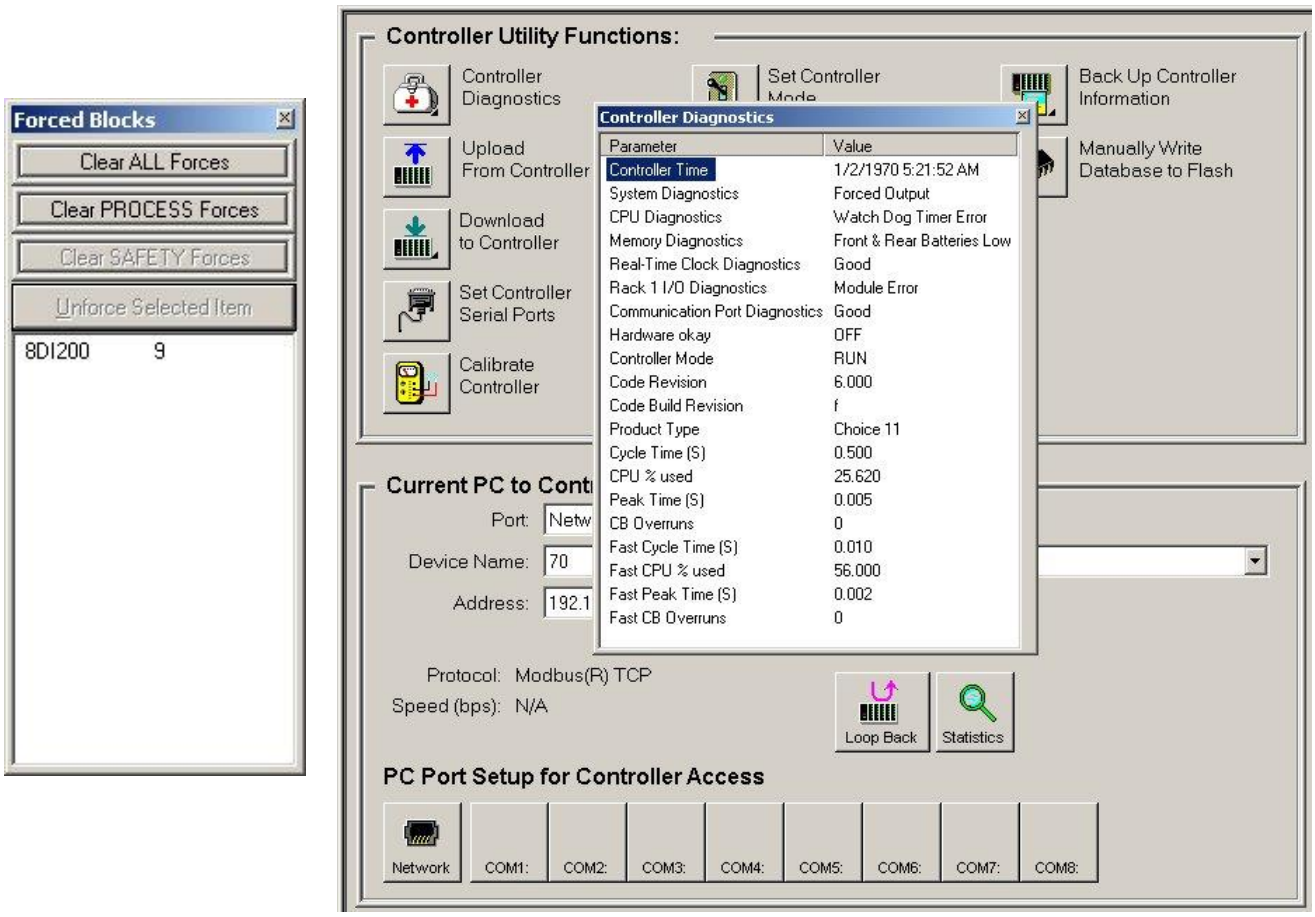


Figure 7 - Forced blocks window (left), Diagnostic monitoring window

900 Control Station

When configuring 900 Control Station, the configuration file from Controller Designer is imported into Station Designer software to simplify database management when building displays. Database mismatches between the controller and operator interface configurations are detected at run-time of the interface.

Remote Access

Controller Designer software supports remote access to ControlEdge HC900 Controllers via Modem using Modbus Protocol or Honeywell's ELN Protocol. To support this function, an external modem must be connected to the serial port of the remote controller. Controller Designer software provides a calling list facility to simplify access. Selecting Modem communications from the Utilities tab and requesting a dial up operation provides the user with a calling list to access the appropriate controller. Once communications are established, the configuration of the controller may be uploaded to the PC and edited or monitored remotely.

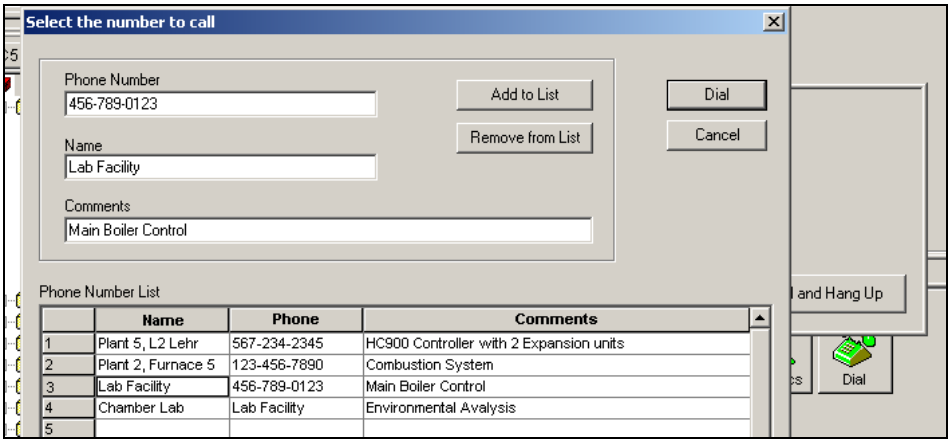


Figure 8 - Remote access dialup

File Export for database transfer

When interfacing the ControlEdge HC900 controller to PC software programs or 3rd party operator interfaces, a time saving service is provided to export tag and variable definitions in CSV or tab delimited formats. In addition, the Modbus addresses of each configured data parameter may also be exported to a file.

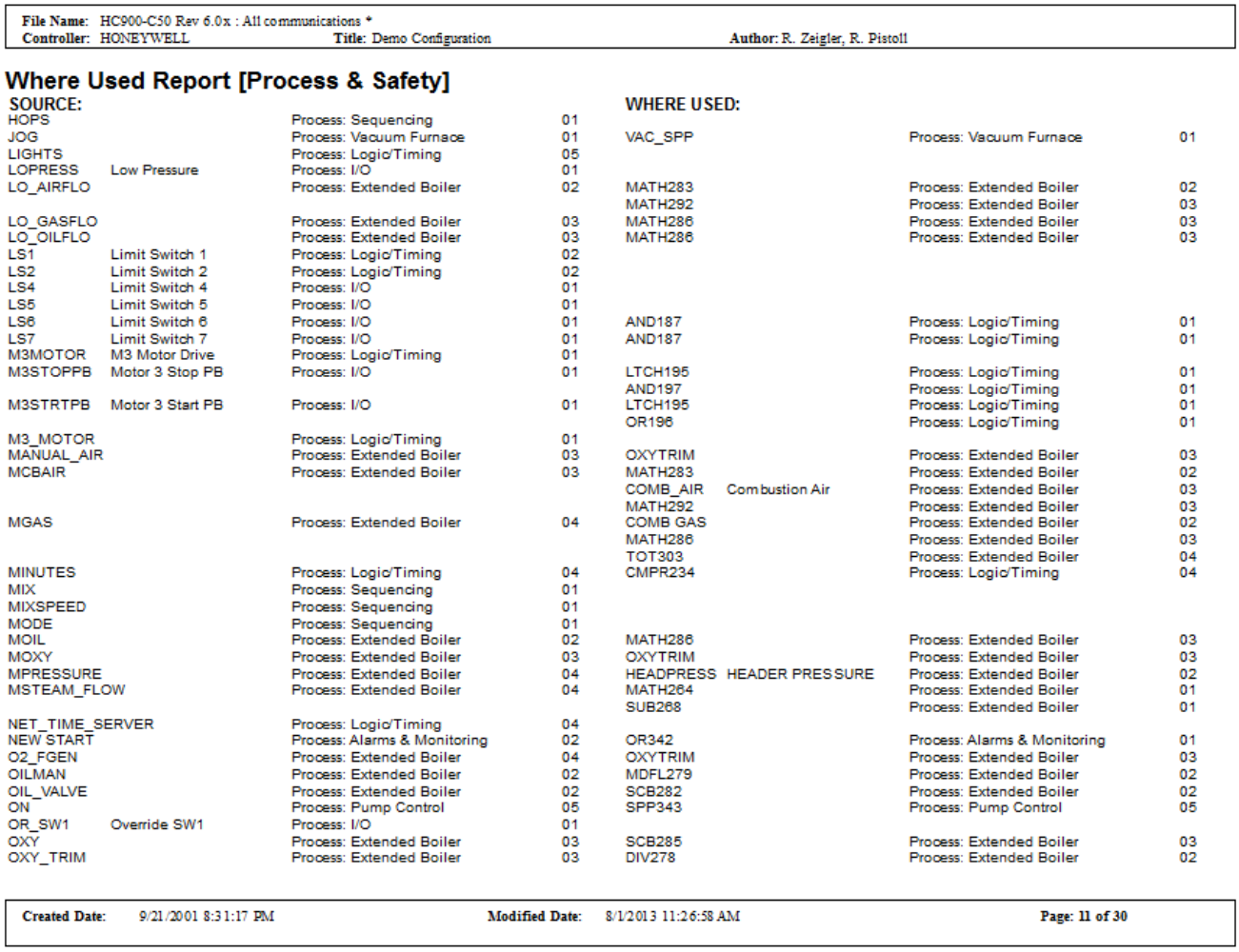
A11 fx Hex Addr

	A	B	C	D	E	F	G	H	I	J
1	RevisionID:	5500.0032.0005.0002.0008								
2	File Name:	HC900-C70 Rev 4.1x : HC900 Standard Demo C70_4.1.cde *								
3	Controller Name:	FURNACE1								
4	Title:	Demo Configuration								
5	Author:	R. Zeigler, R. Pistoll								
6	Created Date:	########								
7	Modified Date:	########								
8										
9	Report Title:	All Modbus Registers Report								
10										
11	Hex Addr	Dec Addr	Partition Name	Tag Name	Description	Type	#	Data Type	Access	EU
12	0x0000	1	Misc__Parameters	Instrument_Mode		System Register		unsigned 16	R/W	
13	0x0002	3	Misc__Parameters	Load_Recipe		System Register		unsigned 16	W	
14	0x0004	5	Misc__Parameters	Reserve_Status___C70R_Only		System Register		unsigned 16	R	
15	0x0040	65	Loops_1_24	F2_ZONE1.PV	PV	PID		float 32	R	
16	0x0042	67	Loops_1_24	F2_ZONE1.RSP_SP2	RSP SP2	PID		float 32	R/W	
17	0x0044	69	Loops_1_24	F2_ZONE1.WSP	WSP	PID		float 32	R/W	
18	0x0046	71	Loops_1_24	F2_ZONE1.Output	Output	PID		float 32	R/W	
19	0x0048	73	Loops_1_24	F2_ZONE1.PV__B_	PV (B)	PID		float 32	R	
20	0x004C	77	Loops_1_24	F2_ZONE1.Gain_1_Prop_Band_1	Gain 1 Prop Band 1	PID		float 32	R/W	
21	0x004E	79	Loops_1_24	F2_ZONE1.Direction	Direction	PID		float 32	R	
22	0x0050	81	Loops_1_24	F2_ZONE1.Reset_1	Reset 1	PID		float 32	R/W	
23	0x0052	83	Loops_1_24	F2_ZONE1.Rate_1	Rate 1	PID		float 32	R/W	
24	0x0054	85	Loops_1_24	F2_ZONE1.Scan_Cycle_Time	Scan Cycle Time	PID		float 32	R	
25	0x0056	87	Loops_1_24	F2_ZONE1.PV_Low_Range	PV Low Range	PID		float 32	R	
26	0x0058	89	Loops_1_24	F2_ZONE1.PV_High_Range	PV High Range	PID		float 32	R	
27	0x005A	91	Loops_1_24	F2_ZONE1.Alarm_1_SP1	Alarm 1 SP1	PID		float 32	R/W	

Figure 9 - File Export

Controller Designer Software Reports

Documenting your configuration is supported through a variety of report formats. Each can be print-previewed. A few of these include a summary of the controller I/O used, function block worksheet selection (each page of diagram worksheet printed as 8.5 x 11” sheet), function block properties, tag parameters, recipe listings, setpoint profile listings, sequencer listings, setpoint scheduler listings, OI display groups, and controller setup. For signal tracing, a Where Used list is also provided.



File Name: HC900-C50 Rev 6.0x : All communications *
Controller: HONEYWELL **Title:** Demo Configuration **Author:** R. Zeigler, R. Pistoll

Where Used Report [Process & Safety]

SOURCE:				WHERE USED:			
HOPS		Process: Sequencing	01				
JOG		Process: Vacuum Furnace	01	VAC_SPP		Process: Vacuum Furnace	01
LIGHTS		Process: Logic/Timing	05				
LOPRESS	Low Pressure	Process: I/O	01				
LO_AIRFLO		Process: Extended Boiler	02	MATH283		Process: Extended Boiler	02
				MATH292		Process: Extended Boiler	03
LO_GASFLO		Process: Extended Boiler	03	MATH286		Process: Extended Boiler	03
LO_OILFLO		Process: Extended Boiler	03	MATH286		Process: Extended Boiler	03
LS1	Limit Switch 1	Process: Logic/Timing	02				
LS2	Limit Switch 2	Process: Logic/Timing	02				
LS4	Limit Switch 4	Process: I/O	01				
LS5	Limit Switch 5	Process: I/O	01				
LS6	Limit Switch 6	Process: I/O	01	AND187		Process: Logic/Timing	01
LS7	Limit Switch 7	Process: I/O	01	AND187		Process: Logic/Timing	01
M3MOTOR	M3 Motor Drive	Process: Logic/Timing	01				
M3STOPPB	Motor 3 Stop PB	Process: I/O	01	LTCH195		Process: Logic/Timing	01
				AND197		Process: Logic/Timing	01
M3STRTPB	Motor 3 Start PB	Process: I/O	01	LTCH195		Process: Logic/Timing	01
				OR196		Process: Logic/Timing	01
M3_MOTOR		Process: Logic/Timing	01				
MANUAL_AIR		Process: Extended Boiler	03	OXYTRIM		Process: Extended Boiler	03
MCBAIR		Process: Extended Boiler	03	MATH283		Process: Extended Boiler	02
				COMB_AIR	Combustion Air	Process: Extended Boiler	03
				MATH292		Process: Extended Boiler	03
MGAS		Process: Extended Boiler	04	COMB GAS		Process: Extended Boiler	02
				MATH286		Process: Extended Boiler	03
				TOT303		Process: Extended Boiler	04
MINUTES		Process: Logic/Timing	04	CMPR234		Process: Logic/Timing	04
MIX		Process: Sequencing	01				
MIXSPEED		Process: Sequencing	01				
MODE		Process: Sequencing	01				
MOIL		Process: Extended Boiler	02	MATH286		Process: Extended Boiler	03
MOXY		Process: Extended Boiler	03	OXYTRIM		Process: Extended Boiler	03
MPRESSURE		Process: Extended Boiler	04	HEADPRESS	HEADER PRESSURE	Process: Extended Boiler	02
MSTEAM_FLOW		Process: Extended Boiler	04	MATH264		Process: Extended Boiler	01
				SUB268		Process: Extended Boiler	01
NET_TIME_SERVER		Process: Logic/Timing	04				
NEW START		Process: Alarms & Monitoring	02	OR342		Process: Alarms & Monitoring	01
O2_FGEN		Process: Extended Boiler	04	OXYTRIM		Process: Extended Boiler	03
OILMAN		Process: Extended Boiler	02	MDFL279		Process: Extended Boiler	02
OIL_VALVE		Process: Extended Boiler	02	SCB282		Process: Extended Boiler	02
ON		Process: Pump Control	05	SPP343		Process: Pump Control	05
OR_SW1	Override SW1	Process: I/O	01				
OXY		Process: Extended Boiler	03	SCB285		Process: Extended Boiler	03
OXY_TRIM		Process: Extended Boiler	03	DIV278		Process: Extended Boiler	02

Created Date: 9/21/2001 8:31:17 PM **Modified Date:** 8/1/2013 11:26:58 AM **Page: 11 of 30**

Figure 10 - Sample Where Used Report

Language Localization

The HC Designer software supports language localization in English, Chinese (Mandarin), Russian, and German. The localization option in the **View** menu allows the user to switch between the supported languages.

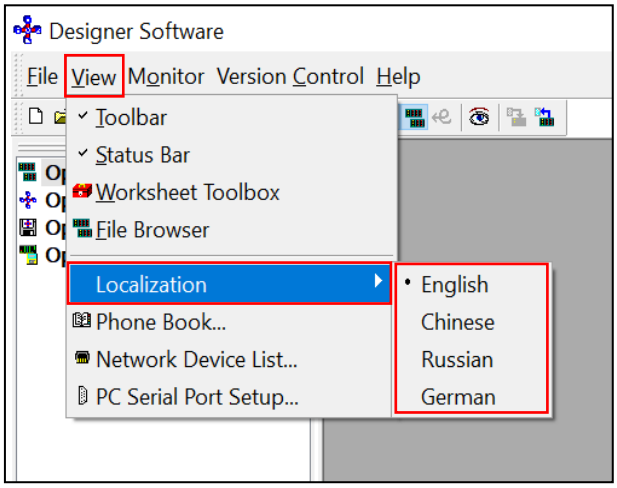


Figure 11 – Language Localization Feature

The following are the screenshots of the localized versions of the HC Designer home page in Chinese, Russian, and German languages shown for reference.

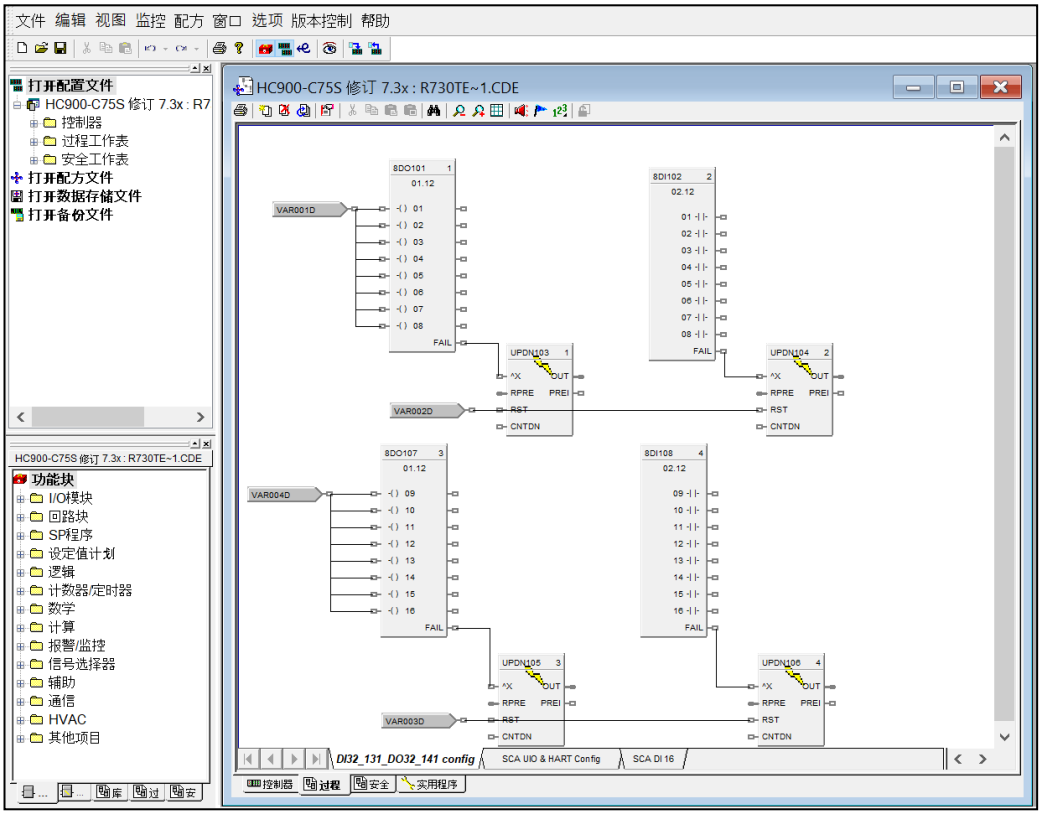


Figure 12 – HCD localized in Chinese language

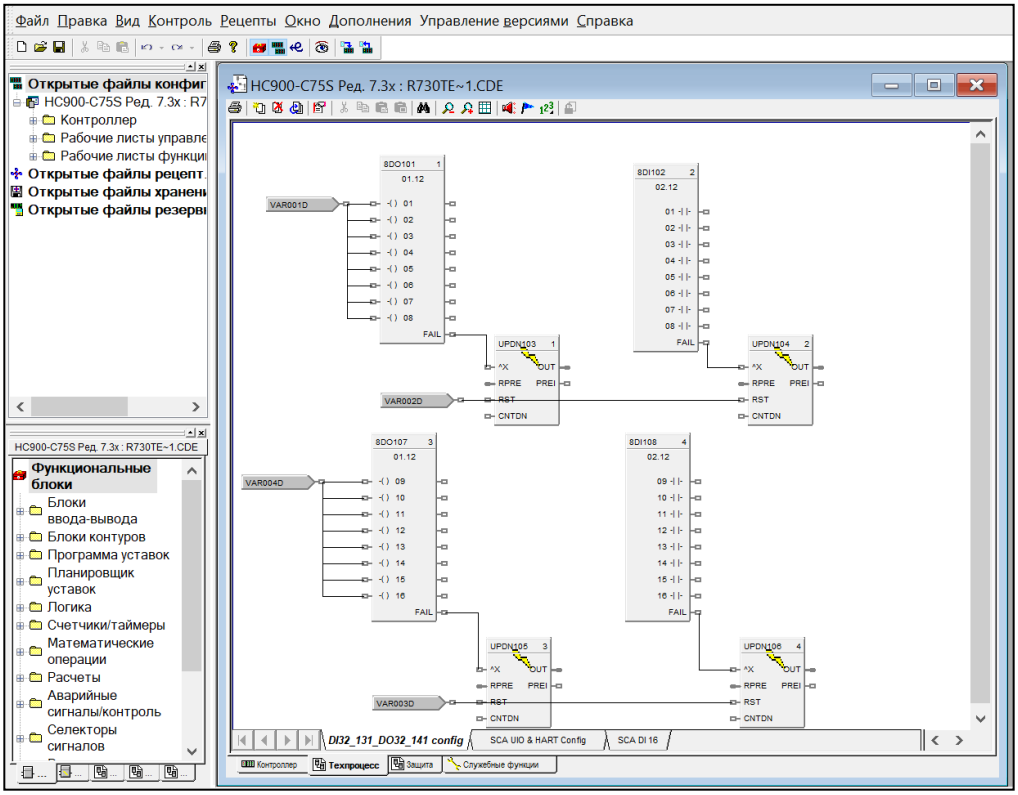


Figure 13 – HCD localized in Russian language

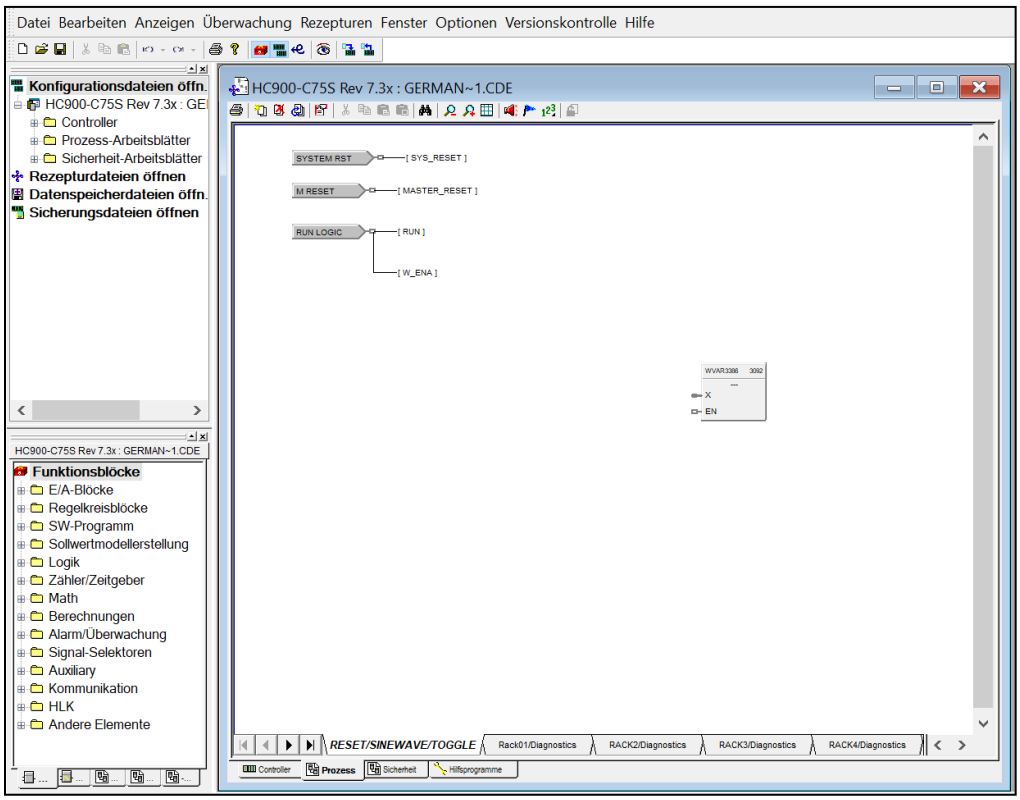
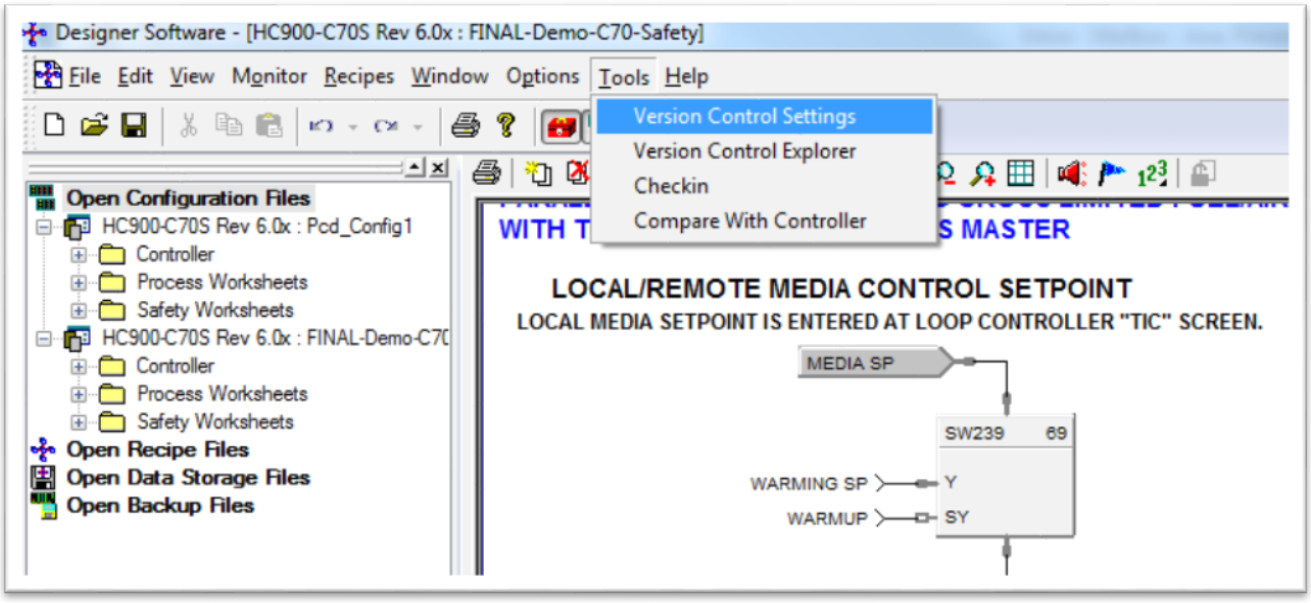


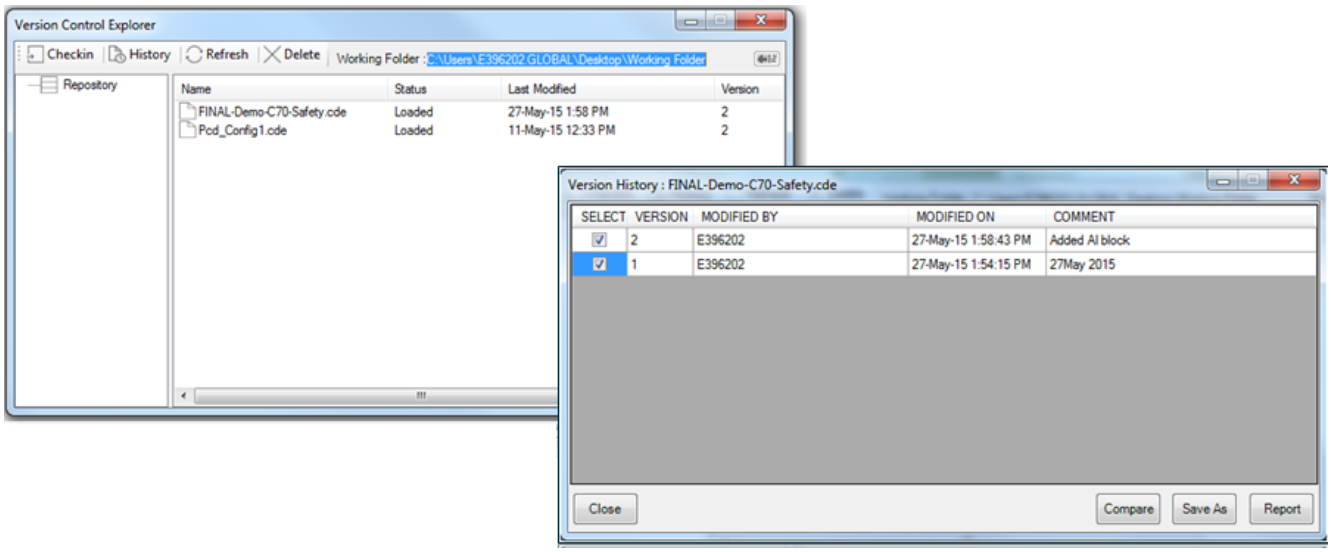
Figure 14 – HCD localized in German language

Version Control

The Version Control System provides capabilities to save changes made to the cde and non cde files over time and creates repositories to manage different versions.

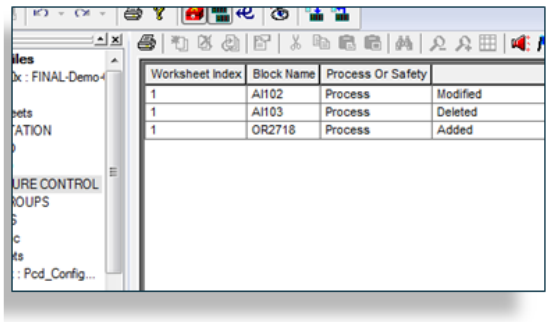


This helps to manage, track, and compare differences between two revisions.

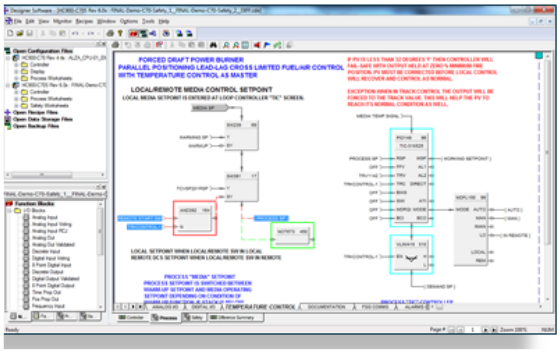


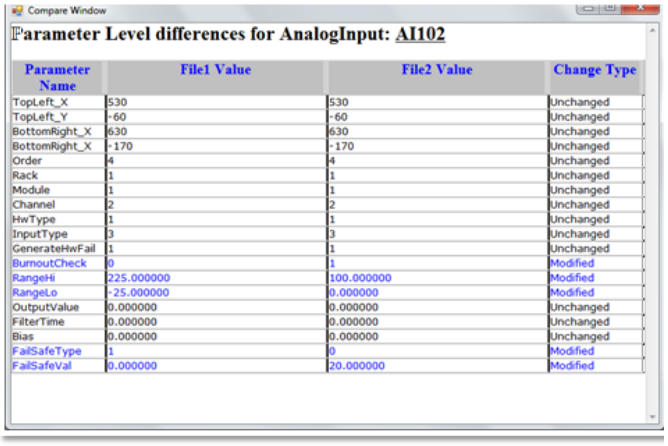
Report summary

The report provides details of compared data between two files or versions. The data is classified and presented under different categories such as Controller, Process, Safety, and Difference Summary. This report can be exported to Microsoft Excel file and used for future references.



Worksheet Index	Block Name	Process Or Safety	
1	AI102	Process	Modified
1	AI103	Process	Deleted
1	OR2718	Process	Added





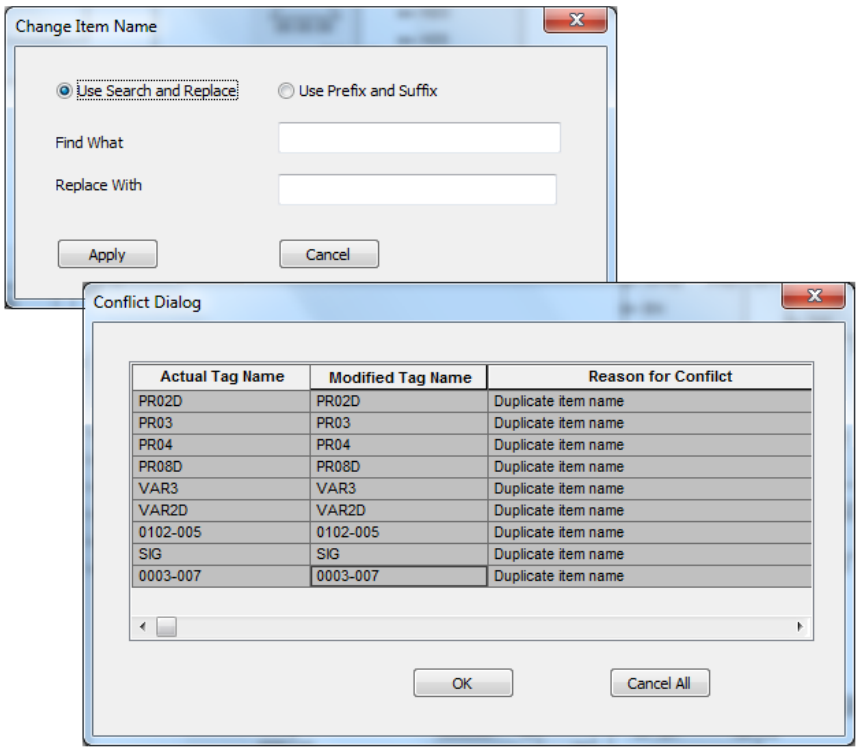
Compare Window

Parameter Level differences for AnalogInput: AI102

Parameter Name	File1 Value	File2 Value	Change Type
TopLeft_X	530	530	Unchanged
TopLeft_Y	-60	-60	Unchanged
BottomRight_X	630	630	Unchanged
BottomRight_X	-170	-170	Unchanged
Order	4	4	Unchanged
Rack	1	1	Unchanged
Module	1	1	Unchanged
Channel	2	2	Unchanged
HwType	1	1	Unchanged
InputType	3	3	Unchanged
GenerateHwFail	1	1	Unchanged
BurnoutCheck	0	1	Modified
RangeHi	225.000000	100.000000	Modified
RangeLo	-25.000000	0.000000	Modified
OutputValue	0.000000	0.000000	Unchanged
FilterTime	0.000000	0.000000	Unchanged
Bias	0.000000	0.000000	Unchanged
FailSafeType	1	0	Modified
FailSafeVal	0.000000	20.000000	Modified

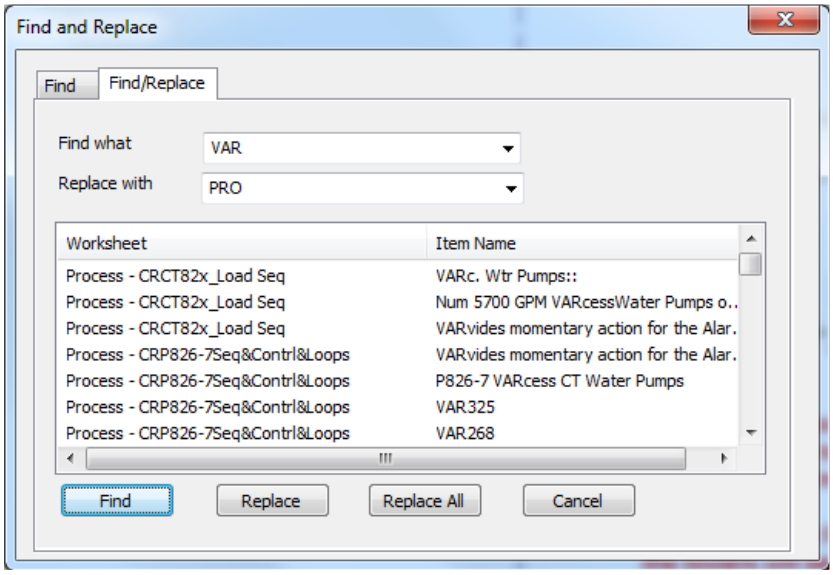
Paste special functionality

This window allows the user to find and replace text and add a prefix or suffix to the item names. This will help to maintain consistency across the item names.



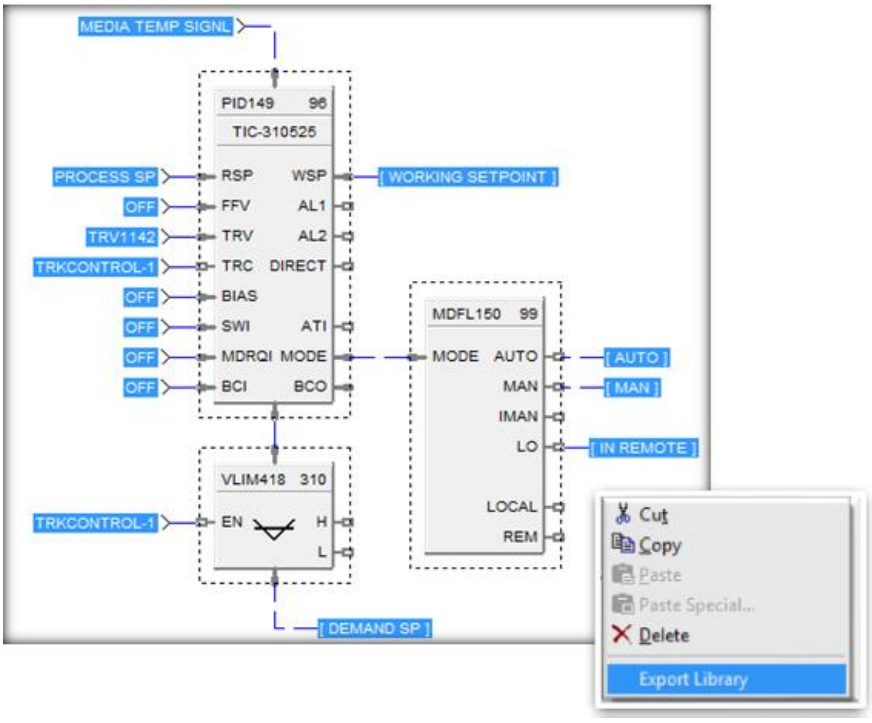
Find and Replace

The **Find and Replace** feature allows the user to identify specific tags and replace them in all instances at the same time.



Library Functionality

This functionality helps to export a group of the control logic and thereby save to a location. These groups can be imported in the worksheet whenever required. This saves time spent in recreating the control logics again. It is easy to share and reuse by other users via the designer software.



Help

Controller Designer provides extensive user help in the form of topical help information that may be accessed from the Help selection on the main menu. Help information in this section cover subjects from how to get started to extensive detail on each function block. See Figure 12.

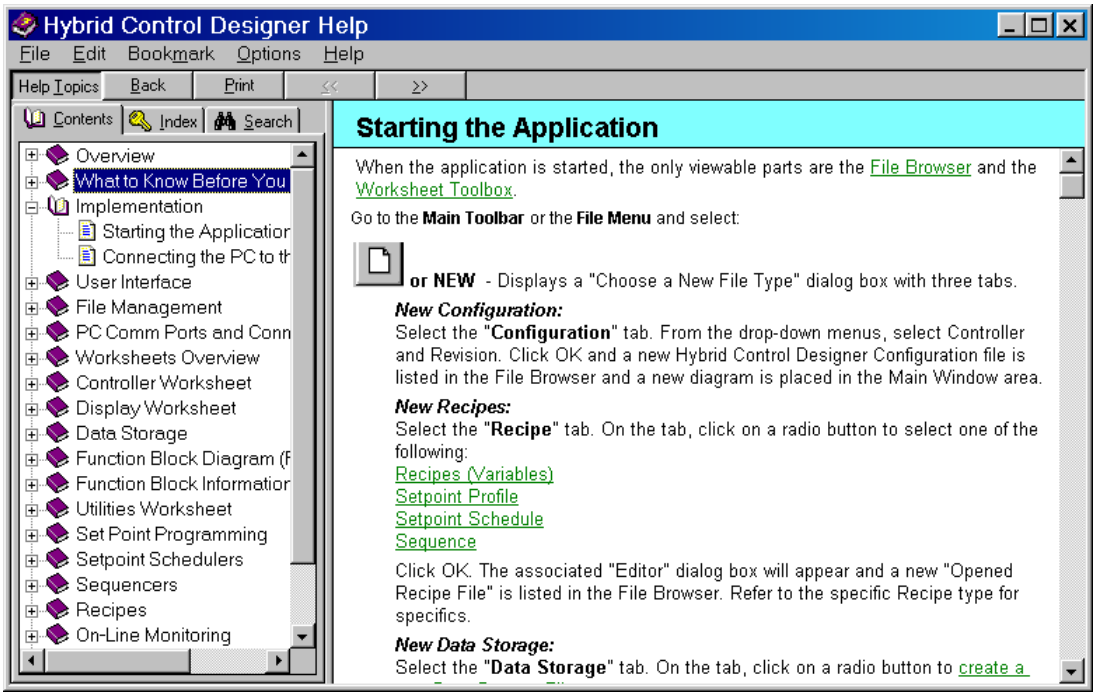


Figure 12 - Topic help

Topic help specific to each function block is available. See Figure 13.

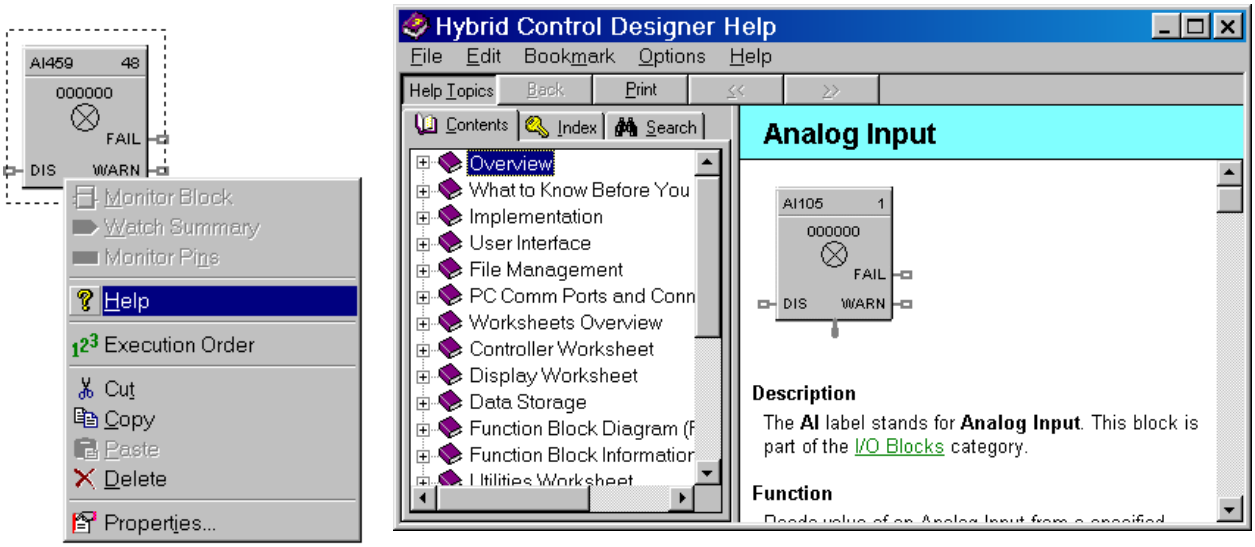


Figure 13 - Right-clicking on an AI block (L) to access its help (R)

Help (Continued)

Popup help for entry fields is available. See Figure 14.

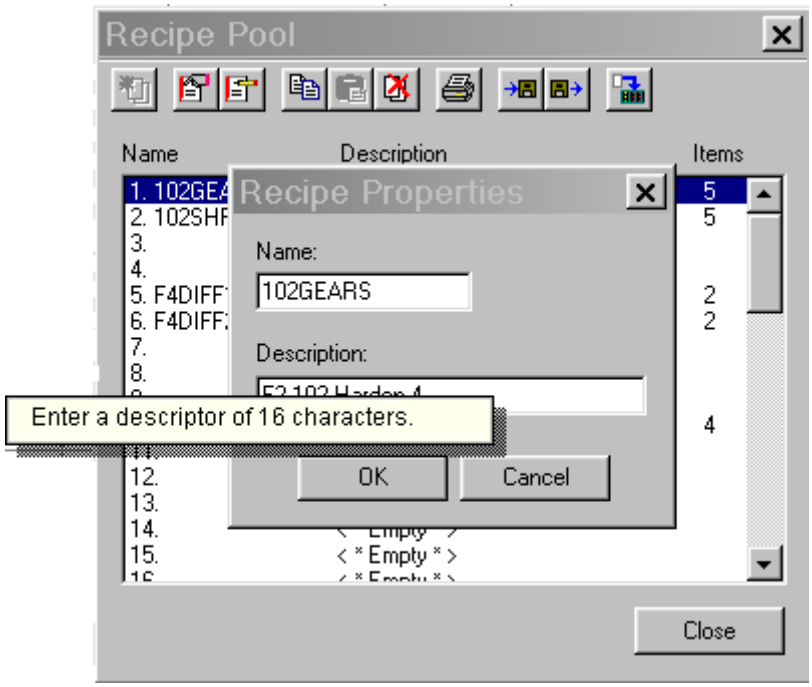


Figure 14 - Right-clicking on a recipe description to see its popup help

ControlEdge HC900 Controller Utilities Software

HC Utilities is a separate optional PC software application that provides many of the user maintenance and diagnostic functions of HC Designer software but restricts configuration changes. This software is an ideal program for OEMs and Integrators who wish to provide a maintenance program to their customers without the risk of unauthorized changes to the controller's program.

Files created in HC Utilities for Recipes, and Data Storage schedules may be loaded into the system via serial communications, network communications.

The serial and network interface capabilities also allow users to download new controller configurations or perform equipment firmware upgrades.

Features include:

- Recipe development: (Variables, Setpoint Profiles, Setpoint Schedules, Sequences)
- Data storage schedules
- Set controller communication ports
- Calibrate controller I/O
- Configuration reloads
- Firmware Upgrades
- View controller diagnostics
- Monitor controller configurations of unlocked worksheets

Specifications

TABLE 1 – ControlEdge HC900 Controller Designer & Controller Utilities Software Specifications	
Design	
PC Requirements	Software runs on Windows™ 7 (32-bit and 64-bit), Windows™ 8.1 (32-bit and 64-bit), Windows™ 10 (32-bit and 64-bit), Windows Server 2016, and Windows Server 2019. Minimum—Pentium Class 1.5 GHz with 1 GB of RAM (2.5 GHz with 4GB with multi core is recommended for better performance) Screen resolution – SVGA (1024x768 recommended) or better
Configuration (HC Designer only)	Off-line configurations with optional on-line (Run mode) configuration download.
Monitoring	On-line monitoring allows user to test the developed configuration.
System Interconnection	Connected to controller through its Ethernet 10/100 Base-T host ports, RS485 port. *Maximum Distance for Ethernet Connection:* Not limited, per user network topology *Cable termination:* RJ-45
Modem	*PC Interface:* Supports Microsoft Windows Telephony API (TAPI) device independent modem communications. Baud rate = 1200 to 56.6KB selectable *Controller Interface:* Connects to the controller configuration port. *Most commercially available modems with equivalent specifications to those validated should function with the ControlEdge HC900 controller.* The following modems have been validated: 3COM US Robotics 56K Data/Fax External Modem, Zoom 56K Dual mode External Modem, Best Data 56SX Data Fax External Modem The modem must have the following capabilities: • Auto answer • Can operate at 1200 baud, 8 data bits, 1 stop bit, and no parity • Hardware handshaking can be disabled • Software handshaking can be disabled • Data Terminal Ready (DTR) input can be disabled • Result codes can be suppressed • Echo can be disabled • Must be equipped with non-volatile memory (NVRAM) so that settings that are configured using command strings can be retained during a power-outage • Must be able to load the NVRAM settings automatically on power-up

TABLE 2 ControlEdge HC900 Controller Designer & Controller Utilities Software Functions	
Controller CPUs supported	C30, C50, C70 and C75
Controller Firmware Version Supported	Software version number must be equal to or a higher number than the controller firmware version number
Configuration File Conversions	Can convert between certain versions or CPU types.
Recipe Development	Recipes may be developed for Setpoint Profiles, Setpoint Schedules, Variables and Sequences. Recipes may be stored as separate files, downloaded to a controller and/or printed for a hard copy record.
Data Storage Schedules	Data Storage schedules in the controller may be developed using a dedicated type of function block. Data files are accessed via communications using HC Historian software. ControlEdge HC900 Supports History Backfill when used along with Experion HS • Benefit: - Critical Data Protection and Compliance • Target: - customers with critical data needs; aerospace manufacturing for complete records of the complete manufacturing process, food & beverage where accurate data on manufacturing and warehousing is required, pilot plants for accurate data retention of processes for new product documentation, data centres. • Secures critical customers from: – Network outage or communication glitches – Experion HS server outages, shutdowns, MS updates • At all other times, the Experion HS history database remains the master • Backfills ONLY occur when plant data is missing
Security	Password security may be applied to the entire configuration file and/or to individual worksheets within a file. Default security may be disabled for worksheets.
Concurrent operation	One instance of HC Designer or HC Utilities per PC at a time
Printing	The following are available for printing: Controller (hardware and email assignments) Function Block diagram (Process and/or Safety worksheets, block parameters, Modbus registers, tags, where-used list, statistics) Display (display settings, help screens, display key assignments, data storage schedule) Recipes (variables, setpoint profiles, setpoint schedules, sequences) Alarm and Event groups
Export Files	Format – CSV, Comma delimited, or Tab delimited Types: Controller – (I/O) Function block Modbus Register Map Function block tags Recipes
Controller maintenance	Calibration – Analog Input Modules TC Cold junction Analog Output Modules Position Proportional Output function blocks Set controller time Serial Port setup Perform controller firmware upgrades

TABLE 3 Summary of ControlEdge HC900 Controller Designer & Controller Utilities Software Main Window Menu Selections	
Main Menu Selection	**Description**
File	• *New:* Provides dialog box • *Open:* Opens an existing Controller Designer configuration. • *Close:* Closes the active window. • *Save:* Saves the active configuration. • *Save As:* Can name the active configuration, select the target CPU type and revision and select the directory where file is to be stored. • *Download:* Alternate selection for download of saved configuration • *Upload:* Alternate selection for upload of complete configuration in controller including graphic pages, text annotations, stored recipes/profiles/schedules/sequences, OI display assignments, OI data storage setup • *Upload Recipes:* Uploads individual recipe files for variables, setpoint profiles, setpoint schedules and sequences. (Allows print, save, edit or download.) • *Backup controller:* Saves backup configuration file. cbk. • *Properties:* File properties, statistics (capacity usage), file read protection, worksheet protection (password access to individual worksheets) • *Write Protect File:* Can enter and confirm a password for the selected file. • *Print Report:* Provides report printout selections for documentation including configured I/O list, worksheets, block parameters, tag list, display listing, recipes, SP profiles, SP schedules, sequences, alarms and event list. • *Print Report Preview:* Provides print preview of report selection plus print selection • *Printer Setup:* Can select printer, paper type, and orientation. • *Exit:* Exits the Controller Designer application.
Edit (HC Designer only)	• *Undo/redo*: undo/redo last edit • *Cut, Copy, Paste:* Editing functions for function block diagram items. • *Delete:* Deletes the currently selected item on the function block diagram. • *Append FBD (Function Block Diagram) Worksheet:* Adds a worksheet • *Delete FBD Worksheet:* Deletes a worksheet and its contents • *Reorder FBD*: Allows the sequence of worksheets to be changed. • *Worksheet properties*: Adds title and description for worksheet • *Unlock Worksheet*: Allows entry of password to unlock protected worksheet • *Block and Tag Order*: Shows list for ordering block sequence (fast and normal scan rates), ordering of major blocks such as control loops for display purposes • *Loop Mode Priority*: Lets you select which has priority: Manual Mode or Tracking Mode. • *Alarms*: Displays alarm groups for setup or changes • *Events*: Shows tag listing for assignment and annunciation as reportable events • *Edit Fixed Modbus Register Map*: Allows limited editing of pre-assigned (fixed) Modbus addresses. • *Configure Modbus Map Type*: For extensive Modbus address editing, select this to change from fixed map to custom map. • *Defragment Function Block List*: Frees up memory consumed by previously deleted function blocks. • *Find*: Directs to area of diagram for tagged variables and blocks. • *Go To*: Can enter the page number of Worksheet to which you want to go. • *Options*: Warning Level: Can enable or disable the Open Input and Unassigned I/O warnings on download. Default Annotation Attributes: Sets the default text attributes for annotation entries.
	• *Toolbar:* Displays or hides the toolbar in the top of the Main window.

TABLE 3 Summary of ControlEdge HC900 Controller Designer & Controller Utilities Software Main Window Menu Selections	
Main Menu Selection	**Description**
View	• *Status Bar:* Displays or hides the status bar at the bottom of the Main window. • *File Browser:* Displays all open files (configurations, recipes, data storage) • *Worksheet Toolbox:* Enables function block diagram tool category listing • *Trace Window:* Shows listing of connection routing for selected input pin to function block • *Localization:* For switching between supported languages by HCD tool • *Phone Book:* Shows editable list of phone numbers • *Grid:* Can place a grid in the function block diagram. • *Zoom Out:* Can zoom out to see more of a document (5 levels). • *Zoom Normal:* Returns object to normal size (Zoom In).
Monitor	• *Monitor Mode:* Enables monitor mode. Enables toolbar for monitoring selections • *Monitor Toolbar:* Disables/Enables monitoring toolbar • *Set Update Rate*: Provides monitoring update rate selection – ¼ sec., ½ sec., 1 sec., and 5 sec. • *Set Logic State Colors*: Select a color scheme for indicating the on/off status of digital wires, digital signal tags, page connectors, and logic inversion. • *Watch Summary Window:* Enables watch window with tabbed selection of I/O, Signal Tags, Variables (write-capable), and display groups (write-capable). Writes are restricted from running in Safe "RUN" mode unless enabled for non-critical safety functions located on the safety worksheet. Writes are preformed using the Write Variable (WVAR) on the process worksheet and connected to the associated variable in the safety worksheet. • *Controller Diagnostics:* Displays controller diagnostics. • *Rack Diagnostics:* Displays rack and I/O diagnostics. • *Controller Ports Diagnostics:* Provides menu selection of all ports for displaying diagnostic status including Ethernet port, RS-485 port, Host connections, Expansion Rack port, Peer to peer connections • *Modbus Port Diagnostics* • *Monitor Function Block:* Alternate selection for enabling function block monitoring • *Forced Blocks:* Displays all blocks with force conditions • *Show/Hide All Function Block Windows:* Allows monitored blocks to be disabled/enabled for viewing • *Show/Hide All Pin Data:* Displays monitoring values (numeric or On/Off state) at any input or output pin • *Show/Hide All Monitor Windows:* Allows all monitoring windows to be disabled/enabled for viewing

TABLE 3 Summary of ControlEdge HC900 Controller Designer & Controller Utilities Software Main Window Menu Selections	
Main Menu Selection	**Description**
Recipes	• *Allocate Recipe Memory:* Allocates memory in controller to allow for more or fewer recipes in the four pools below. • *Recipes (Variables):* Displays recipe pool, allows stored recipe review, supports recipe development, recipe printout is selectable • *Setpoint Profiles:* Displays setpoint profile pool, allows stored profile review, supports profile development, profile printout is selectable • *Setpoint Schedules:* Displays setpoint schedules, allows stored schedule review, supports schedule development, schedule printout is selectable • *Sequences:* Displays sequence pool, allows stored sequencer review, supports sequencer development, sequence printout is selectable
Window	• *Cascade:* Arranges windows so that they overlap. • *Tile Horizontally:* Arranges windows over and under each other. Each window is visible, and none overlap. • *Tile Vertically:* Arranges windows side by side. Each window is visible, and none overlap. • *Arrange All:*
Version Control	• *Version Control Settings:* Creates or uses existing repository and working folder. • *Version Control Explorer:* Shows the folder structure and status of the files in the working folder. • *Checkin To Version Control:* Stores the changes from the working folder to repository folder. • *Compare:* Compares differences between two revisions of the cde file.
Help	• *Help Topics:* Calls up the top-level Help Contents page. • *About Help:* Displays copyright and software version information.

TABLE 4 ControlEdge HC900 Controller Designer Functional Tabs	
Tab	**Description**
Controller	Displays the I/O used in configuration by rack, module, channel. Supports configuration of: • Controller name (for network peer addressing) • E-mail alarm setup
Display (for support of legacy 559 and 1042 OI functionality) Available for configurations prior to version 6.000	Displays the 559 and 1042 operator interface setup. Supports configuration of: • Operator interface displays (for example: trends, horizontal or vertical bars) • Alarms • Events • Operator interface security • Filenames • Help displays • Startup display
Function Blocks	Supports configuration of control and data acquisition strategy using function blocks available from category tree. Up to 40 named worksheets with 20 pages each can be assigned.
Modbus Map	Appears when using a custom Modbus map. Custom Modbus map lets you assign blocks and parameters to custom addresses rather than pre-assigned fixed Modbus addresses.
Utilities	Supports configuration of: • PC communications ports (Com1 – Com8), selectable controller IP addresses • Controller communications ports and IP address setup with auto-detect/verification selection • Real-time clock, controller mode • Other functions: • Controller, I/O, controller communications port, peer controller diagnostics • Analog I/O calibration • Slidewire calibration (Position Proportional Output) • Show I/O force conditions (HC Designer only) • Upload, Download and Loop-back check functions

Warranty/Remedy

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.

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

ASIA PACIFIC

Honeywell Process Solutions,
(TAC) **hfs-tac-support@honeywell.com**

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Honeywell Limited
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FAX: +(61) 7-3840 6481
Toll Free 1300-36-39-36
Toll Free Fax:
1300-36-04-70

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or
(TAC)
hfs-tac-support@honeywell.com

Specifications are subject to change without notice

For more information
To learn more about ControlEdge HC900 Controller, visit **https://process.honeywell.com/** Or contact your Honeywell Account Manager

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Honeywell

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Houston, TX 77042

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Honeywell House, Skimped Hill Lane
Bracknell, England, RG12 1EB

Shanghai City Centre, 100 Jungi Road
Shanghai, China 20061

https://process.honeywell.com/

51-52-03-43
May 2022

CONTROLEDGE™ HC900

A Solution for Process Control and Safety Related Applications

Process Measurement and Control

Honeywell

A SOLID AND SECURE INVESTMENT FOR THE FUTURE

High performance—enhances quality
Easy to use and engineer—improves productivity
Low total cost of ownership—maximizes profitability

The Honeywell ControlEdge™ HC900 Process and Safety System has a modular, scalable design that meets the control and safety requirements of a wide range of applications ranging from process PLCs to DCS.

A single flexible system for process control and safety with faster start-up time, common engineering tools, reduced training, simplified maintenance and lowest cost of ownership.

WIDE-RANGING APPLICATIONS

The ControlEdge HC900 Process and Safety System reduces hardware, software, training and support requirements, and is ideal for diverse industries such as:

- Chemicals, including specialty and fine chemicals, plastics and rubber
- Pharmaceuticals and cosmetics
- Power (excluding nuclear)
- Cement and glass
- Pulp and paper
- Mining and metals
- Water and waste water
- Food and beverage
- Oil & Gas, Refining
- Metro Rail
- HVAC
- Data Centers

APPLICATIONS IN WHICH CONTROLEDGE HC900 IS PROVING INVALUABLE INCLUDE THE FOLLOWING:

Safety:

- Burner Management Systems (e.g. furnaces, boilers, pre-heaters, kilns, ovens, reactors,calciners, dryers, thermal oxidizers, melters, incinerators, process heaters, vaporizers)
- Combustion control
- Pipeline control
- Spill prevention
- Terminal automation
- Emergency shutdown
- Pressure and flow applications
- Heat Treatment

Critical control:

- Electronics and semiconductors
- Cement
- Glass
- Textiles

EASY TO USE AND ENGINEER— IMPROVES PRODUCTIVITY

The modular, scalable ControlEdge HC900 Controller is available in three rack sizes, with upto 12 racks per CPU, and three CPU performance levels to handle a wide range of automation requirements. ControlEdge HC900 supports up to 4,608 I/O points.

EXPERION HS

Experion HS is a powerful software platform that incorporates innovative applications for human machine interface (HMI) applications and supervisory control and data acquisition (SCADA). Built upon the proven technologies of the Experion platform, Experion HS is an integrated and affordable solution for smaller unit operations. Experion HS enables seamless integration, configuration and data exchange with the ControlEdge HC900 system.

When paired with Experion HS, ControlEdge HC900 can meet FDA 21 CFR part 11 requirements for pharmaceuticals, food and beverage industry that need a proven and reliable solution capable of advanced controller security and protection methods, change management and automated electronic record keeping.

ControlEdge HC900 also has pharma specific function blocks which significantly simplify your engineering efforts.

CONTROLEDGE HC900 ALLOWS YOU TO PERFORM EASY ENGINEERING

- HC Designer Configuration Software available in English and Chinese Mandarin
- Process-specific function blocks reduce configuration time and your operational costs
- Powerful Accutune III auto-tuning algorithms enable control loops to be quickly and easily tuned
- Simple intuitive tools, advanced monitoring and debugging tools which are easy to use and engineer
- Product enhancements made easy with web-based downloads at zero annual maintenance fee
- Easily integrated by Honeywell trained local channel partners with global product support
- Universal analog inputs reduce inventory cost
- SIL Universal IO (UIO) with 1ms SOE, Line Monitoring, Voting & Validation, Redundancy allows easy adaptation to late engineering changes
- HART-IP support for improved device diagnostics and easy maintenance
- Modular and scalable (4608 IO's and upto 12 racks per CPU)
- Version control, logic replication and library creation which simplify change management and engineering efforts

INTEGRATED SOLUTION WITH OTHER HONEYWELL PRODUCTS

CONTROLEDGE HC900 OPC SERVER FROM MATRIKONOPC

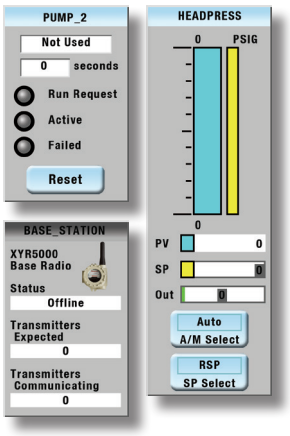
The ControlEdge HC900 OPC Server from MatrikonOPC provides secure and reliable real-time data access between all Controller series and any OPC-enabled applications such as Historians, HMIs, SCADA etc. It enables third party connectivity – which is key to successful phased migration and integration. It enables easy and cost-efficient management of openly connected systems – crucial in today's highly competitive industrial environment. And by using standardized MatrikonOPC components you can build stronger, more secure architectures.

Furthermore, the ControlEdge HC900 OPC Server is OPC certified. OPC certification is the process of ensuring that applications meet the standards specified by the OPC Foundation. OPC certification requires extensive testing to ensure true interoperability. OPC certification means multi-vendor system interoperability is guaranteed.

INTEGRATED 900 CONTROL STATION WITH GLOBAL DATABASE

The 900 Control Station operator interface provides a large assortment of standard preformatted displays for controller monitoring and servicing. Their use shortens design time, reduces engineering costs, and facilitates standardization of operator interaction with the process–all while enhancing the ability to customize easy-to-understand graphic displays that look like the process the operator is monitoring.

Station Designer software is a robust yet user-friendly PC tool that integrates with the HC900 Controller's Designer software to streamline the task of configuring a custom operator interface. It is an intuitive development environment that offers more than 4,000 pre-built process graphic symbols (for pumps, valves, tanks, buttons, switches), widgets, animation, hide object, if-then-else scripting, and more.



HIGH PERFORMANCE— ENHANCES QUALITY

ControlEdge HC900's diverse connectivity and communications options adapt to existing process-line infrastructure, satisfy specific control requirements, and accommodate specialty applications.

CONTROLEDGE HC900 PROVIDES TIGHTER CONTROL

- The standard fuzzy logic of the HC900 prevents process overshoot, provides accurate control, increases throughput and efficiency and minimizes energy costs

ACCURATE DIAGNOSTICS

- Advanced diagnostics at module and channel level add reliability to system

FLEXIBLE CONNECTIVITY TO SUIT YOUR PROCESS ENVIRONMENT

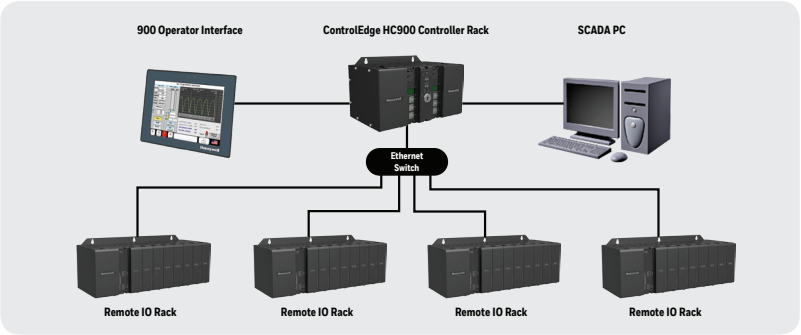
- Open Ethernet connectivity
- Serial Modbus connectivity
- Peer-to-peer communications
- Wireless connectivity
- E-mailed alarm/event reporting

FAULT TOLERANT AND RELIABLE

- Keeps your system running continuously with redundancy

LOW TOTAL COST OF OWNERSHIP— MAXIMIZES PROFITABILITY

The ControlEdge HC900 process and safety system integrates easily and smoothly with the Honeywell Experion HS (SCADA) solution, and with 900 Control Station HMI.



SAME I/O MODULES FOR PROCESS AND SAFETY

- Reduced inventory costs
- Quick replacement of modules maximizes plant uptime

LOWEST PRODUCT LIFECYCLE COST

- No annual upgrade fee (HC Designer)
- World-wide product support

COMMON SOFTWARE TOOLS FOR PROCESS AND SAFETY

- Reduced training costs
- Reduces engineering time and cost

CONTROLLER

Function Blocks: C70, C75CPU - up to 15000, C50CPU- 2000, C30CPU-400.

Controller C75 CPU supports redundancy (in common and separate rack). Redundant CPU racks can be placed atleast 1km apart.

Analog Inputs: Up to 1152 universal analog inputs, 2304 high level.

Accuracy: 0.1% of span (field calibration to ± 0.05% of span).

Analog Outputs: Up to 480 with internal power, 2304 with external power 0 to 20 mA maximum,12 bits, 0.1% accuracy.

Universal IO (SIL): Up to 2304 per system. User configurable DI with SOE,

DO 24VDC, AI /AO 4-20mA with Line

Monitoring, HART and IO redundancy support.

Digital Inputs/Outputs: Up to 4608, contact DI, 24Vdc DI/DO, 120Vac DI/DO, 240Vac DI/DO.

Total I/O: Up to 4608.

I/O Racks per System: One controller and up to 11 remote I/O racks.

Control Loops: PID, on/off, cascade, ratio, %C, three-position step.

Control Output Types: Current, time-proportioning, position-proportioning, three-position steps.

Setpoint Programmers: 50 segments each, 16 event outputs, multiple stored profiles.

Setpoint Scheduler: 50 segments, 8 ramp/soak outputs, eight auxiliary outputs, 16 events, multiple schedules.

Comm: Ethernet 10/100/base T, Modbus/TCP protocol, up to 10 Ethernet hosts on C50, C70, C75 up to 32 peer-to-peer controllers, Serial Modbus RTU, RS485 or, slave or master operation (up to 32 slaves).

Operating Temp: Rated 32°F to 140°F (0° to 60°C).

Humidity: Rated 10% RH to 90% RH, non-condensing.

CONTROL STATION OPERATOR INTERFACE

Display: 10.4 in and 15 in Industrial TFT LCD color display.

Touch Screen: Resistive analog.

Distance from Controller: Ethernet—328ft (100m), RS485—2000ft (600m).

Power Supply: 24Vdc, 1.4A.

Operating Temperature: -10 to 50 °C (14 to 122°F).

Humidity: Rated 0 to 85% max. RH non-condensing.

Panel Rating: NEMA 4X/IP66 front panel.

Memory: 512 MB of non-volatile Flash memory, with optional SD card (standard capacity).

Comm. Ports: Ethernet 10/100 base-T. Three or four isolated serial communication ports, (2xRS-232 and 1 or 2 x RS-422/485) - model dependent.

USB Ports: 1 or 2 USB Host ports with Universal Serial Bus Specification Rev 2.0. Support data transfers at (high speed, full speed). Hardware over current protected (0.5 A max per port).

900 Station Designer Software

Configuration: 900 control station 900 Control Station CR interface - offline.

Operating Environment: Windows Vista, Windows 7 (32 & 64-bit), Windows 8, Windows 10.

PC: Pentium class processor and RAM as required by the chosen operating system plus 50MB for software installation. 800 by 600 pixels minimum, 256 or more colors. RS-232 or USB port.

Multilingual: English, French, Italian, German, Spanish.

Cable: USB Host, Ethernet 10/100 base.

Setpoint Programmer Pre-plot Display

Concurrent Batch Reports

NEMA Type 4X operator interface screen withstands harsh operating environments.

Function block widgets accelerate configuration development.

Recipe selection makes product/process changeovers simple and accurate.

Multi-level log-on security feature prevents unauthorized access.

Alarm/event logging with e-mail notification.

Embedded web server feature allows access to your application from anywhere.

Multiple interfaces on each controller enable process management from up to three locations.

HC900 DESIGNER SOFTWARE

Configuration: HC900 Controller—offline with run-mode editing.

Operating System: Windows 7 (32 & 64-bit), Windows 8, Windows 10

CPU: 1.5 GHz (2.5 GHz preferred)

RAM: > 1GB

DrivePorts: USB (2.0 & 3.0)/ Ethernet

Cable: RS485—three-wire, Ethernet 10/100 base T.

Modem Support: Monitor, upload, download configuration.

Language: English and Chinese Mandarin.

For more information

To learn more about Honeywell's ControlEdge HC900, visit www.honeywellprocess.com or contact your Honeywell account manager.

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