

Prices Start at See Page

## Digital Controller/Programmers

CAL9500P 1/16 DIN Programmable Process Controller	\$297.00	212
Honeywell DCP50 1/16 DIN Single Channel Controller/Programmer	\$474.00	Call
Honeywell DCP100 1/4 DIN Single Channel Controller/Programmer	\$944.00	Call
Honeywell DCP300 Single/Dual Channel Controller/Programmer	\$1319.00	Call
Honeywell IPC5000 Single/Dual Channel Digital Controller/Programmer	\$2553.00	Call

## Multiloop PID and Process Automation Controllers (PAC)

Honeywell Experion Control Systems for Small and Mid-Sized Applications	Call	224
Honeywell HC900 Hybrid Control System		216
Honeywell UDC3500 1/4 DIN Universal Digital Controller	\$766.00	206
Siemens 353 Process Automation Controller	\$2020.00	215

## Single Loop PID Controllers

CAL3300 1/32 DIN Autotune Temperature Controller	\$222.00	210
CAL9300 1/16 DIN Autotune Temperature Controller	\$238.00	210
CAL9400 1/16 DIN Dual Display Autotune Temperature Controller	\$262.00	210
CAL9900 1/16 DIN Low Cost PID Temperature Controller	\$299.00	211
Honeywell UDC100 1/4 DIN Temperature Controller	\$349.00	197
Honeywell UDC1200 1/16 DIN Universal Digital Controller	\$331.00	196
Honeywell UDC1700 1/8 DIN Universal Digital Controller	\$479.00	196
Honeywell UDC2500 1/4 DIN Universal Digital Controller	\$479.00	198
Honeywell UDC3200 1/4 DIN Universal Digital Controller	\$729.00	202
Siemens 353 Process Automation Controller	\$2020.00	215
WEST Controls Plus Series Single Loop PID and Limit Controllers	\$286.00	213
WEST Controls ProVu 4 Advanced Temperature Controller	\$515.00	214

## Accessories and Software

CALgrafx Charting, Logging and Configuration Software	\$254.00	212
CALopc Server Software for SCADA Connectivity	\$219.00	212
Honeywell HC900 Hybrid Control Designer Software	\$842.00	221
Honeywell Process Instrument Explorer Configuration Software	\$159.00	207



Due to manufacturer agreements, not all products are available in all geographic areas and markets. Prices in this catalog are current at the publication date, and are subject to change without notice.

# UDC1200/1700 MicroPro Universal Digital Controllers **Honeywell**

## Features

- Two four-digit displays with 7 LED segments, each configurable for PV and SP (non-adjustable or adjustable), PV and ramping SP, or PV only
- NEMA 3/IP65 moisture-resistant, dust-proof front panels
- Universal input: Seven thermocouple types, RTDs, and linear signals (mV, mA, V)
- Up to three outputs: Electromechanical relay, solid state relay (open collector) or DC linear
- Two soft alarms on outputs 2 and 3 plus loop alarm
- Four control algorithms available: On/Off, PID, PD+MR, and three-position step control (for valve positioning)
- RS485 ASCII serial communication output optional
- Dual setpoint available on both UDC1200 and UDC1700
- PC software support for diagnostics and configuration
- Direct replacements for retired UCD1000 and UDC1500

## Specifications

**Accuracy:** 0.1% span  $\pm$  1 least significant digit.

**Temperature Stability:** 0.01% of span per °C.

**Input Types:** *Thermocouple:* J, K, T, L, B, R, and S; *RTD:* (3-wires connect) Pt100 $\Omega$  (IEC),  $\alpha=0.00385$ , Fixed decimal; *DC Linear:* 10-50 mV, 4-20 mA, 1-5V, or 2-10 V; Decimal point configurable up to 3 places.

**Input Sampling Rate:** 4x/sec.

**Approvals:** Meets CE mark requirement. UL approved. DC120L (limit-control model) is FM approved as a safety device.

**Control Output:** *Types available:* Output 1/2/3: DC, electromechanical relay, SSR drive (open collector); *DC linear output:* 0-20 or 4-20 mA, 0-5 or 0-10 V; *Accuracy:*  $\pm 0.25\%$  (250 $\Omega$  for mA, 2K $\Omega$  for volt)

**Alarm Output:** 2 soft alarms max. (SP+1 loop alarm). Alarm inhibit available on power-up and setpoint switching; *Alarm output:* Up to 2 relays or SSR output on OUT2 and 3; *Types:* PV high or low, band, deviation high or low, loop; *Combination alarms:* Logical OR, AND, or hysteresis of alarms available to individual output.

**Retransmission:** OUT3 Current or volt signal can retransmit PV/SP.

**Automatic Tuning Type:** Pre-tune and self-tune.

**Proportional Bands:** 0 (inactive), 0.5% to 999.9% of input span with 0.1% increments. Two proportional bands available for duplex mode.

**Reset:** Off or from 1 sec to 99 min:59 sec; Rate: 0 to 99 min:59 sec.

**Manual Reset:** 0 to 100% output (single),  $\pm 100\%$  output (dual).

**ON/OFF Hysteresis:** 0.1% to 10.0% of input span.

**Auto/Manual Mode:** Front-key selectable with bumpless transfer between automatic and manual mode.

**Cycle Times:** Up to 2 cycle times available for time duplex control.

**Setpoint Ramp:** From 1 to 9,999 engineering units/hour.

**Communication Interface:** RS485-ASCII; Speed: 1200, 2400, 4800, 9600, or 19200 baud; Link characteristics: 32 drop max, ASCII protocol, 2 wire.

## Operating Conditions

**Ambient Temperature:** 32° to 131° F.

**Relative Humidity:** 20-95% non-condensing.

**Voltage:** 90-264 VAC, 50/60 Hz; *Power Consumption:* 4W

**Mounting and Wiring:** Plug-in with pre-assembled mounting fixture. Screw terminals at rear of case (combination head).



## Ordering Instructions

Make a selection from each table. Follow the arrows to be sure the unit you want is available. A complete model number looks like this: DC1202-1-0-0-0-1-0-0-0

## Model Selection Guide

		Catalog Number	Availability					Price
UDC1200 1/16 DIN Controller		DC120_-	↓	↓	↓	↓	↓	\$331.00
UDC1700 1/8 DIN Controller		DC170_-	↓	↓	↓	↓	↓	479.00
Input Type	RTD or Linear mV Input	1-	•					0.00
	Thermocouple Input	2-	•					0.00
	Linear mA Input	3-		•				0.00
	Linear Voltage	4-			•			0.00
	Limit Controller (T/C only)	L-					•	0.00
Output 1	Relay (Control 1)	-1-	•	•	•	•	•	0.00
	SSR Driver (Control 1)	-2-	•	•	•	•	•	0.00
	Linear 0-10 Volts	-3-	•	•	•	•	•	38.00
	Linear 0-5 Volts	-5-	•	•	•	•	•	38.00
	Linear: 4-20 mA (Control 1)	-7-	•	•	•	•	•	38.00
Output 2	None	-0-	•	•	•	•	•	0.00
	Relay (Control 2 or ALM 2)	-1-	•	•	•	•	•	38.00
	SSR Driver (Control 2 or ALM 2)	-2-	•	•	•	•	•	38.00
	Linear: 0-10 Volts	-3-	•	•	•	•	•	58.00
	Linear: 0-5 Volts	-5-	•	•	•	•	•	58.00
Linear: 4-20 mA (Control 2 only)	-7-	•	•	•	•	•	58.00	
Output 3	None	-0-	•	•	•	•	•	0.00
	Relay (ALM 1 only)	-1-	•	•	•	•	•	36.00
	SSR Driver (ALM 1 only)	-2-	•	•	•	•	•	36.00
	Linear: 0 to 10 Volts	-3-	a	a	a	a	•	58.00
	Linear: 4-20 mA (Retransmit only)	-7-	•	•	•	•	•	58.00
Transmitter Power Supply (24 VDC)	-8-	•	•	•	•	•	81.00	
Option 1	None	-0-	•	•	•	•	•	0.00
	RS485 ASCII Serial Communication	-1-	•	•	•	•	•	93.00
	Digital Input (Remote Alarm Reset)	-2-	•	•	•	•	•	57.00
RS485 Modbus Communication	-3-	•	•	•	•	•	93.00	
Option 2	90 to 264 VAC Power Supply	-1000	•	•	•	•	•	0.00
	24 to 48 VAC/DC Power Supply	-2000	•	•	•	•	•	0.00

**Restrictions:** (a) Available on DC1700 models only.

# Choosing the Right Honeywell 1/4 DIN Digital Controller



UDC100



UDC2500



UDC3200



UDC3500

Enclosure Rating	NEMA 3	NEMA 4X	NEMA 4X	NEMA 4X
Accuracy (Typical)	0.50%	0.25%	0.20%	0.10%
Analog Inputs Standard	1 Low	1 Low	1 Low	1 Low
Optional	—	1 High Level	1 Low	2 Low/4 High
Analog Outputs (Optional)	—	2	2	3
Digital Inputs (Optional)	—	2	2	4
Digital Outputs (Optional)	1	Up to 4	Up to 4	Up to 5
Local Setpoints	1	Up to 3	Up to 3	Up to 3
Setup/Configuration Software	UC100PC	Process Instrument Explorer	Process Instrument Explorer	Process Instrument Explorer
Setpoint Programmer (Optional)	—	6 Ramp/6 Soak	6 Ramp/6 Soak	10 Ramp/10 Soak
Math Functions	—	Standard, Limited	Optional, Advanced	Optional, Advanced
<b>Features</b>				
1/4 DIN Cutout/Footprint	Standard	Standard	Standard	Standard
Universal 90–264 VAC Power	Standard	Standard	Standard	Standard
Universal Analog Input	Standard	Standard	Standard	Standard
Thermocouple Health	—	Standard	Standard	Standard
AccuTune III	—	Standard	Standard	Standard
Infrared Comm Port	—	Optional	Standard	Standard
24 VAC/DC Power	Optional	Optional	Optional	Optional
Alarm Relays	Optional	Optional	Optional	Optional
Limit Controller	—	Optional	—	—
Ethernet Communications	—	Optional	Optional	Optional
RS485 Communications	—	Optional	Optional	Optional
Position Proportional	—	—	Optional	Optional
Carbon/Oxygen Probe	—	—	Optional	Optional
Real-Time Clock	—	—	—	Optional
Logic Gates	—	—	—	Optional
Cascade Control	—	—	—	Optional (2 Loops)
8-Segment Characterizer	—	—	—	Optional
Totalizer	—	—	—	Optional
Healthwatch	—	—	—	Optional

Approvals



Prices Start at

\$349.00

\$479.00

\$729.00

\$766.00

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## UDC2500 Universal Digital Controller

Works with RS485 to Ethernet bridge. Call for details.



"Honeywell UDC2500"

*UDC2500 packs new powerful features into a 1/4 DIN single loop controller, while retaining all the simplicity, flexibility, and the industry-standard interface of the UDC2300 it replaces.*

Features and options include:

- Up to 2 analog inputs (1 universal and 1 high level)
- Up to 2 analog outputs
- Up to 4 digital outputs
- Up to 2 digital inputs
- NEMA 4X, IP68 front face
- Built-in front-face infrared communications port for configuring with a Pocket PC or laptop computer
- PC-based Process Instrument Explorer configuration tool
- Ethernet communications
- FM-approved limit controller model
- Universal input/output model
- Thermocouple health monitoring
- AccuTune III (Fast/Slow, Heat/Cool)

### Quick Setup and Diagnostics!

The front-face infrared transceiver provides a non-intrusive wireless connection with the UDC2500, all the while maintaining the controller's NEMA 4X/IP66 integrity.

No accessing the back of the controller, no screwdriver needed to wire the communication cable! Just aim and upload!

The software also gives you instant information on the UDC's current operating parameters, digital inputs and alarm status — to help identify internal or analog input problems!

**Learn more about Process Instrument Explorer on page 207.**

The 1/4 DIN UDC2500 monitors and controls temperatures and other variables in applications such as furnaces and ovens, environmental chambers, packaging machinery, plastic processing machines.

Its features include: Universal AC power supply, optional RS422/485 Modbus® RTU or Ethernet 10Base-T TCP/IP communication protocols, input/output isolation, and isolated auxiliary current output.

Combine these with AccuTune III™ tuning with fuzzy logic overshoot suppression, and the result is true price-to-performance leadership.

Best yet, you can configure the UDC2500 with a Pocket PC, using the front-face infrared communication port, or with a PC and a serial-to-infrared interface. There's no need to get access to the back of the controller to download or upload a brand new configuration!

### Other Features

**AccuTune III™:** This feature provides a truly plug-and-play tuning algorithm, which will, at the touch of a button or through a digital input, accurately identify and tune any process, including those with dead time or integrating processes. AccuTune III speeds up and simplifies startup, and allows retuning at any setpoint.

You now have the choice of two tuning options: Fast Tune and Slow Tune. Fast Tune will tune the process so the temperature is reached faster (a slight overshoot will be allowed). Slow Tune will minimize overshoot, but it will take more time for the process temperature to reach the target setpoint. Heat/Cool (Duplex Tune) will automatically tune both the heating and cooling sides of the process.

**Fuzzy Logic:** Fuzzy logic suppresses process variable overshoot due to setpoint changes or externally induced process disturbances. It operates independently from AccuTune III tuning. Fuzzy logic doesn't change the PID constants, but temporarily modifies the internal controller response to suppress overshoot. This allows more aggressive tuning to coexist with smooth PV response. It can be enabled or disabled depending on the application or the control criteria.

**Two Sets of Tuning Constants:** Two sets of PID parameters can be configured for each loop and automatically or keyboard selected.

**Auxiliary Output:** This isolated output can be scaled from 4-20 mA for 0 to 100% for any range. It can be configured to represent Input 1, Input 2, PV, active Setpoint, Local SP1, Deviation, or the Control Output.

**Transmitter Power:** This output provides up to 30VDC to power a two-wire transmitter (requires the use of Alarm 2 open collector output or auxiliary output).

**Dual Setpoints:** A simple push-button selection allows to quickly switchover from primary to alternate setpoint with minimal operator confusion.

**Universal Switching Power:** Operates on any line voltage from 90 to 264 VAC 50/60 Hz without jumpers. 24 VAC/DC instrument power is available as an option.

**Timer Option:** Provides a configurable time period of 0 to 99 hours, 59 minutes, or units of minutes and seconds. It can be started through Alarm 2, the keyboard, or a digital input. The timer output is Alarm 1, which energizes at the end of the Timer period, and can be automatically reset. The Timer period can be changed between each batch. Status is shown on the lower display.

**Moisture Protection:** The NEMA4X and IP66-rated front face permits use in applications where it may be subjected to moisture, dust, or hose-down conditions.

**Setpoint Ramp/Soak Programming Option:** Lets you program and store six Ramp and six Soak segments for setpoint programming. Run or Hold of program is keyboard or remote digital switch selectable.

**Setpoint Rate:** Lets you define a ramp rate to be applied to any local setpoint change. A separate upscale or downscale rate is configurable. A single setpoint ramp is also available as an alternative.

**Limit Control Model:** Provides a latching relay that is activated whenever the PV goes above or below a preset setpoint value. An indicator will light when the output is activated, and the lower display will show a message. Reset is through a front-face key or an external switch. An FM-approved model is available.


**Data Security:** Five levels of keyboard security protect tuning, configuration, and calibration data, accessed by a configurable 4-digit code. Nonvolatile EEPROM memory assures data integrity during loss of power.

**Diagnostic/Failsafe Outputs:** Continuous diagnostic routines detect failure modes, trigger a failsafe output value and identify the failure to minimize troubleshooting time.

**High Noise Immunity:** The controller is designed to provide reliable, error-free performance in industrial environments that often affect highly noise-sensitive digital equipment.

## Communications Option

A communications link is provided between the UDC2500 and a host computer or PLC via the RS422/485 Modbus RTU or Ethernet TCP/IP communications option. An infrared communication link is also available allowing a non-intrusive configuration of the instrument.



**Want to Know How Your Thermocouples Are Performing?**

Thermocouples fail. It's a fact you deal with every day. But when they fail without any warning, you're stuck dealing with a slew of costly problems!

- Your furnace or oven shuts down.
- You run the risk of destroying entire batches.
- You waste energy reheating product after the failed thermocouples are replaced.

You can choose to replace your thermocouples on a scheduled basis, but that's not always the best answer. It's expensive, labor-intensive, and not always necessary.


So, to help make your application run more smoothly, Honeywell has added Thermocouple Health Monitoring as a standard feature in its UDC family of controllers.

You get four different levels of alarm: Good, Failing, Failure Imminent, and Failed (Burnout), so you can replace the temperature sensors before they fail, and save yourself the time, money, and hassle!

**T/C Health Monitoring Standard on All New UDCs!**

OUT — Control Relay 1 or 2 on  
ALM — Alarm conditions exist

RL — Remote or Local Setpoint 2  
MA — Manual or Auto Mode  
FC — Degrees Fahrenheit or Centigrade



### Key Functions

FUNCTION	Selects functions within each configuration group.	SETUP	Scrolls through configuration groups.
LOWER DISPLAY	Returns controller to normal display from Setup mode. Toggles various operating parameters for display.	▲	Increases setpoint or output value. Increases configuration values or changes functions in Configuration mode groups.
M-A RESET	Selects Manual or Auto mode. Resets the latching limit controller relay. In Setup mode, used to restore original value or selection.	▼	Decreases setpoint or output value. Decreases configuration values or changes functions in Configuration mode groups.
SP SELECT	Cycles through configured setpoints when held.	RUN HOLD	Enables Run/Hold of Setpoint Ramp or Program plus Timer start.

## Operator Interface

**Indicators:** Provide alarm, control mode, and temperature unit indication. There is also indication of when Remote Setpoint is active, the status of the control relays, and whether a setpoint program is in Run or Hold mode.

**Displays:** You decide how the controller interacts with the process by selecting, through simple keystrokes, the functions you want.

During normal operation, the upper display is dedicated to the process variable (4-digits) and special annunciator features. During normal operation for the optional dual display model, the 4-digit lower display shows selected operating parameters such as Output, Setpoints, Inputs, Deviation, active Tuning Parameter Set, Timer Status, or minutes remaining in a setpoint ramp. During configuration, both displays provide guidance for the operator through 6-character alphanumeric prompts.

## Ethernet Communications Option

Widely used by manufacturers, the Ethernet connection, which uses Modbus TCP/IP, allows the controller to connect to other Ethernet networks and exchange data with computers or devices on that network for monitoring or managing your process from almost any location.

The Ethernet cable can be connected to a hub (using a straight-through cable) or directly to a PC (using a crossed cable or straight-through cable reconfigured at the UDC2500 terminals).

The controller can be configured via Process Instrument Explorer PC software. PIE lets you configure all the UDC's parameters, and monitors a variety of parameters in the controller. It can also configure the UDC2500 to send an e-mail when an alarm condition has been encountered.

# UDC2500 Universal Digital Controller

# Honeywell

## Specifications

**Input Accuracy:**  $\pm 0.25\%$  full scale, typical ( $\pm 1$  digit for display). Can be field calibrated to  $\pm 0.05\%$  full scale, typical 16-bit resolution

**Sampling Rate:** Inputs sampled six times a second

**Temperature Stability:**  $\pm 0.01\%$  of full scale span per  $^{\circ}\text{C}$  change, typical

**Input Signal Failure Protection:** *Thermocouple inputs:* Upscale, downscale, failsafe, or none; *Thermocouple health:* Good, failing, failure imminent, or failed; *Failsafe output level:* Configurable 0-100% of output range

**Input Impedance:** 4 to 20 mA input: 250 $\Omega$ ; 0-10 V input: 200K $\Omega$ ; All other: 10 meg $\Omega$

**Maximum Lead Wire Resistance:** *Thermocouples:* 100 $\Omega$ /leg; 100, 200, and 500 RTD: 100 $\Omega$ /leg; 100 low RTD: 10 $\Omega$ /leg

**Stray Rejection:** *Common mode: AC (50 or 60 Hz):* Greater of 120 dB (with maximum source impedance of 100 $\Omega$ ) or  $\pm 1$  LSB (least significant bit); *DC:* Greater of 120 dB (with maximum source impedance of 100 $\Omega$ ) or  $\pm 1$  LSB; *DC:* (to 1 KHz): Greater of 80 dB (with maximum source of impedance of 100 $\Omega$ ) or  $\pm 1$  LSB. *Normal mode: AC (50 or 60 Hz):* 60 dB (with 100% span peak-to-peak maximum)

**Alarm Outputs:** One SPDT electromechanical relay. Second alarm available if the second control relay is not used for control purposes. Up to four setpoints are independently set as high or low alarm, two for each relay. Setpoint can be on any input, PV, deviation, manual mode, failsafe, PV rate, RSP mode, communication shed or output. Adjustable hysteresis 0-100%. Alarm can also be set as an ON or OFF event at the beginning of a setpoint ramp/soak segment. *Alarm relay contacts rating:* 5 Amps resistive at 120 VAC, 240 VAC, or 30 VDC

**Controller Output Types:** *Electromechanical relays:* 1 or 2 SPDT contacts. Both normally open and normally closed contacts are brought out to the rear terminals. Internally socketed. *Resistive load:* 5 Amps at 120 or 240 VAC, or 30 VDC; *Inductive load:* 3 Amps at 130 or 250 VAC, 3.5 Amps at 30 VDC; *Motor:* 1/6 H.P. *Dual electromechanical relays:* 2 SPST relays. One normally closed contact for each relay brought out to rear terminals. Useful for time duplex or three-position step control. Instruments with this option have a total of 4 relays plus 1 current output. Internally socketed. *Resistive load:* 2 Amps at 120 or 240 VAC, or 30 VDC; *Inductive load:* 1 Amp at 130 VAC, 250 VAC, or 30 VDC; *Minimum load:* 20 mA; *Solid state relays:* One or two externally mounted SPST triac normally open outputs. Internally socketed. *Resistive load:* 1.0 Amp at 25 $^{\circ}\text{C}$  and 120 or 240 VAC, 0.5 Amps at 55 $^{\circ}\text{C}$  and 120 or 240 VAC; *Inductive load:* 50 VA at 120 VAC or 240 VAC; *Minimum load:* 20 mA. *Open Collector outputs (1 or 2):* Socketed assembly replacing a relay. Opto-isolated from all other circuits except current output, but not from each other, internally powered at 30 VDC. *Maximum sink current:* 20mA; *Overload protection:* 100 mA. *Current output (1 or 2):* Range can be set anywhere between 0 to 21 mA and as direct or reverse action. The second output can be used in Aux Out mode, and configured to represent input, PV, setpoint, deviation, or control output. The second current output is mutually exclusive with the second digital input. *Resolution:* 12 bits over 0 to 21 mA; *Accuracy:* 0.05% full scale; *Temperature stability:* 0.01% full scale/ $^{\circ}\text{C}$ ; *Load resistance:* 0 to 1000 $\Omega$ .

**Controller Output Algorithms:** *On-off or time proportional:* One relay or open collector output. Control action can be set for direct or reverse. *Time proportional relay resolution:* 3.3 msec. *On-off duplex, three-position step control or time proportional duplex:* Two relays or open collector outputs. Control action can be set for direct or reverse. *Time proportional relay duplex resolution:* 3.3 msec. *Current proportional:* Single 4 to 20 mA current output signal that can be configured for direct or reverse action. *Current proportional duplex:* Single split current output for heat and cool (4-12 cool, 12-20 heat) or a combination of first current output (heat = 50% to 100% range) and second current output (cool = 0% to 50% range). Both are 4 to 20 mA signals that can be set for direct or reverse action. *Current/time duplex:* Variation of time proportional duplex for heat/cool applications. Time proportional output is a relay. Current proportional output is a 4 to 20 mA signal that can be fed into a negative or positive grounded load of 0 to 1000 $\Omega$ , operational over 50% range or entire range.

**Digital Input (Isolated):** 30 VDC source for external dry contacts or isolated solid state contacts. Digital inputs are isolated from line power, earth ground, analog inputs, and all outputs except for second current output. Second digital input is mutually exclusive with the second current output.

**Input Filter Software:** Single pole low pass section with selectable time constants, off to 120 seconds available on both analog inputs.

**Auxiliary (Isolated) Linear Output Option:** 21 mA DC maximum into negative or positive grounded or non-grounded load of 0-500 $\Omega$ . Output range set between 0 and 21 mA, and as direct or reverse action, and configured to represent IN1, IN2, PV, setpoint, LSP1, deviation or control output. The range of the auxiliary output, as a function of the selected variable, can be scaled. This output can be used as a second current output for current duplex outputs. *Resolution:* 12 bits over 0-21 mA; *Accuracy:* 0.1% of full scale; *Temperature stability:* 0.01% F.S./ $^{\circ}\text{C}$ ; *Load resistance:* 0 to 500 $\Omega$

**Communications Interface Option:** *RS422/485 Modbus RTU:* 4800, 9600, 19200, or 38400 baud selectable; Floating point or integer data; 4000 ft. max. length; Two-wire, multi-drop Modbus RTU protocol, 15 drops max, up to 31 drops for shorter link length. *Ethernet TCP/IP:* 10Base-T, 330 ft. max. length; Four-wire, single drop, five hops max. *Infrared (IR):* Serial infrared, 3 ft. max. link for IrDA 1.0 compliant devices; 19200 or 38400 baud selectable; floating point or integer data. (**Note:** PC's standard IR port will not support this option. Serial to Infrared adapter required. See Model Selection Guide.)

**Setpoint Programming Option:** Configure 6 ramp and 6 soak segments for use as one program or several small programs. Each ramp segment configured to run in hours and minutes or degrees per minute. Soak segments can have a deviation that guarantees the time for each soak and will not start until the PV is reached.

**Digital Displays Option:** Vacuum fluorescent, dual displays. Four-character upper display dedicated to PV. Alternate info displayed during configuration mode. Six-character, alphanumeric lower display shows key-selected operating parameters. Provides guidance during controller configuration.

**Indicators:** Alarm relay status (ALM 1 or 2), control mode (A or M), temperature units (F or C), remote setpoint or SP2 active (R), control relay status (OUT 1 or 2), Local setpoint 1 active (L)

**Modes of Operation:** Manual, automatic with local or remote setpoint

**Wiring Connections:** Screw terminals on the rear of the case

**Power Consumption:** 15 VA maximum 90 to 264 VAC and 24 VAC/DC

**Power Inrush Current:** 10A maximum for 4 ms (under operating conditions). *Caution:* When applying power to more than one UDC2500, make sure that sufficient power is supplied.

## Design, Environmental and Operating Conditions

**Ambient Temperature:** 32 to 131 $^{\circ}\text{F}$  (0 to 55 $^{\circ}\text{C}$ )

**Relative Humidity:** 5 to 90% RH max rating to 104 $^{\circ}\text{F}$ . For higher temperatures, RH specification is derated to maintain constant moisture content.

**Vibration:** 0 to 200 Hz; 0.6 g; *Mechanical Shock:* 5 g; 30 ms

**Voltage:** 90 to 264 VAC (CSA models rated to 250V max.); 20 to 27 VAC

**Frequency (Hz):** 48 to 52 (58 to 62 for VAC)

**CE Conformity:** Meets protection requirements of 73/23/EEC, the low voltage directive and 89/336/EEC, the EMC directive.

**Product Class:** *Class I:* Permanently connected, panel mounted industrial control equipment with protective grounding. (EN61010-1)

**Installation Category (Overvoltage):** *Category II:* Energy-consuming equipment supplied from fixed installation. Local-level appliances and Industrial Control Equipment. (EN 61010-1)

**Pollution Degree:** 2, Normally nonconductive pollution with occasional conductivity caused by condensation. (Ref. IEC 664-1)

**EMC Class:** Group 1, Class A, ISM equipment (EN 55011, emissions), Industrial equipment (EN 50082-2, immunity). *EMC assessment:* Technical File (TF).

**Declaration of Conformity:** 51453655

### Input Actuators

Input Type	°F Range	°C
<b>Thermocouples</b>		
B	0 to 3300	-18 to 1816
E	-454 to 1832	-270 to 1000
E (low)	-200 to 1100	-129 to 593
J	0 to 1600	-18 to 871
J (med)	20 to 900	-7 to 482
J (low)	20 to 550	-7 to 288
K	0 to 2400	-18 to 1316
K (med)	-20 to 1200	-29 to 649
K (low)	-20 to 750	-29 to 399
NiMo-NiCo (NNM90)	32 to 2500	0 to 1371
NiMo-NiCo (low)	32 to 1260	0 to 682
Nicrosil Nisil (NIC)	0 to 2372	-18 to 1300
NIC (low)	0 to 1472	-18 to 800
R, S	0 to 3100	-18 to 1704
T	-300 to 700	-184 to 371
T (low)	-200 to 500	-129 to 260
W5W26	0 to 4200	-18 to 2315
W5W26 (low)	0 to 2240	-18 to 1227
<b>Radiamatic</b>		
Type RH	0 to 3400	-18 to 1871
Type RI	0 to 9999 max.*	-18 to 9999 max.*
<b>Differential T/C**</b>		
	-50 to 150	-46 to 66
<b>RTD</b>		
IEC Alpha = 0.00385		
100Ω, 200Ω, 500Ω	-300 to 1200	-184 to 649
100Ω (low)	-300 to 300	-184 to 149
<b>Linear</b>	4-20 or 0-20 mA; 0-10 or 0-100 mV; 0-5, 1-5, or 0-10V	
<b>Linear Input 2</b>	4-20 or 0-20 mA; 0-5, 1-5, or 0-2V	

\* User enters the range manually per RI type and application.

\*\* Factory calibrated for a pair of J thermocouples at an ambient temperature mean of 450° F (232° C). Can be field-calibrated for other ambient temperatures or other thermocouple types.

### Ordering Instructions

Make a selection from each table. A complete catalog number looks like this: DC2500-CE-0000-200-00000-E0-0

### Model Selection Guide

Description		Catalog Number	Availability	Price
Digital Controller for Use with 90-264 VAC Power		DC2500	↓	\$479.00
Digital Controller for Use with 24 VAC/DC Power		DC2501	↓	557.00
Output 1	None (To be used as Indicator only)	0 _	• •	0.00
	Current Output (4-20/0-20 mA)	C _	• •	38.00
	Electromechanic Relay (5Amp, Form C)	E _	• •	0.00
	Solid State Relay (1 Amp)	A _	• •	0.00
	Open Collector Transistor Output	T _	• •	22.00
	Dual Relays, Heat/Cool (2 Amp, Form A)	R _	• •	66.00
Output 2 + Alarm 1 or Alarms 1+2	No Additional Outputs or Alarms	_ 0 _	• •	0.00
	One Alarm Relay Only	_ B _	• •	38.00
	Electromechanical Relay + Alarm 1	_ E _	• •	76.00
	Solid State Relay + Alarm 1	_ A _	• •	76.00
Open Collector + Alarm 1	_ T _	• •	95.00	
Communi-cations	None	0 _ _ _	• •	0.00
	1 Aux Output + 1 or 2 Digital Inputs	1 _ _ _	• •	138.00
	RS485 Modbus + AuxOut/DI	2 _ _ _	• •	198.00
	10Base-T Ethernet (Modbus RTU) plus Aux Output/Digital Inputs	3 _ _ _	• •	221.00
Software Selection	Standard Functions, Single Display	_ 0 _ _	• •	0.00
	Dual Display with Auto/Manual	_ A _ _	• •	33.00
	12-Segment Setpoint Programming plus Dual Display, Auto/Manual Limit Controller Model	_ B _ _ _ L _ _	• • a a	117.00 17.00
Reserved	No Selection (For Future Use)	_ _ 0 _	• •	0.00
Infrared Interface	None	_ _ _ 0-	• •	0.00
	IrDA Interface for Use with Pocket PC	_ _ _ R-	• •	35.00
Input 1	TC, RTD, mV, 0-5/1-5V	1 _ _ -	• •	0.00
	TC, RTD, mV, 0-5/1-5V, 0-20/4-20mA	2 _ - -	• •	0.00
	TC, RTD, mV, 0-5/1-5/0-10V, 0-20/4-20mA	3 _ - -	• •	49.00
Input 2	None	_ 00-	• •	0.00
	0-5/1-5V, 0-20/4-20mA	_ 10-	b b	133.00
Approvals	CE, UL, and CSA (Standard)	0 _ _ _ -	• •	0.00
	CE, UL, CSA, and FM	1 _ _ _ -	c c	38.00
	CE Only	2 _ _ _ -	• •	0.00
Tags	None	_ 0 _ _ _ -	• •	0.00
	Stainless Steel ID Tag (3x22 Char)	_ T _ _ _ -	• •	49.00
Reserved	Future Options	_ _ 000-	• •	0.00
Manual	English Hard Copy (51-52-25-127)	E _ -	• •	32.00
Certificate	None	_ 0-0	• •	0.00
	Certificate of Conformance (F3391)	_ C-0	• •	37.00

### Restrictions

- a Available only with Output 1 options E\_, A\_, and T\_.
- b Not available on limit controller model.
- c Available only on limit controller. Not available with Output 1 options C\_ or R\_.

### Accessories

Description	Catalog Number	Price
4-20 mA Input Resistor Assembly (250Ω)	30731996-506	\$23.00
0-10V Input Resistor Assembly (100K Pair)	30754465-501	81.65
Process Instrument Explorer Software	50001619-001	159.00
Mounting Kit (12 Brackets)	51452763-501	32.20
DIN Adaptor Kit	30755223-003	81.65
Product Information on CD (All Languages)	51453375-501	16.65
Actisys Serial to Infrared Adapter for PCs	ACT-IR220L+	95.00



### Protect your instrumentation investment!

Need electrical surge protection? Phoenix Contact offers a full line of electrical surge protection for AC- and DC-powered controllers. Call for pricing.



### Need a temperature input for your controller?

See pages 98 to 105.

# UDC3200 Universal Digital Controller

# Honeywell

Conversion Made Easy!



Configure the new UDC through the front-panel infrared port and your Pocket PC!

Thermocouple Health... Only Honeywell Has It!

## New Power and Flexibility

### Front face meets NEMA 4X/IP66 hosedown standard

- Front face withstands continuous water spray (at least 5 minutes) at 65 gal/min from a 1" dia. nozzle from a distance of 10 to 12 feet.
- Eliminates the need for costly protective bezels or enclosures in hosedown areas.

### Dual display provides easy access to information

- A new 7 character upper display (the UDC3300 has 6 characters) and an 8 character, 14-segment, alphanumeric lower display provide large numerical readout of any input PV, setpoint output or other selected variables.
- Dedicated PV display (upper display) minimizes operator confusion.
- Minimizes operator training by providing clear configuration prompts and control parameter labeling.

### Non-intrusive front face infrared port standard on all UDC3200s

- Non-intrusive I/R connection reduces setup time and maintains the NEMA 4X integrity.
- No need to access the back of the UDC to communicate with it.
- Works with Pocket PC and Process Instrument Explorer software, lets you upload or download configurations in seconds

### Industry standard Ethernet communication available as an option

- Uses Modbus TCP/IP to connect to other Ethernet networks.
- Lets you monitor your process from almost any location.
- Configure the controller directly from your PC — even configure the controller to send an e-mail when an alarm condition occurs.

### RS485 Modbus-compatible communication option

- Provides the capability of daisy chaining up to 31 UDC3200 Controllers on a serial multi-drop link, which connects to a host computer.
- Accurate on-line monitoring of process operation.
- Allows host device to override controller outputs or SP.

### PC-base configuration tools make setup simple

- Create/Edit configurations live or off-line via communications port
- Same software works on PC, Laptop and Pocket PC.
- Same software works with UDC2500, UDC3200, UDC3500, UDA2182 analyzer and other future Honeywell products.

### Thermocouple health diagnostics prevent costly process shutdowns

- Monitor the condition of your thermocouple, and determine whether it's good, failing or in danger of imminent failure.
- Gives you the advanced notice and warning to replace thermocouples before they fail

### Designed for easy field upgrades

- Field upgrade from relay to current output or vice versa. Add a printed wiring board to field upgrade to communications or AuxOut/digital input.
- You can upgrade the software in the field, or return the unit to factory configuration in a single step.

### Heater break alarm checks output circuit to ensure operation

- Immediately alerts you to a heater failure.
- Saves operating time by not continuing to run with a failed heater.

### Enhanced AccuTune III for better accuracy

- Fast Tune will tune the process to reach the temperature faster.
- Slow Tune minimizes overshoot.
- Heat/Cool automatically tunes both the heating and cooling sides of the process.

### Adaptive tuning accurately identifies and tunes any process

- AccuTune III recognizes both setpoint and load changes.
- PV Adapt monitors and modifies controller tuning "on-line" in the Automatic mode.
- Can be configured as TUNE + PV to operate with on-demand tuning or as SP + PV to operate with setpoint changes only.
- Can tune both heat and cool with one press of the key.
- Speeds up and simplifies startups and allows return to any setpoint.

### Two sets of tuning constants reduces time to reach setpoint, saves time and energy

- Two sets of configured PID parameters can be selected automatically based upon the PV or SP value.
- Select via the keyboard or the digital Input option.
- AccuTune may be used to calculate both sets of PID constraints.
- Optimize on-spec product at different loads.



**Choose from five outputs**

- Current Outputs (4-20 or 0-20 ma)
- Electromechanical Relays (5 amps)
- Solid State Relays (1 amp)
- Dual Electromechanical Relays (2 amps)
- Open Collector Outputs

**Position proportional control**

- Accepts input from Feedback Slidewire, with two relays available to operate motor.
- Actual motor position is displayed on instrument (not a calculated value) and can be used in PID calculation.

**Second universal input option lowers installation costs**

- Allows a second direct input of T/C, RTD, Radiamatic, linear voltage or current signals. Lets you switch easily between Inputs 1 and 2.
- Provides calculation for differential temperature, average temperature, carbon potential, oxygen control or dewpoint control PVs.
- Improves accuracy by eliminating an additional source of error (temperature transmitter)

**Two digital inputs for application flexibility**

- 2 optional DIs can be configured for any 25 different actions.
- Provides flexibility required for applications involving multiple discrete logic operations.
- Enables use of more DI functions than available on UDC3000 or UDC5000 to solve application problems.

**Feedforward summer and multiplier functions standard**

- Provides a standard algorithm for summing or multiplying any analog input directly with the calculated controller PID output
- Cost effective — no need to purchase Math Option.

**Math algorithm option makes UDC3200 fit in complex applications**

- No confusing function blocks
- One general math equation is provided as part of the Math option.
- Derives a process variable, setpoint or auxiliary output signal.
- Available with weighted average, multiplier/divider, adder/subtractor and input high/low select.
- Saves auxiliary devices.

**Setpoint ramp and rate functions — no need to buy an optional setpoint programmer for simple batch processes**

- Setpoint Rate prevents an abrupt and harmful changes in the process — improves product quality: Provides a SP Ramp Rate, in engineering units per hour, that defines the speed at which the SP will change when ramping between any 2 local setpoints: Can be applied when switching between local SP1 or SP2. Configure different rates for increasing and decreasing SP changes.
- Setpoint Ramp: Provides a single SP Ramp defined by the time in minutes it takes to reach the final, configurable setpoint value from the starting local SP.

**PV hot start eliminates need for operator action after power loss**

- Smooths process recovery following power loss or interruption.
- Saves time and energy returning to a SP following power recovery.
- The controller will initialize the local setpoint at the current PV value upon power start up in the event of loss of power when configured for Setpoint Ramp or SP Programming.
- New DI selection provides initialization of the local SP at the current PV value upon a momentary (transition) closure of the Digital Input.

**Three local setpoints eliminate the need for separate programmer**

- Configure for three local setpoints or two local and one remote.
- SP selection made via front panel keys or an optional digital input.
- Ramp rate applies to all 3 local SPs providing a simple programming function.

## Which UDC is right for you?

Feature	2500	3200	3500
NEMA 4X Enclosure	●	●	●
Universal Output Model	●	●	●
Thermocouple Health Monitor	●	●	●
Enhanced Auto-Tune	●	●	●
Infrared Communication Port	●	●	●
Ethernet Communications	○	○	○
PC-Based Configuration Tool	○	○	○
Setpoint Programming	○	○	○
Position Proportional Control		○	○
Carbon and Oxygen Probe		○	○
Slidewire Inputs		○	○
Math Functions		○	○
Limit Controller	○		
Real-Time Clock			○
Data Storage			○
5 Logic Gates			○
Up to 5 Output Relays			○
4 Digital Inputs			○
HealthWatch Diagnostics			○

● Standard

○ Optional

**Output rate limiter cuts energy use at startup or process upset**

- Limits the maximum rate of change for controller output.
- Separate rate for both increasing and decreasing output signals in percent per minute
- Eliminates the need for manual intervention.
- Allows more aggressive tuning near setpoint.

**Failsafe output protects process and equipment from damage**

- Continuous diagnostics used to detect failure modes.
- Forces controller to a pre-determined output value.
- Available as a Digital Input selection.
- Can be configured to latch or lockout the operator.
- Controller output moves to predictable, not random values.
- Provides a method of planned and safe shutdown.

**Universal instrument power supply minimizes number of models and configurations needed**

- Automatically covers voltage range of 90–264 VAC, 50 or 60 Hz, which conforms to the standard AC voltages found worldwide and covers a majority of the control installations in the target markets.
- A 24 VAC/DC 50 or 60 Hz powered model is also available.
- Ideal for spares with undefined power requirements.
- Eliminates damage due to power supply miswiring on installation.

**Transmitter power minimizes space requirements, installation costs, and wiring labor**

- Provides 30VDC power for a 4–20 mA two-wire transmitter. Uses open-collector alarm 2 output or optional auxiliary current output.
- Eliminates purchasing an external power supply, saving \$50 to \$100.
- Minimizes panel space requirements, installation cost and labor.

**Security lockout prevents unauthorized changes to configurations**

- Permits up to 5 levels of keyboard security. User-selectable 4-digit code maximizes process security.
- Permits the ability to disable operator use of the Auto/Manual key, Setpoint/Select key or Run/Hold key.

# UDC3200 Universal Digital Controller



## Specifications

**Input Accuracy:** ± 0.20% full scale, typical (±1 digit for display). Can be field calibrated to ±0.05% full scale, typical 16-bit resolution

**Sampling Rate:** Inputs sampled six times a second

**Temperature Stability:** ±0.01% of full scale span per °C change, typical

**Input Signal Failure Protection:** *Thermocouple inputs:* Upscale, downscale, failsafe, or none; *Thermocouple health:* Good, failing, failure imminent, or failed; *Failsafe output level:* Configurable 0-100% of output range

**Input Impedance:** 4 to 20 mA: 250Ω; 0-10 V: 200KΩ; All other: 10 megΩ

**Maximum Lead Wire Resistance:** *Thermocouples:* 50Ω/leg; 100, 200, and 500 RTD: 100Ω/leg; 100 low RTD: 10Ω/leg

**Input Filter Software:** Single pole low pass section with selectable time constants, off to 120 seconds available on both analog inputs.

**Stray Rejection:** *Common mode: AC (50 or 60 Hz):* Greater of 120 dB (with maximum source impedance of 100Ω) or ±1 LSB (least significant bit); *DC:* Greater of 120 dB (max source impedance of 100Ω) or a ±1 LSB; *DC: (to 1 KHz):* Greater of 80 dB (max source of impedance of 100Ω) or ±1 LSB. *Normal mode: AC (50 or 60 Hz):* 60 dB (with 100% span peak-to-peak max)

**Digital Input (Isolated):** 30 VDC source for external dry contacts or isolated solid state contacts. Digital inputs are isolated from line power, earth ground, analog inputs, and all outputs except for second current output. Second digital input is mutually exclusive with the second current output.

**Alarm Outputs:** One SPDT electromechanical relay. Second alarm available if the second control relay is not used for control purposes. Up to four setpoints are independently set as high or low alarm, two for each relay. Setpoint can be on any input, PV, deviation, manual mode, failsafe, PV rate, RSP mode, communication shed or output. Adjustable hysteresis 0–100%. Alarm can also be set as an ON or OFF event at the beginning of a setpoint ramp/soak segment. *Alarm relay contacts rating:* 5 Amps resistive at 120 VAC, 240 VAC, or 30 VDC

**Controller Output Types:** *Electromechanical relays:* 1 or 2 SPDT contacts. *Resistive load:* 5 Amps at 120 or 240 VAC, or 30 VDC; *Inductive load:* 3 Amps at 130 or 250 VAC, 3.5 Amps at 30VDC; *Motor:* 1/6 H.P. *Dual electromechanical relays:* 2 SPST relays. One N/C contact for each relay brought out to rear terminals. Useful for time duplex, position proportional, or three-position step control. Instruments with this option have a total of 4 relays plus 1 current output. *Resistive load:* 2 Amps at 120 or 240 VAC, or 30 VDC; *Inductive load:* 1 Amp at 130 VAC, 250 VAC, or 30 VDC, 20 mA min. load; *Solid state relays:* One or two externally mounted SPST triac normally open outputs. *Resistive load:* 1.0 Amp at 25° C and 120 or 240 VAC, 0.5 Amps at 55° C and 120 or 240 VAC; *Inductive load:* 50 VA at 120 VAC or 240 VAC; 20 mA min load. *Open Collector outputs (1 or 2):* Socketed assembly replacing a relay. Opto-isolated from all other circuits except current output, but not from each other, Internally powered at 30 VDC. 20mA max. sink current; *Overload protection:* 100 mA. *Current output (1 or 2):* Outputs provide a 21 mA DC max. into a negative or positive grounded load or into a non-grounded load. Current outputs are isolated from each other, line power, earth ground, and all inputs. Can be configured to be 0 to 20 or 4 to 20 mA and direct or reverse acting, without field calibration. Output can represent input, PV, setpoint, deviation, or control output. *Resolution:* 14 bits over 0 to 21 mA; *Accuracy:* 0.05% full scale; *Temperature stability:* 0.01% full scale/°C; *Load resistance:* 0 to 1000Ω.

## Input Actuators

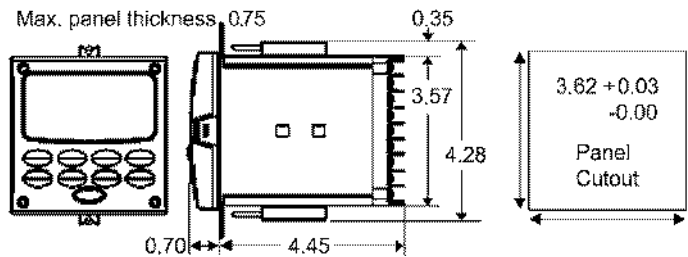
Input Type	°F Range	°C
<b>Thermocouples</b>		
B	0 to 3300	-18 to 1816
E	-454 to 1832	-270 to 1000
E (low)	-200 to 1100	-129 to 593
J	0 to 1600	-18 to 871
J (med)	20 to 900	-7 to 482
J (low)	20 to 550	-7 to 288
K	0 to 2400	-18 to 1316
K (med)	-20 to 1200	-29 to 649
K (low)	-20 to 750	-29 to 399
NiMo-NiCo (NNM90)	32 to 2500	0 to 1371
NiMo-NiCo (low)	32 to 1260	0 to 682
Nicrosil Nisil (NIC)	0 to 2372	-18 to 1300
NIC (low)	0 to 1472	-18 to 800
R, S	0 to 3100	-18 to 1704
T	-300 to 700	-184 to 371
T (low)	-200 to 500	-129 to 260
W5W26	0 to 4200	-18 to 2315
W5W26 (low)	0 to 2240	-18 to 1227
<b>Radiamatic</b>		
Type RH	0 to 3400	-18 to 1871
Type RI	0 to 9999 max.	-18 to 9999 max.
<b>Differential T/C**</b>		
	-50 to 150	-46 to 66
<b>RTD</b>		
IEC Alpha = 0.00385		
100Ω, 200Ω, 500Ω	-300 to 1200	-184 to 649
100Ω (low)	-300 to 300	-184 to 149
<b>Linear</b>		
	4 to 20mA, 0 to 20mA; 0 to 10mV, 0 to 50mV, or 0 to 100 mV; 0 to 5V, 1 to 5V, or 0 to 10V	
<b>Combinational</b>		
Carbon	0 to 1250 mV	
Oxygen	-30 to 510 mV	
<b>Slidewire</b>		
	0 to 1000Ω input range	

\*\* Factory calibrated for two Type J T/Cs at an ambient temp. mean of 450° F (232° C). Can be field-calibrated for other temperatures or T/C types.

**Controller Output Algorithms:** *On-off or time proportional:* One relay or open collector output. Control action can be set for direct or reverse. *Time proportional relay resolution:* 3.3 msec. *On-off duplex, three-position step control or time proportional duplex:* Two relays or open collector outputs. Control action can be set for direct or reverse. *Time proportional relay duplex resolution:* 3.3 msec. *Current proportional:* Single 4 to 20 mA current output signal that can be configured for direct or reverse action. *Current proportional duplex:* Single split current output for heat and cool (4-12 cool, 12-20 heat) or a combination of first current output (heat = 50% to 100% range) and second current output (cool = 0% to 50% range). Both are 4 to 20 mA signals that can be set for direct or reverse action. *Position proportional:* Two SPDT electromechanical or solid state relays (recommended) operate any motor having a 100Ω or 1000Ω feedback slidewire. *Current/time duplex:* Variation of time proportional duplex for heat/cool applications. Time proportional output is a relay. Current proportional output is a 4 to 20 mA signal that can be fed into a negative or positive grounded load of 0 to 1000Ω ohms, operational over 50% range or entire range.

**Communications Interface Option:** RS422/485 Modbus RTU: 4800, 9600, 19200, or 38400 baud selectable; Floating point or integer data; 2000 ft. max. with Belden 9271 Twinax cable and 120Ω termination resistors, 4000 ft. max. with Belden 8227 Twinax cable and 100Ω termination resistors; Two-wire, multi-drop Modbus RTU protocol, 15 drops max, up to 31 drops for shorter link length. *Ethernet TCP/IP:* 10Base-T, 330 ft. max. length; Four-wire, single drop, five hops max. IP address is factory-set to 10.0.0.2. Use switch rather than a hub for maximum UDC Ethernet performance. *Infrared (IR):* Serial infrared, 3 ft. max. link for IrDA 1.0 compliant devices; 19200 or 38400 baud selectable; floating point or integer data. (**Note:** PC's standard IR port will not support this option. Serial to Infrared adapter required. See Model Selection Guide.)

## Dimensions



**Ordering Instructions**

Make a selection from each table. A complete catalog number looks like this: DC3200-CE-0000-200-00000-E0-0

**Model Selection Guide**

Description		Catalog Number	Availability	Price
Digital Controller for Use with 90-264 VAC Power		DC3200	↓	\$729.00
Digital Controller for Use with 24 VAC/DC Power		DC3201	↓	751.00
Output 1	Current Output (4-20/0-20 mA)	C _ _	• •	0.00
	Electromechanic Relay (5Amp, Form C)	E _ _	• •	0.00
	Solid State Relay (1 Amp)	A _ _	• •	0.00
	Open Collector Transistor Output	T _ _	• •	0.00
	Dual Relays, Heat/Cool (2 Amp, Form A)	R _ _	• •	22.00
Output 2 + Alarm 1 or Alarms 1+2	No Additional Outputs or Alarms	_ 0 _	• •	0.00
	One Alarm Relay Only	_ B _	• •	38.00
	Electromechanical Relay + Alarm 1	_ E _	• •	71.00
	Solid State Relay + Alarm 1	_ A _	• •	71.00
	Open Collector + Alarm 1	_ T _	• •	71.00
Communications	None	0 _ _ _	• •	0.00
	1 Aux Output + 1 or 2 Digital Inputs	1 _ _ _	• •	154.00
	RS485 Modbus + AuxOut/DI	2 _ _ _	• •	204.00
	10Base-T Ethernet (Modbus RTU) plus Aux Output/Digital Inputs	3 _ _ _	• •	221.00
Software Selection	Standard Functions, Includes AccuTune	_ 0 _ _	• •	0.00
	Math Option	_ A _ _	• •	193.00
	12-Segment Setpoint Programming	_ B _ _	• •	111.00
	Setpoint Programming plus Math	_ C _ _	• •	271.00
Reserved	No Selection (For Future Use)	_ _ 0 _	• •	0.00
Interface	Infrared Interface for Use with Pocket PC	_ _ _ R	• •	0.00
Input 1	TC, RTD, mV, 0-5/1-5V	1 _ _ _	• •	0.00
	TC, RTD, mV, 0-5/1-5V, 0-20/4-20 mA	2 _ _ _	• •	15.00
	TC, RTD, mV, 0-5/1-5/0-10V, 0-20/4-20 mA	3 _ _ _	• •	50.00
	Carbon, Oxygen, or Dewpoint (2 Inputs)	160-	a a	271.00
Input 2	None	_ 00-	• •	0.00
	TC, RTD, mV, 0-5/1-5V, 0-20/4-20mA	_ 10-	• •	154.00
	TC, RTD, mV, 0-5/1-5/0-10V, 0-20/4-20mA	_ 20-	• •	198.00
	Slidewire Input for Position Proportional	_ 40-	b b	154.00
Approvals	CE (Standard)	0 _ _ _ _	• •	0.00
	CE, UL, and CSA	1 _ _ _ _	• •	38.00
Tags	None	_ 0 _ _ _	• •	0.00
	Stainless Steel ID Tag (3x22 Char)	_ T _ _ _	• •	49.00
Reserved	Future Options	_ _ 000-	• •	0.00
Manual	English Hard Copy (51-52-25-127)	E _ _	• •	32.00
Certificate	None	_ 0-0	• •	0.00
	Certificate of Conformance (F3391)	_ C-0	• •	69.00

**Accessories**

Description	Catalog Number	Price
4-20 mA Input Resistor Assembly (250Ω)	30731996-506	\$23.00
0-10V Input Resistor Assembly (100K Pair)	30754465-501	81.65
Process Instrument Explorer Software	50001619-001	159.00
Mounting Kit (12 Brackets)	51452763-501	32.20
DIN Adaptor Kit	30755223-003	81.65
Product Information on CD (All Languages)	51453375-501	16.65
Actisys Serial to Infrared Adapter for PCs	ACT-IR220L+	95.00

**Restrictions**

- Select None from Input 2 options.
- Available only with Output options -EE-, -AA-, and -R\_.

**Auxiliary (Isolated) Linear Output Option:** 21 mA DC max. into negative or positive grounded or non-grounded load of 0-500Ω. Output range set between 0 and 21 mA, and as direct or reverse action, and configured to represent IN1, IN2, PV, setpoint, LSP1, deviation or control output. *Resolution:* 12 bits over 0-21 mA; *Accuracy:* 0.1% of full scale; *Temperature stability:* 0.01% F.S./°C; *Load resistance:* 0 to 500Ω

**Setpoint Programming Option:** Configure 6 ramp and 6 soak segments for use as one program or several small programs. Each ramp segment configured to run in hours and minutes or degrees per minute. Soak segments can have a deviation that guarantees the time for each soak and will not start until the PV is reached.

**Digital Displays:** Vacuum fluorescent, dual displays. Seven-character upper display dedicated to PV. Alternate information displayed during configuration mode. Eight-character, alphanumeric lower display shows operating parameters. Provides guidance during controller configuration.

**Indicators:** Alarm relay status (ALM 1 or 2), control mode (A or M), temperature units (F or C), active setpoint (■), control relay status (OUT 1 or 2), digital input status (DI 1 or 2)

**Modes of Operation:** Manual, automatic with local or remote setpoint

**Wiring Connections:** Screw terminals on the rear of the case

**Power Consumption:** 20 VA max. (90 to 264 VAC); 15 VA (24 VAC/DC)

**Power Inrush Current:** 10A maximum for 4 ms (under operating conditions). *Caution:* When applying power to more than one UDC3200, make sure that sufficient power is supplied.

**Design, Environmental and Operating Conditions**

**Ambient Temperature:** 32 to 131°F (0 to 55°C)

**Relative Humidity:** 5 to 90% RH max rating to 104° F.

**Vibration:** 0 to 200 Hz; 0.6 g; *Mechanical Shock:* 5 g; 30 ms

**Voltage:** 90 to 264 VAC (CSA models rated to 250V max.); 20 to 27 VAC

**Frequency (Hz):** 48 to 52 (58 to 62 for VAC)

**CE Conformity:** Meets protection requirements of 73/23/EEC, the low voltage directive and 89/336/EEC, the EMC directive.

**Product Class:** *Class I:* Permanently connected, panel mounted industrial control equipment with protective grounding. (EN61010-1)

**Installation Category:** *Cat II:* Energy-consuming equipment supplied from fixed installation. Local-level appliances and industrial control equipmt.

**Pollution Degree:** 2, Normally nonconductive pollution with occasional conductivity caused by condensation. (Ref. IEC 664-1)

**EMC Class:** Group 1, Class A, ISM equipment (EN 55011, emissions), Industrial equipment (EN 50082-2, immunity). *EMC assessment:* Technical File (TF).

**Declaration of Conformity:** 51453655

**Approval Body Ratings:** UL listed (standard) UL61010C-1, CSA certified (option) CSA1010-1

**Learn more about Process Instrument Explorer software on page 207. Works with all UDC2500, 3200, and 3500 models for easy setup and parameter changes.**

## UDC3500 Universal Digital Controller

Honeywell



The end of confusing codes! UDC3500 display supports English language prompts for programming!

### Features

- 3 universal analog inputs, 4 digital inputs
- Up to 3 analog outputs, Up to 5 digital outputs
- 0.10% Accuracy
- Math Functions
- Ethernet or RS485 communication options; Front-panel infrared communications standard!
- Cascade or two loops of control
- PC or Pocket PC configuration
- HealthWatch maintenance and diagnostics option and thermocouple health feature
- Setpoint programming options: basic (1 program, 10 segments) or enhanced (4 programs, 20 segments each)
- NEMA 4X and IP66 front face protection

### The Industry Standard Gets Even Better!

**Infrared Communications:** No need to get access to the back of the controller to communicate with the instrument, no need to take your screwdriver to wire a communication cable, no wiring mistake possible! You can now duplicate an instrument's configuration, upload or download a new configuration in a matter of seconds, just by pointing your Pocket PC in the direction of the instrument. The infrared connection provides a non-intrusive wireless connection with the UDC, and maintains NEMA 4X and IP66 integrity.

It takes less than 2 seconds to upload an instrument configuration! You can then save the configuration file onto your PC or Pocket PC for review, modification or archiving. This software also gives you important maintenance information on the controller. You get instant information on the current operating parameters, digital inputs and alarm status, identify internal or analog input problems.

**AccuTune III™:** This standard feature provides a truly plug and play tuning algorithm, which will, at the touch of a button or through a digital input, accurately identify and tune any process including those with deadtime and integrating processes. AccuTune speeds up and simplifies startup, and allows retuning at any setpoint. The algorithm used is an improved version of AccuTune II™ found on earlier models of the UDC controllers.

Two possibilities are available for tuning your process: Fast Tune and Slow Tune. Fast Tune will tune the process so that the temperature is reached faster (a slight overshoot will be allowed). Slow Tune will minimize overshoot, but it will take more time for the process temperature to reach the target setpoint. Heat/Cool (Duplex Tune) will automatically tune both the heating and cooling sides of the process.

**Fuzzy Logic:** This standard feature uses fuzzy logic to suppress process variable overshoot caused by setpoint changes or externally induced process disturbances. It operates independently from AccuTune III™ tuning. It does not change the PID constants, but instead temporarily modifies the internal controller response to suppress overshoot. This allows more aggressive tuning to coexist with smooth PV response. It can be enabled or disabled depending on the application or the control criteria.

**Diagnostic/Failsafe Outputs:** Continuous diagnostic routines detect failure modes, trigger a failsafe output value and identify the failure to minimize troubleshooting time.

**Auxiliary Output Option:** Any of the three current outputs can function as an Auxiliary Output, which can be scaled for 0 to 100% for any range. An Auxiliary Output can be configured to represent any analog input, PV, active Setpoint, Local SP1, Remote SP, Deviation, or Control Output. The second current output cannot be used with Ethernet Communications.

**Four Sets of Tuning Constants:** Four sets of PID parameters can be configured for each loop and can be selected automatically or manually by Keyboard or Digital Input.

**Timer Option:** Provides a configurable time period of 0 to 99 hours, 59 minutes or units of minutes and seconds. It can be started through the keyboard, Alarm 2, the Real-Time Clock or by a digital input. The timer output is Alarm 1, which energizes at the end of the timer period, and can be automatically reset. The timer period can be changed between each batch. Status is shown on the lower display.

**Setpoint Rate:** Lets you define a ramp rate to be applied to any local setpoint change. A separate upscale or downscale rate is configurable. A single setpoint ramp is also available as an alternative.

**Output Rate Limiter:** A maximum output rate may be configured for both the upscale and the downscale output directions.

**Data Security:** Five levels of keyboard security protect tuning, configuration, and calibration data, accessed by a configurable 4-digit code. Nonvolatile EEPROM memory assures data integrity during loss of power.

**Auto/Manual Station Plus Backup Control:** A UDC3500 can act as both an Auto/Manual station PLUS as a backup PID controller, should the primary loop controller fail. Since PID control is sometimes implemented through a PLC, this feature provides a cost-effective way to ensure the process does not have to shut down or remain in manual mode if the PLC fails.

**Indicators:** Provide alarm, control mode and temperature unit indication. There are also indicators for which setpoint is active, the status of the control relays, status of the Digital Inputs, when an AccuTune III™ process is being performed and whether a Setpoint Program is in Run, Hold or Guaranteed Soak mode.



## Process Instrument Explorer Configuration Software

**No need to get access to the back of the controller, no need to find a screwdriver to wire the communication cable! Just aim and upload!**

**Compatible with UDC2500, UDC3200, UDC3500 controllers and UDA2182 process analyzer!**

### Features

- Simple, intuitive software running on a Pocket PC, desktop, or laptop computer
- Save setup time by loading stored configurations to multiple instruments
- Non-intrusive infrared connection safes time and maintains controller's NEMA 4X/IP66 integrity
- Uses the same menu structure as your controller
- Full instrument configuration available
- Store multiple instrument configurations in a Pocket PC
- Transfer stored configurations or maintenance data to a PC
- Runs on Windows XP (SP1) or Vista (SP1), and Microsoft® Pocket PC 2002 or higher

Process Instrument Explorer makes configuration and setup a simple task. Point your Pocket PC at your instrument and upload the complete configuration. Make changes easily, right from the palm of your hand, using a menu structure identical to the one accessible from the front-panel buttons. Then, point the Pocket PC at the UDC again, and download the changes you've just made to the field unit, so you can save them on the PC in your plant office.

PIE lets you connect to your controllers over Modbus RTU (using the RS485 port), Modbus TCP through the controller's Ethernet port, or through the front-face infrared port.



**Hardware connection:** Infrared communications (ACT-IR220L+), RS485, or 10Base-T or 10/100Base-T Ethernet. Pocket PC with Intel PXA250 or PXA255 CPU and 32MB RAM

**Operating system:** Windows XP SP1 or Vista SP1; Pocket PC 2002 or newer; Requires Microsoft ActiveSync or Windows Mobile Device Center for PC and Pocket PC to communicate via ActiveSync cable.

**Data storage:** Capacity limited only by the storage capacity of the desktop, laptop, or Pocket PC

### Model Selection Guide

Description	Catalog Number	Price
Process Instrument Explorer Software	50001619-001	\$159.00
Actisys Serial to Infrared Adapter for PCs	ACT-IR220L+	95.00

**Real-time clock lets you use your UDC3500 as a temperature recorder!**

### Options

**HealthWatch:** Three timers and three counters track UDC3500 controller functions. Timers can track total operating time, time in manual or automatic mode, time in alarm state, time of digital input activation, time in "sooting" state. Counters can track manual mode counts, alarm trip counts, control relay actuations, digital input actuations, outside PV range limit counts, failsafe mode counts, re-tune counts, out of soak band counts, and power cycle events.

Selected maintenance and diagnostic data can be accessed from the front panel or via communications. Alarms can be configured to activate when a desired threshold is reached. A security code is required to perform resetting of any of the above listed counter or timer functions.

**Ethernet Communications:** Widely used by manufacturers, the Ethernet connection, which uses Modbus TCP/IP, allows the controller to connect to other Ethernet networks and exchange data with computers or devices on that network for monitoring or managing your process from almost any location.

**Software Configuration:** New UDCs can be configured via the Process Instrument Explorer (PIE) PC software. This software lets you configure all of the UDC's parameters, and monitor various parameters. The controller can even be configured to send an Email when an alarm condition has been encountered.

**Setpoint Ramp/Soak Programming:** Enables you to program and store up to ten Ramp and ten Soak segments for setpoint programming. Run or Hold of program is keyboard or remote digital switch selectable. Each Soak Segment may have a unique Guaranteed Soak Deviation value. Each Ramp and Soak Segment can be configured to use any one of the four PID Sets.

**Real Time Clock:** A battery-backed clock feature that lets you perform such things as starting a Setpoint Program on a specific date and time, or tracks time and temperature to server as a temp logger.

**Transmitter Power:** This option provides up to 30 VDC to power a 2-wire transmitter (requires the use of Output #2 open collector output selection or one of the current outputs).

**Math Functions:** Two pre-configured math algorithms are available for easy implementation. The following selections are available: feedforward summer, feedforward multiplier, weighted average, summer/subtractor, multiplier/divider, input high/low select, 8-segment characterizers, polynomial curve characterizer, and totalizer

**Combinational Inputs:** Inputs can be combined for use with Relative Humidity, % Oxygen, Carbon Potential, Dewpoint or Math Algorithms. This controller can accept carbon probes from Cambridge, Marathon Monitors, Corning, AAAC, Barber Coleman, MacDhui, Bricesco or Furnace Controls.

**Logic Gates:** Five Logic Gates configurable as OR, NOR, AND, NAND, XOR, XNOR, or COMPARATOR. Each Gate has two inputs and one output. Logic Gates may be linked together to perform more complex functions.

**Alarms:** Up to four electromechanical alarm relays are available to activate external equipment when preset alarm setpoints are reached. Each of the four alarms can be set to monitor two independent setpoints, and as either high or low alarm. In addition to the chosen alarm configuration, a diagnostic alarm can monitor current outputs for an open circuit condition. Effectively, the diagnostic alarm can be used as an additional digital input used to trip an alarm relay when a current output circuit opens..

## UDC3500 Universal Digital Controller

Honeywell

## Specifications

## Input

Up to three universal analog inputs. Can be configured to operate as 2 universal and 2 high level inputs, or as 1 universal and 4 high level inputs. *Sampling Rate:* Inputs sampled six times a second.

**Accuracy:**  $\pm 0.10\%$  full scale typical ( $\pm 1$  digit for display); Field calibrated to  $\pm 0.05\%$  full scale typical; 16 bit resolution typical; *Temperature Stability:*  $\pm 0.01\%$  full scale/ $^{\circ}\text{C}$  change.

**Analog Input Signal Failure Operation:** *Burnout selections:* Upscale, downscale, burnout, or none; *Thermocouple health:* Good, failing, failure imminent, or failed; *Failsafe output level:* Configurable 0-100% output range.

**Impedance:** *Thermocouples:* 50 $\Omega$ /leg; 100, 200, 500, or 1000 $\Omega$  RTD: 100 $\Omega$ /leg; 100 $\Omega$  Low RTD: 10 $\Omega$ /leg.

**Leadwire Resistance:** 4-20, 0-20 mA input: 250 $\Omega$ ; 0-10, -1-1 Volt input: 200K $\Omega$ ; All other: 10 meg $\Omega$ .

**Slidewire Input (#3) for Position Proportional Control:** 100 to 1000 $\Omega$

**Stray Rejection:** *Common mode: AC (50 or 60 Hz):* greater of 120 dB or  $\pm 1$  LSB (least significant bit) with line voltage applied.; *DC:* Greater of 120 dB or  $\pm 1$  LSB; *DC (to 1 KHz):* Greater of 80 dB or  $\pm 1$  LSB with 50 VAC applied. *Normal mode: AC (50 or 60 Hz):* 60 dB (100% span peak-to-peak max.)

**Digital Inputs (Four Optional):** +30 VDC source for external dry contacts or isolated solid state contacts. Digital inputs are isolated from line power, earth ground, analog inputs, and all outputs.

## Input Actuations

PV Input		$^{\circ}\text{F}$	$^{\circ}\text{C}$
Thermo-couples	B	0-3300	-18-1815
	E	-454-1832	-270-1000
	E (low)	-200-1100	-133-593
	J	0-1600	-18-871
	J (med)	20-900	-7-482
	J (low)	20-550	-7-288
	K	0-2400	-18-1316
	K (med)	-20-1200	-29-649
	K (low)	-20-750	-29-399
	NiMo-NiCo (NNM)	32-2500	0-1371
	NNM (low)	32-1260	0-682
	NiC (Nicrosil Nisil)	0-2372	-18-1300
	NiC (low)	0-1472	-18-800
	Platinell	32-2516	0-1380
	Platinell (low)	32-1382	0-750
	R, S	0-3100	-18-1704
	T	-300-700	-184-371
	T (low)	-200-500	-133-260
W <sub>5</sub> W <sub>26</sub>	0-4200	-18-2316	
W <sub>5</sub> W <sub>26</sub> (low)	0-2240	-18-1227	
Radiamatic	Type RH	0-3400	-18-1871
	Type RI	0-9999 max	-18-9999 max
RTDs ( $\alpha=0.00385$ )	100, 200, 500, or 1000 $\Omega$	-300-1200	-184-649
	100 $\Omega$ (low)	0-300	-18-149
Linear	Milliamps	4-20, 0-20 mA	
	Millivolts	0-10, 0-50, 0-100, 0-500, -10-10 mV	
	Volts	0-1, 0-5, 0-10, 1-5, -1-1 V	
Combi-national	Carbon Probe	0-1250 mV	
	Oxygen Probe	-30-510 mV	
Slidewire	Resistive	0-1000 $\Omega$	
	Herculine <sup>®</sup>	10260 and 11280 Slidewire Emulation	

## Looking for sensors? We've got 'em!

Pressure — Pages 77 to 96

Temperature — Pages 97 to 122

Level — Pages 1 to 54

Flow — Pages 55 to 76

## Outputs

Up to 3 current and auxiliary outputs provide a 0-21 mA current output into a negative or positive grounded load or into a non-grounded load. Current outputs are isolated from each other, line power, earth ground, and all inputs. Can be configured to be 0- or 4-20 mA without field calibration, and for direct or reverse action when used as a control output. Current outputs not used for control can be used in AuxOut mode. Auxiliary outputs can be set to represent any analog input, pV, setpoint, deviation, or control output.

An auxiliary output's range can be scaled per the range of the selected variable, and set anywhere between 0 and 21 mA. *Resolution:* 14 bits over 0-21 mA; *Accuracy:* 0.05 full scale; *Temperature stability:* 0.01% full scale/ $^{\circ}\text{C}$ ; *Load resistance:* 0-1000 $\Omega$ .

The first current output is a standard feature on all UDC3500s. The second current output is an option and is mutually exclusive with Ethernet communications. A third current output option is mutually exclusive with the Output 2 options listed here.

**Infrared Communications:** *Type:* Serial infrared; *Link length:* 3 ft. max. for IrDA 1.0 compliant devices; *Baud rate:* 19200 or 38400 baud selectable.

## Output #2 Options

**Electromechanical Relays:** 1 or 2 N/O or N/C SPDT contacts. Internally socketed; *Resistive:* 5 amps @ 120 VAC, 240 VAC or 24 VDC; *Inductive load:* 3 amps @ 130 VAC or 250 VAC; *Motor:* 1/6 H.P.

**Dual Electromechanical Relays:** 2 N/C SPST relays. This option must be used as Loop 1 output for On/Off Duplex, Time Duplex, Three Position Step Control, and Position Proportional Control. Instruments with this option have a total of 5 relays plus 1 or 2 current outputs.; *Resistive load:* 5 amps @ 120 VAC, 240 VAC or 30 VDC; *Inductive load:* 1 amp @ 130 VAC or 250 VAC.

**Solid State Relays:** SPST solid state contact, triac N/O output with zero-crossing detection; *Resistive load:* 1.0 Amp @ 25 $^{\circ}\text{C}$  and 120 or 240 VAC; 0.5 Amp @ 55 $^{\circ}\text{C}$  and 120 or 240 VAC; *Inductive load:* 50 VA @ 120 or 240 VAC.

**Open Collector:** Transistor drive for powering external relay, isolated from earth ground and all other circuits except for first current output. (**Note:** Applying external power supply to this output will damage the instrument.); *Sink current:* 20 mA max.; *Overload protection:* 100 mA.

**Solid State Relays (10 Amps):** 1 or 2 externally mounted SPST triac N/O outputs for use with open collector outputs. *Resistive:* 15 Amps @ 25 $^{\circ}\text{C}$  and 120 or 240 VAC, 10 Amps @ 55 $^{\circ}\text{C}$  and 120 or 240 VAC; *Inductive:* 50 VA @ 120 or 240 VAC; *Motor rating:* 1 HP @ 25 $^{\circ}\text{C}$ , 0.75 HP @ 55 $^{\circ}\text{C}$ .

## Controller Output Algorithms

Depending on the control algorithms specified, the controller can be configured for the following algorithms: On/Off, PID-A, PID-B, PD with manual reset; Three position step control (TPSC)

TPSC is a motor control that requires no feedback slidewire linked to the motor shaft. TPSC uses two relays to control an electric motor: one to drive the motor upscale, one downscale. TPSC is an automatic backup mode to Position Proportional control if the feedback slidewire should fail. TPSC requires the Dual Relay output option and is not available on Loop 2.

**Time Proportional:** Provides On/Off or time proportional (relay) output

**Current Proportional:** A single 4-20 mA current output signal that can be configured for direct or reverse action.

**Position Proportional:** Positions a reversible motor with a feedback slidewire in proportion to the output of the control algorithm. Requires dual relay output option and third analog input. Not available on Loop 2.

**Current Proportional Duplex:** Provides a second set of tuning parameters and a split range current output or a second current output (via an optional current output) for heat/cool zones.

**Current/Relay Duplex (Relay=Heat):** Variation of duplex with current active for 0-50% output and relay active for 50-100% output.

**Relay/Current Duplex (Relay=Cool):** Variation of duplex with current active for 50-100% output and relay active for 0-50% output.

**On-Off Duplex, Three Position Step Control, or Time Proportional Duplex:**

Provides two independent PID tuning sets and two time proportional outputs, one for heat zone above 50% output, and one for cool zone below 50% output. Requires dual relay output option.

**Auxiliary Linear Output:** 21 mA DC max. into a grounded or non-grounded load of  $\pm 0$ -1000 $\Omega$ ; Range can be set between 0 to 21 mA, direct or reverse action. Can be used as a second current output for current duplex outputs. *Resolution:* 12 bits over 0 to 21 mA; *Accuracy:* 0.05% full scale; *Temperature stability:* 0.0075% full scale./ $^{\circ}$ C; *Load resistance:* 0 to 1000 $\Omega$ .

**Options**

**Enhanced Setpoint Programming:** Lets you program and store up to 4 independent setpoint programs, each with up to 10 ramp/soak segments. Can be combined to form two programs (20 ramp/soak segments ea.). Program run or hold is selectable through keyboard or remote digital switch. Each soak segment can have a unique Guaranteed Soak Deviation value. Each ramp or soak segment can be configured to use any of the four PID sets.

**Three Relay Board:** 3 SPDT contacts. Both N/O and N/C contacts are brought out to the rear terminals. Relays are used for alarm outputs or control loop #2 output. May also be used as Logic Gate function outputs. *Resistive load:* 5 amps @ 120 or 240 VAC or 30 VDC; *Inductive load:* 3 amps @ 130 or 250 VAC; *Motor:* 1/6 H.P.

**Alarm Outputs:** 4 alarm relays max, depending on the type and quantity of control outputs. Each alarm may have one or two setpoints, independently set as high or low alarm; Setpoints can be any input, PV, deviation, manual mode, failsafe, PV rate, remote SP mode, communication shed, or output. A single adjustable hysteresis of 0.0 to 100.0% is provided. Alarm status is available via any comm port, and is shown on the display annunciators.

**RS422/485 Modbus RTU Interface:** *Baud Rate:* 4800, 9600, 19200 or 38400 baud selectable; *Data format:* Floating point or integer; *Link length:* 2000 ft. max. with Belden 9271 Twinax cable and 120 $\Omega$  termination resistors, 4000 ft. max. with Belden 8227 Twinax cable and 100 $\Omega$  termination resistors; *Link characteristics:* 2-wire, multi-drop Modbus RTU protocol, 15 drops max. or up to 31 drops for shorter link length.

**Ethernet TCP/IP Communications Interface:** *Type:* 10Base-T; *Link length:* 330 ft. max.; *Link characteristics:* Four-wire plus shield, single drop, 5 hops max; *IP address:* 10.0.0.2 as shipped from the factory; *Recommended network configuration:* Use switch (not a hub) to maximize UDC's Ethernet performance; Ethernet communication is mutually exclusive with Current Output #2.

**Environmental and Operating Conditions**

**Ambient Conditions:** *Operating temperature:* 32 $^{\circ}$  to 131 $^{\circ}$  F; *Relative humidity:* 5% to 90%

**Vibration:** *Frequency:* 0 to 200 Hz; *Acceleration:* 5g.

**Mechanical Shock:** *Acceleration:* 5g; *Duration:* 30 ms.

**Line Voltage:** *VDC:* 20 to 30; *VAC:* 90 to 264 VAC or 20 to 27 VAC. *Frequency:* 48 to 52 Hz; 58 to 62 Hz for VAC.

**Power Consumption:** 24 VA max (90 to 264 VAC); 18 VA max (24 VAC/DC)

**Power Inrush Current:** 10A max. for 4ms under operating conditions, reducing to a max 265 mA (90 to 264 VAC) or 900 mA (24 VAC/DC) after 1 second.

**Enclosure Rating:** Controller must be panel mounted. Terminals must be enclosed within the panel. *Front bezel:* NEMA 3R and IP54 or NEMA 4X with IP66, UL and CSA approved as Type 4 (when installed with four screws)

**Approval Ratings:** CE approval standard. Front bezel UL and CSA approved as Type 4 moisture protection when used with 4 screws; UL listed per UL61010C-1 (optional); CSA certified per CSA1010-1 (optional).

**EMC Classification:** Group 1, Class A, ISM Equipment (EN 55011, emissions), Industrial Equipment (EN 61326, immunity).

**Notes and Restrictions**

1 Heat/Cool, Position Proportional, TPSC, and Relays 1&2

2 Requires Input 2. Select None from Input 2 Choices)

a Available only with Output #2 Option R, Dual 2-Amp Relays.



**Ordering Instructions**

Make a selection from each section below. Check the availability column to be make the options you need are available. A finished catalog number looks like this: DC3500-CE-1020-110-00000-E0-0

**Model Selection Guide**

Description	Catalog Number	Price
Controller for 90-264 VAC Power, Current Out #1	DC3500-	\$766.00
Controller for 24 VAC/VDC Power, Current Out #1	DC3501-	799.00
Output 2	None	0_- 0.00
	Current (4-20/0-20 mA, Current Out #3)	C_- 28.00
	Electromechanical Relay (5Amp, Form C)	E_- 28.00
	Solid State 1 Amp, Zero-Crossing Type	A_- 28.00
	Open Collector Transistor Output	T_- 28.00
	Dual 2 Amp Relays, Form A (Note 1)	R_- 64.00
Relay Out #3, #4, #5	None	_0- 0.00
	Three E-M Relays (5 Amp Form C)	_E- 52.00
Communications	None	0_ _ _ 0.00
	Current Out #2 + 4 Digital Input	1_ _ _ 307.00
	Current Out #2 + 4 DI + Modbus RS485	2_ _ _ 428.00
	10-Base T Ethernet (Modbus RTU) + 4 DI	3_ _ _ 428.00
Software Selection	Standard Functions (Includes AccuTune)	_0_ _ 0.00
	Math Option	_A_ _ 195.00
	Setpoint Programming (1 Prog, 10 Segments)	_B_ _ 84.00
	Setpoint Programming (SPP) + Math	_C_ _ 280.00
	HealthWatch	_D_ _ 84.00
	SPP + HealthWatch	_E_ _ 139.00
	Math + HealthWatch	_F_ _ 262.00
	SPP + Math + HealthWatch	_G_ _ 324.00
Enhanced Options	Enhanced SPP (4 Prog, 20 Segments Each)	_H_ _ 236.00
	Enhanced SPP + Math	_J_ _ 413.00
	Enhanced SPP + HealthWatch	_K_ _ 313.00
	Enhanced SPP + Math + HealthWatch	_L_ _ 486.00
Loops of Control	Single Loop	_ _ 0_ 0.00
	Two Loops + Internal Cascade	_ _ 2_ 195.00
Realtime Clock	None	_ _ _ 0- 0.00
	Realtime Clock	_ _ _ C- 39.00
Input 1	TC, RTD, mV, 0-5/1-5V	1_ _ _ 0.00
	TC, RTD, mV, 0-5/1-5V, 0-20/4-20 mA	2_ _ _ 17.00
	TC, RTD, mV, 0-5/0-10/1-5/1-10V, 0-20/4-20 mA	3_ _ _ 51.00
	Relative Humidity (Note 2)	15_ _ 162.00
	Carbon, Oxygen, or Dewpoint (Note 2)	16_ _ 280.00
Input 2	None	_0_ _ 0.00
	TC, RTD, mV, 0-5/1-5V, 0-20/4-20 mA	_1_ _ 162.00
	TC, RTD, mV, 0-5/0-10/1-5/1-10V, 0-20/4-20 mA	_2_ _ 207.00
	Two High Level AI	_3_ _ 172.00
Input 3	None	_ _ 0- 0.00
	TC, RTD, mV, 0-5/1-5V, 0-20/4-20 mA	_ _ 1- 162.00
	TC, RTD, mV, 0-5/0-10/1-5/1-10V, 0-20/4-20 mA	_ _ 2- 207.00
	Two High Level AI	_ _ 3- 172.00
	Slidewire Input (Requires Dual Relay Out)	_ _ 4- 162.00
Approvals	CE (Standard)	0_ _ _ _ 0.00
	CE, UL, and CSA	1_ _ _ _ 39.00
Tags	None	_0000- 0.00
	Stainless Steel ID Tag (3 Lines x 22 Char)	_T000- 49.00
Manual	Hard Copy English Manual	E_ _0 32.00
Certificate	None	_0-0 0.00
	F3391 Certificate of Confirmation	_C-0 37.00

**Accessories**

Description	Catalog Number	Price
4-20 mA Input Resistor Assembly (250 $\Omega$ )	30731996-506	\$23.00
0-10V Input Resistor Assembly (100K Pair)	30754465-501	81.65
Process Instrument Explorer Software	 50001619-001	159.00
DIN Adaptor Kit	 30755223-003	81.65
Actsys Serial to Infrared Adapter for PCs	ACT-IR220L+	95.00

# PID Autotune Temperature Controllers



**1/32 or 1/16 DIN format:**

With four-digit single or dual display

**5 Alarm Configurations:**

With latch and sequencing

**Ramp/Soak:** One segment programmer

**Dual Output:** Relay or SSD output device options

**PID Heat-Cool:** With fan or water cooling options

**Environmental Rating:** CE compliant IP66/NEMA 4 face plate

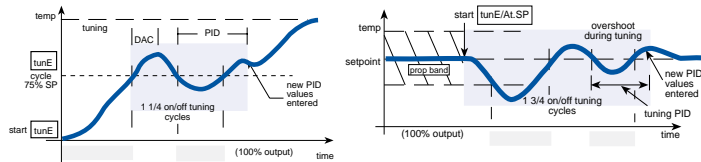
**Sleeve Mounting:** Mini-mizes machine down when servicing

The CAL Model 3300 1/32 DIN and Models 9300 and 9400 1/16 DIN digital temperature controllers follow CAL Controls' familiar tradition of innovative design. With the optional CALComms™ serial communication system and Windows®-based software, you can program these CAL controllers to fit almost any PID control application.

A one-shot autotune algorithm helps automate system start-up and maintain good control over a wide range of process conditions.

In addition to the normal PID terms (proportional band, integral time, derivative time), the algorithm also tunes derivative approach control (DAC), which minimizes overshoot by tuning warm-up characteristics independent of normal operation.

Ideal cycle time is calculated, ready for manual acceptance if compatible with the external device — contractor, solid state relay or valve. To ensure good control over a wide range of applications, the 3300 includes two versions of the algorithm.



**Tune:** This tuning method (above left) normally achieves the best results. Starting with the load cool, tuning occurs during warm-up, preventing overshoot.

**Tune at Setpoint:** Setpoint tuning (above right) is useful for specialized applications like cool, multizones, and processes below 200° F. During the tuning cycle, some overshoot occurs because the tuning cycle is at setpoint. DAC is not recalculated.

**Autotune:** Autotune configures both heat and cool channels and also calculates the ideal cycle time settings for manual implementation.

**Ramp Soak:** Enables the controller to ramp up or down from current temperature to setpoint at a predetermined rate. Before switching off the heat output, the temperature at setpoint is controlled for an adjustable soak period.

**Heat/Cool Applications:** The 3300 air- or water-cool strategy provides a comprehensive solution to demanding heat-cool applications. Linked heat and cool channels move together under PID control to

**Input Actuation Table**

Sensor Type	Range		Linearity		
T/Cs	B	32 to 3272° F	0 to 1800° C ±2.0° C*		
	E	32 to 1112° F	0 to 600° C ±0.5° C		
	J, L	32 to 1472° F	0 to 800° C ±0.5° C		
	K, N	-58 to 2192° F	-50 to 1200° C ±0.25° C*		
	R, S	32 to 2912° F	0 to 1600° C ±2.0° C*		
	T	-273 to 482° F	-200 to 250° C ±0.25° C*		
RTD	Pt100Ω	-273 to 752° F	-200 to 400° C ±0.25° C*		
Linear Inputs		<b>0-20 mV</b>	<b>4-20 mV</b>	<b>SP Limits</b>	<b>Linearity</b>
	Lin1	0 - 100		0 to 400	±0.5%
	Lin2		0 - 100	-25 to 400	
	Lin3	0 - 1000		0 to 3000	
	Lin4		0 - 1000	-250 to 3000	
Lin5	0 - 2000		0 to 3000		

4 to 20 mA input available with use of 1Ω resistor, see Accessories.

Note: Linearity: 5-95% of sensor range. \* Exceptions: B: 5° (70°-500° C); K/N: 1° > 350° C; R/S: 5° < 300° C; T: 1° < -25° > 150° C RTD/Pt100Ω: 0.5 < 100° C



**FM-Approved Limit Controllers!**

Standard CAL3300, 9300, and 9400 models are approved for limit control applications when the output is programmed to latch on alarm, process is shut down on sensor failure, and programming menu is locked.



330-0-000-000FM	\$222.00
930-0-000-000FM	238.00
940-0-000-000FM	262.00

eliminate offset and provide a consistent deadband. Cool proportional band, relative cool, deadband and cool power limit adjustments. Non-linear cool channel for flash-to-steam systems.

**Choice of Outputs:** Two output devices are fitted as standard, to be allocated to the main output (Setpoint 1) and the second output (Setpoint 2) during configuration. CAL controllers come with your choice of output options: a 2-Amp electromechanical relay plus solid state relay drive, two electromechanical relays (one 2-Amp, and one 1-Amp), or two solid state relay drives.

**Alarms:** When the sequence alarm feature is selected, it prevents an alarm signal on power up. The alarm is enabled only when the process temperature reaches setpoint.

When activated, the alarm relay and indicator latch until manually reset, even though the alarm condition may have disappeared.

**Improving Control Accuracy**

**Control accuracy monitor:** Monitors control accuracy within 0.1° C/F. The variance maximum and minimum temperatures are displayed and continually updated.

**Output percentage power monitor:** The duty cycle monitor indicates if the heater to load ratio is compatible with good control.

**Error messages and diagnosis:** Clear mnemonic messages show fault conditions, and autotune data can be displayed to assist diagnosis of control problems.

**Multi-level operator knockouts:** Provided by the lock function, (for OEM use only in hidden level four). Prevents unauthorized adjustment of program functions but allows current options to be viewed.

**Setpoint lock:** Prevents unauthorized setpoint adjustment.



**Specifications**

**Inputs**

**Thermocouple:** IPTS68/DIN 43710; *CJC rejection:* 20:1 (0.05°/°C); *External resistance:* 100Ω maximum

**RTD:** DIN 43760 (100Ω 0° C/138.5Ω 100° C Pt); *Bulb current:* 0.2 mA max.

**Linear Process Inputs:** *mV range:* 0-50 mV

**Calibration Accuracy:** ±0.25% sensor max. ±1° C

**Sampling Frequency:** Input 10Hz, CJC 2 sec.

**Rejection:** *Common mode:* Negligible effect up to 140dB, 240V, 50-60Hz; *Series mode:* 60dB, 50-60 Hz

**Temperature Coefficient:** 150 ppm/°C sensor max.

**Outputs**

**Solid State Relay Driver (SSd):** To switch a remote 5 VDC solid state relay, +0/-15% 15 mA non-isolated

**Miniature Power Relay:** Form A/SPST contacts (AgCdO) 2A/250 resistive

**Displays:** Main 4 digits high brightness green LED. 0.4" high. *Digital range:* -199 to 9999; *Hi-res mode:* -199.9 to 999.9; *LED indicators:* Flashing setpoint 1 square, green, setpoint 2 round, red

**Keypad:** 3 elastomer buttons

**Environmental**

**Safety:** Pending UL 873, EN 61010, CSA 22.2 No. 1010.1-92

**EMC:** *Emissions:* EN50081-1 FCC rule 15 sub J, class A; *Immunity:* EN50082-2

**Ambient Conditions:** *Temperature:* 32 to 130° F; *Humidity:* 80% max.

**Moldings:** Flame-retardant polycarbonate

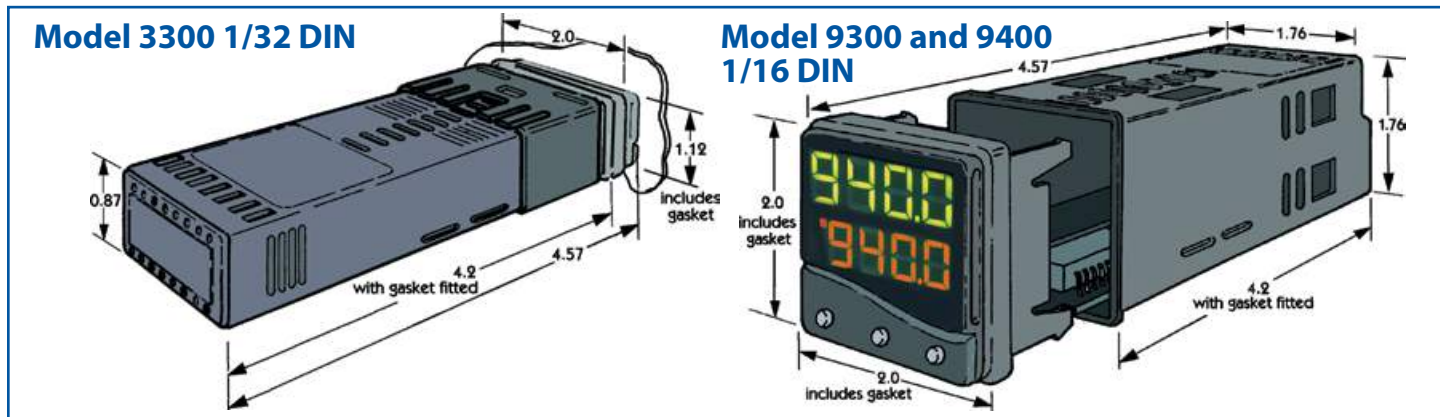
**Ordering Instructions**

Make one selection from each table. A finished catalog number looks like this: 330-000-000 or 941-100-000.

**Model Selection Guide**

Description		Catalog Number	Price
1/32 DIN Temperature Controller, Single Display		330-	\$222.00
1/16 DIN Temperature Controller, Single Display		930-	238.00
1/16 DIN Temperature Controller, Dual Display		940-	262.00
Output	Standard: 1 Solid State Driver, 1 Relay	0-000-	0.00
Power/Comms	Standard Model (100-240V)	-000	0.00
	Low Voltage 12/24 VDC **	-030	0.00
	Standard Voltage with RS232 Option	-200	63.00
	Standard Voltage with RS485 Option	-400	63.00
Accessories	Communication Module PCB RS232	3C0000200	63.00
	CALComms™ Software and Manual	1001GB300	193.00
	1Ω Resistor for 4-20 mA Inputs	071.110	4.00
	Quench Arc Snubber for Relay Output	070.001	6.00
	1/4 DIN to 1/16 DIN Panel Adapter	904.400	12.00

\*\* Not available on CAL9400 dual display temperature controllers.



**CAL 9900: 1/16 DIN PID Temperature Controller**

The CAL 9900 pioneered the market of digital 1/16 DIN temperature controllers in 1986, and is still popular today as a low-cost solution for temperature control.

**Model Selection Guide**

Description		Catalog Number	Price
1/16 DIN temperature controller with thermocouple, two-wire RTD or linear input, 115 VAC power			
SP1	Relay	991.	\$299.00
Output	Solid State Relay Driver 5VDC, 25 mA	992.	299.00
SP2	None	01 _	0.00
	5A Relay	11 _	24.00
	Solid State Relay Driver 5VDC, 25 mA	21 _	24.00
Units	Fahrenheit	F	0.00
	Celsius	C	0.00

Solids Flow and Motion

Controllers and Programmers

Digital Indicators

Recorders and Data Acquisition

Combustion Safety and Efficiency

Process Valves

# CAL9500P Low-Cost Programmable Controller



Controller



### Features

- Full PID control, heat/cool function
- Autotune at 75% or 100% of setpoint
- RS232/485 communication

### Programmer Features

- Up to 31 profiles, up to 36 segments
- Unlimited use of event outputs via second third outputs
- Copy, paste, edit, and delete functions for easy program building
- Call another program as a sub-program event
- Up to 999 program loop cycles or continuous loop cycling
- Hold back function ensures next segment does not start until last segment reaches setpoint
- Three power fail recovery systems (hold, continue, and reset)
- Front-panel interrogation of program position
- Memory usage indication during programming

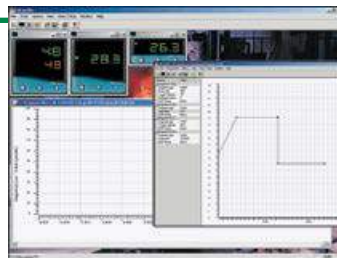
## CAL Controller Software and Connectivity Tools

**CALgrafix Standard:** Single user license (CALopc server and CALgrafix client) that allows connection to a single RS485 network of up to 128 controllers. Compatible with CAL's 33/93/9400 and 9500p ranges of temperature and process controllers only.

**CALgrafix Professional:** Single user license (CALopc server and CALgrafix client) for connection to multiple networks of up to 128 controllers. Additional distributed controller networks can be added by purchasing additional CALopc server licenses. Additional Windows® installations of CALgrafix can be added by purchasing CALgrafix Client licenses. Third-party OPC servers will also work with CALgrafix Pro.

**CALgrafix Client:** For adding CALgrafix Windows software installations to the CALgrafix Professional setup.

**CALopc Server:** A CALopc server license allows a network of CAL's temperature or process controllers to connect third-party clients or additional networks of controllers.



Description	Catalog Number	Price
CALgrafix Pro	1003GB000	\$254.00
CALgrafix Client	1005GB000	110.00
CALopc Server	1004GB000	219.00

### Specifications

**Inputs:** Thermocouple types: B, E, J, K, L, N, R, S, T; RTDs: 2-wire and 3-wire Pt100Ω; Linear: 0-50mV, 0-20 mA or 4-20mA, 0-5 or 0-10V

**Accuracy:** ±0.25% sensor maximum ±1° C

**Sampling Frequency:** Input 10Hz, CJC 2 sec.

**Rejection:** Common mode: Negligible effect up to 140dB, 240V, 50-60 Hz; Series mode: 60dB, 50-60 Hz

**Temperature Coefficient:** 50 ppm/°C sensor maximum typical

**Outputs:** Solid state relay driver: SSR 6VDC (nominal), 20 mA non-isolated; Miniature power relay: Form A/SPST contacts (AgCdO); Relays: 2 Amp/250 VAC resistive load; Analog output: 4-20 mA, 500Ω max. ±0.1% full scale typical; 0-5VDC 10 mA (500Ω min.) ±0.1% full scale typical; 0-10 VDC 10 mA (1 KΩ min.) ±0.1% full scale typical

**Displays:** 4-digit upper display, high brightness green LED 0.4" high; 4-digit lower display, high brightness orange LED 0.35" high; Digital range: -199 to 9999, High-res range: -199.9 to 999.9; LED output indicators: SP1 square, green; SP2/SP3 round, red

**Keypad:** Three elastomeric buttons

**Programmer Functions:** Segments: Total of 126 per program; Programs: Maximum of 31 programs; Program memory: 351 Bytes

**Supply Voltage:** 100-240 VAC, 50-60 Hz, ±10% max. permitted fluctuation

**Power Requirements:** 6.0 Watts (nominal)

**Environmental Protection:** NEMA 4X/IP66 enclosure, flame-retardant polycarbonate moldings, Degree II pollution protection, Categories II and III installation rating

**Ambient Temperature:** 32° to 130° F (0° to 50° C)



### Ordering Instructions

Make one selection from each table. A finished catalog number looks like this: 95-00-1-B-2-00

### Model Selection Guide

Description	Catalog Number	Price	
1/16 DIN Programmable Controller	95-	\$0.00	
Output	Type 1	Type 2	
	Solid State Driver	2 Amp Relay	00- 303.00
	2 Amp Relay	2 Amp Relay	11- 317.00
	Solid State Driver	Solid State Driver	22- 297.00
	4-20 mA	2 Amp Relay	B1- 380.00
	4-20 mA	Solid State Driver	B2- 368.00
	0-5V	2 Amp Relay	C1- 380.00
	0-5V	Solid State Driver	C2- 368.00
	0-10V	2 Amp Relay	D1- 380.00
	0-10V	Solid State Driver	D2- 368.00
Output 3	Always 2 Amp Relay	1- 0.00	
Input Type	Temperature Sensor	A- 0.00	
	4-20 mA	B- 0.00	
	0-5V	C- 0.00	
	0-10V	D- 0.00	
Communi-cations	None	0- 0.00	
	RS232	2- 63.00	
	RS485	4- 63.00	
Faceplate Color	Standard	00 0.00	
	Jade Green	0D 0.00	
	Blue	0Q 0.00	
	Red	0R 0.00	
	Yellow	0S 0.00	
	Gray	0E 0.00	

# WEST Plus Series Digital PID and Limit Controllers

Temperature Control Solutions

## Features

- Universal input with jumperless input configuration
- Full PID or ON/OFF control, Heat/Cool operation (on dual output models); FM-Approved limit controllers available
- Selectable pre-tune, self-tune, manual tune
- Four button operation, dual 4-digit LED displays
- Process and loop alarms
- Ramping setpoint, dual setpoints with remote selection
- Optional digital input and remote reset, 10V SSR driver output, and 24 VDC transmitter power supply
- Windows® software for off-line configuration

## Specifications

**Universal Input:** T/Cs: J, K, C, R, S, T, B, L, N and Pt 20% Rh vs. Pt 40% Rh; RTD: 3-wire; PT100; 50Ω per lead max (balanced); DC Linear (scalable –1999 to 9999): 0–5, 1–5, 0–10 or 2–10VDC; 0–20 or 4–20 mA DC; 0/10–50mV; Sample Rate: 4 per second; 14 bit resolution; Impedance: >10MΩ for T/C and mV ranges, 47kΩ for V ranges and 5Ω for mA ranges

**Input Accuracy:** ±0.1% range ±1 LSD (T/C CJC better than 1° C)

**Digital Input 1 (option):** Selects between two setpoints or auto/manual tune control; volt free or TTL input

**Remote Setpoint Input (option):** Basic: 0/4–20mA, 0/2–10V, 0–5V; scalable –1999 to 9999; local or remote setpoint selected from front panel; Full: 0/4–20mA, 0/1–5V, 0/2–10V, 0–100mV; scalable –1999 to 9999; potentiometer (2kΩ min.); local or remote setpoint; DI can switch between setpoints or between auto/manual modes

**Sensor Break Detection:** <2 seconds (except zero-based DC ranges)

**Relay Output:** SPDT; 240VAC 2.0A resistive. Lifetime: >500,000 operations

**Solid State Relay Driver Output:** >10VDC nominal into 500Ω min.

**DC Linear Output:** 0/4–20mA into 500Ω max.; 0/2–10V, 0/1–5V into 500Ω min.; control outputs have 2% over/under drive applied; Accuracy ±0.25% (mA into 250Ω load, V into 2kΩ load)

**Triac Output:** 0.01 to 1A AC, 20 to 280Vrms, 47–63Hz (limit 2)

**Transmitter Power Supply:** Optional 24 VDC (Limit 1)

**Control Functions:** Heat Power, Cool Power, Process Alarm (reverse or direct); Modes (Alarms 1 and 2): High/low, SP deviation, band, logical OR/AND; Process Loop Alarm: (reverse or direct); Retransmit: (setpoint or PV)

**Communications Interface:** User-selectable: 2-wire, RS-485 serial communications, choice of Modbus® or ASCII protocol; 1200 to 19,200 baud

**PC Configuration:** Off-line. Serial port to dedicated configuration socket

## Construction

**Display:** Dual 4 digit displays, Red or Green, 7 segment LED; Annunciators: LED indicators for output and status; Five indicators

**Enclosure:** Rugged ABS plastic housing, NEMA 4X/IP66 front panel, IP20 behind panel protection; mounts via plug-in with panel mounting fixing strap

**Agency Approvals:** CE, UR, cUR, UL file# E67237;

EMC: Certified EN61326; FM approved limit controllers



**Dimensions:** 6x00+ (WxHxD): 1.89" x 1.89" x 4.33"; Panel Cutout: 1.77" square; 8x00+ (WxHxD): 1.89" x 3.78" x 3.93"; Panel Cutout: 1.77" x 3.62"; 4x00+ (WxHxD): 3.78" x 3.78" x 3.93"; Panel Cutout: 3.62" square

## Environmental and Electrical Characteristics

**Operating Conditions:** Temperature: 32° to 131° F; Humidity: 20% to 95% rH non-condensing

**Supply Voltage:** 100–240V 50/60Hz; 24VDC (20–48VAC / 22–65 VDC) opt.

**Power Consumption:** 5W / 7.5VA max



## Ordering Instructions

Make a selection from each table. A complete catalog number looks like this: P6101Z21001010

## Model Selection Guide

Description		Catalog Number	Availability	Price
1/16 DIN PID Controller, Universal Input		P6101Z2	↓	\$286.00
1/8 DIN PID Controller, Universal Input		P8101Z2	↓	466.00
1/4 DIN PID Controller, Universal Input		P4101Z2	↓	497.00
1/16 DIN Limit Controller, Universal Input		P6701Z21	↓	\$322.00
1/8 DIN Limit Controller, Universal Input		P8701Z21	↓	506.00
1/4 DIN Limit Controller, Universal Input		P4701Z21	↓	528.00
Output 1	None	0	• •	0.00
	SPDT Relay (2 Amp, 240 VAC)	1	a a	34.00
	10 VDC Solid State Relay Driver	2	• •	34.00
	DC Linear (mA, V)	7	• •	58.00
Output 2	None	0	• •	0.00
	SPDT Relay (2 Amp, 240 VAC)	1	• •	34.00
	10 VDC Solid State Relay Driver	2	• •	34.00
	DC Linear (mA, V)	7	• •	58.00
Output 3	None	0	• •	0.00
	SPDT Relay (2 Amp, 240 VAC)	1	• •	34.00
	10 VDC Solid State Relay Driver	2	• •	34.00
	DC Linear (mA, V)	7	• •	58.00
Option Slot A	None	0	• •	0.00
	RS-485 Serial Communication	1	• •	77.00
	Digital Input	3	• •	77.00
	Basic Remote Setpoint	4	b b	77.00
Voltage	100–240 VAC	0	• •	0.00
	24–48 V AC/DC	2	• •	19.00
Display Colors	Both Displays in Red	0	• •	0.00
	Both Displays in Green	1	• •	0.00
	Upper Display Red, Lower Green	2	• •	0.00
Option Slot B	None	0	• •	0.00
	Full Remote Setpoint with DI #2	R	• •	106.00

## Restrictions

- a Required Output #1 for limit controller models
- b Not available on limit controller models



**Need a temperature input for your controller?**

**See pages 98–105.**

# WEST ProVU4 Temperature Controller/Programmer

## Features

- Universal input for thermocouple, RTDs and linear DC process signals
- Up to nine relay, SSD driver, triac and linear outputs
- Up to two digital inputs for setpoint selection, profile control, datalogging start/stop, control output enable/disable or auto/manual control
- Backlit graphical LCD with dual color screen. Displays alarm status, trending, plus LEDs for heat, cool, autotune and alarm
- Setup wizard for configuring inputs, alarms, outputs, comms and real-time clock
- Setpoint programming: 255 segments, up to 64 programs, with ramp, dwell, hold, loop, jump to other profiles, delayed or real-time day/time profile start
- Datalogging option: Historical process data for analysis or reports, logs process values, setpoints, or alarms buffer recording
- Modbus RS485 and Modbus TCP Ethernet supported
- USB port for upload/download of configuration and download data to a PC



## Input Actuation Table

Input		Range °C	Range °F
T/C Types	T	-240 to 400°	-400 to 752°*
	E	-240 to 1000°	-400 to 1832°
	K	-240 to 1373°	-400 to 2503°*
	J	-200 to 1200°	-328 to 2192°*
	L	0 to 762°	32 to 1402°*
	N	0 to 1399°	32 to 2551°*
	R	0 to 1759°	32 to 3198°
	S	0 to 1762°	32 to 3204°
	PtRh	0 to 1850°	32 to 3362°
	D	0 to 2315°	0 to 4199°
C	0 to 2320°	32 to 4208°	
B	100 to 1824°	211 to 3315°	
RTD Types	3-Wire PT100	-199 to 800°	-328 to 1472°
	NI120	-80 to 240°	-112 to 464°
Linear	Type	Range	Offset Range
	mA DC	0 to 20mA	4 to 20mA
	mV DC	0 to 50mV	10 to 50mV
	VDC	0 to 5 V	1 to 5 V
Aux. Input	Type	Slot A Ranges	Slot B Ranges
	mA DC	0-20, 4-20	0-20, 4-20
	mV DC	0/10-50, 0-100	0/10-50, 0-100
	VDC	0/1-5, 0/2-10	0/1-5, 0/2-10
	Potentiometer		>2000Ω

\* Decimal place can be displayed up to 999.9° C/F

## Specifications

- Sampling Rate:** 10 per second.
- Input Isolation:** Isolated from all outputs (except SSR driver) at 240V AC.
- Sensor Break Detection:** T/C, RTD: Control goes to preset power value. High/Sensor Break alarms activate; Linear (4-20mA, 2-10V and 1-5V only): Control goes to preset power value. Low/Sensor Break alarms activate.
- Thermocouple/RTD Input Calibration:** ±0.1% full range, ±1LSD
- Linear Inputs:** Scalable from -9999 to 10000.
- Relay Output:** Single: SPDT 2A resistive at 120/240VAC; Dual: SPST, 2A resistive at 120/240VAC; Quad: SPST, 2A resistive at 120/240VAC
- SSR Driver:** Voltage >10V into 500Ω min
- Triac Output:** Voltage: 20 to 280Vrms (47 to 63Hz). Current Rating: 0.01 to 1A
- Linear DC:** 0/1-5, 0/2-10V, 0/4-20 mA (selectable) with 2% over/under-drive when used for control outputs. Accuracy: ±0.25% of range
- Transmitter Power:** 24V nominal (19 to 28V DC) into 910Ω min. resistance.
- Alarm Types:** Up to 5 alarms selectable as Process High, Process Low, Band, Deviation, Rate of Signal Change, Sensor/Input Break, Loop Alarm.
- Tuning Types:** Pre-Tune, Auto Pre-Tune, Self-Tune or Manual Tuning
- Proportional Bands:** Primary, secondary. 0.5% to 999.9% input span in 0.1% increments, or On/Off control.
- Loop Reset:** Automatic: Integral Time Constant, 1 sec to 99 min 59 sec and OFF; Manual: Bias 0 to 100% (±100% Primary and Secondary).
- Rate:** Derivative Time Constant, 1 sec to 99 min 59 sec and OFF
- Setpoint Ramp:** Rate selectable 1 to 9999 LSDs per hour and infinite
- Setpoint Programming:** 64 profiles max. Total segments: 255 max.
- Communications:** RS485: Modbus RTU; Ethernet: Modbus TCP slave. Connection via RJ45 connector on top of case.
- Display:** 2.62" x 1.47" (WxH), 160 x 80 pixel, monochrome graphic LCD with a dual color (red/green) backlight.
- Front Panel:** To IP66 (IP65 front USB connector). IP20 behind the panel.
- Approvals:** CE, UL, cUL.



## Ordering Instructions

Make one selection from each table. A finished catalog number looks like this: V4-1\_\_\_\_\_-\_\_\_\_\_-01

## Model Selection Guide

Description	Catalog Number	Price
ProVu Advanced Controller	V4-	\$515.00
Unit	Standard Controller Controller with USB Port	1C__- 1U__- 0.00 78.00
Profiler Option	None Setpoint Program (64 Profiles, 255 Segments)	__0_- __P_- 0.00 208.00
Power Supply	100-240 VAC 24-48 VAC/VDC	___0- ___2- 0.00 17.00
Slot 1 Options	None 2A Relay SPDT at 120/240 VAC DC Driver for Solid State Relay Linear DC	0__- 1__- 2__- L__- 0.00 32.00 32.00 54.00
Slot 2 Options	None 2A Relay SPDT at 120/240 VAC DC Driver for Solid State Relay Linear DC 24 VDC TPS	_0_- _1_- _2_- _L_- _T_- 0.00 32.00 32.00 54.00 68.00
Slot 3 Options	None 2A Relay SPDT at 120/240 VAC DC Driver for Solid State Relay Linear DC 24 VDC TPS	__0- __1- __2- __L- __T- 0.00 32.00 32.00 54.00 68.00
Slot 4 Option	None Quad Relay Board	0__- 1__- 0.00 100.00
Slot A Options	None RS485 Serial Communications Ethernet Port	_0_- _1_- _5_- 0.00 71.00 132.00
Slot B Options	None Full Remote Setpoint with Digital Input	0-01 0-0R 0.00 99.00

Call for Triac, dual relay, or dual SSR card options.

# Siemens 353 Process Automation Controller

## Features

- Up to 25 control and/or ladder logic loops for solving complex control problems
- Front faceplate pushbuttons allow for quick configuration changes in the field — no added tools needed
- Short case design for mounting in 12"-deep cabinets
- Removable real-time clock/configuration board option minimizes maintenance and complexity

## Standard Configuration

Nine common control strategies are built in, selectable with a single pushbutton.

- Single loop controller with tracking or fixed setpoint, or operator setpoint limits
- Ratio-set or cascade loop controller, operator setpoints
- Ethernet-set controller with tracking setpoint
- External setpoint with fixed setpoint
- Dual loop controller
- Graphical software provides a choice of function block or ladder logic configuration

## Specifications

**Universal Analog Input (isolated):** Thermocouple: J, K, T, E, S, R, B and N; RTD: DIN 43760, US (NBS 126), JIS C-1604; Slidewire: 500-5000; Ohms: 0-5000 $\Omega$ ; Millivolt: -19.5 to 78 mV DC; I/O Expander Board: Qty 2

**Universal Digital/Frequency Input (isolated):** Frequency Range: 0 to 25,000 Hz; Minimum Operating Frequency: 0.05 Hz; ON Voltage: 4-30 VDC; OFF Voltage: 0-1 VDC; Input Current: <5 mA @ 30 VDC; I/O Expander Board: Qty 2

**Analog Inputs (non-isolated):** 1-5 VDC, 4-20 mA with included 250 resistor; MPU Controller Board: Qty 3; I/O Expander Board: Qty 1

**Digital Inputs (isolated):** 0-1 VDC OFF, 15-30 VDC ON; MPU Controller Board: Qty 3; I/O Expander Board: Qty 1

**Scan Time:** Varies with configuration: 20 mSec (minimum)

**Analog Outputs (non-isolated):** 4-20 mA into 800 $\Omega$  (max.); MPU Controller Board: Qty 2; I/O Expander Board: Qty 1

**Digital Outputs (non-isolated):** Open collector transistor (emitter @ station common); Load Voltage: 30 VDC max.; Load Current: 100 mA max.; Off State Leakage Current: <200 mA @ 30 VDC; MPU Controller Board: Qty 2

**Relay Outputs (SPDT):** Contact Rating: 5A @ 120 VAC, 2.5 A Resistive Load @ 230 VAC; Minimum Current: 100 mA @ 10 mV DC, 150 mA @ 50 mV AC; I/O Expander Board: Qty 2

**Optional Boards:** Local I/O expander, LonWorks remote I/O bus, Local Instrument Link network, realtime clock/removable configuration board, Ethernet communications

**Ambient Temperature:** Operating: 32 to 122° F (0 to 50° C)

**Two-Wire Transmitter Power:** 25 VDC  $\pm$ 3V; 120 mA, short circuit protected

**Approvals:** FM/CSA: Class I, Div 2, Groups A-D BASEEFA: Ex N IIC, CE

**Climate Conditions (IEC654-1):** Class B3 Standard Mounting; Class D1 Installed per instructions in Class D1 enclosure

**Electrostatic Discharge:** IEC 801-2; RFI Protection: IEC 801-3; Electrical Transients: IEC 801-4

**Heat Dissipation:** 80 BTU/Hr

The Siemens 353 loop controller can serve as a simple single or advanced multiloop controller with complete control functions including indication, control, logic, or sequencing for a small unit batch or continuous process.

Almost any application including a combination of continuous control (flow, temperature, or pressure) and discrete control (motor start/stop and interlocks) can be configured.

The weather-resistant faceplate provides a local message display with access to pushbutton configuration for quick in-field changes.

The 353 can be completely configured from its faceplate or by Windows® utility software. Configurations can be downloaded through the built-in RS232 front port or by Ethernet, RS485 Modbus, or Local Instrument Link.

## Logic Functions

The ability to use both function blocks and ladder logic in the same controller allows you to design your control strategy to meet real-world requirements. Factory-configured options (FCOs) provide quick field setup for a selection of basic control schemes — PID, cascade, or ratio control. A large selection of reusable function blocks allows for simple changes to the FCOs, or for designing a custom control strategy to meet the needs of specific process control applications.



**Great for boiler applications and as DCS front-end devices!**

## Ordering Instructions

Make one selection from each table. A finished catalog number looks like this: TGX:353\_\_\_\_\_. Order accessories as separate line items.

## Model Selection Guide

Description		Catalog Number	Price
Siemens 353 Process Automation Controller		353	\$2020.00
Controller Board	120/240 VAC (85-264 VAC) 47-63 Hz 24 VDC +20%, -15%	A D	0.00 70.00
Case	Standard Case with Ethernet Connector	4	0.00
Display Panel	Operator's Fixed Analog/Digital Display	F	0.00
Expansion Board	Multimedia Card Only	NCNB	0.00
	Multimedia Card + Local I/O Expander	1CNB	595.00
Approvals	None	N	0.00
	FM/CSA, CE Compliant	4	0.00
	FM/CSA, CE Compliant, ABS Approved	W	0.00
I/O Modules	6-Channel DC Current Input	A6X30001750	707.00
	6-Channel DC Voltage Input	A6X30001751	707.00
	6-Channel RTD Input	A6X30001823	918.00
	6-Channel DC Current Output	A6X30001827	918.00
	6-Channel DC Voltage Output	A6X30001831	918.00
	12 Channel Discrete I/O	A6X30001835	531.00
Accessories			
Configuration Startup Kit (Software CD, DB9 Adapter, Cable Assembly)		iConfig-V4.01	1657.00
Range Resistor Kit (Three 250 $\Omega$ Resistors)		16354-30	24.00
Configuration Cable Assembly		16353-61	33.00
DB9 to MMJ11 Cable Adapter		16353-63	59.00

## Honeywell HC900 Hybrid Control System for Process Equipment



### Advanced Process and Logic Controller!

The HC900's fully integrated operator interface and controller are used for configuration, control, logic, autotuning, and monitoring. The integrated multiple functions reduce your hardware, software, training, and support needs.

- Up to 32 loops of PID control, with AccuTune III auto-tuning
- Up to 960 analog inputs; Up to 1920 points with remote I/O
- Data storage right on the controller — 1MB FIFO data stored in controller's battery-backed RAM; New utility software extracts data in .CSV format for performance analysis, remote sites, laboratory, and pilot plant applications
- Up to 250 signals (tags) at three different sampling rates; Typically two weeks of data (10 points at two points/minute)
- Discrete logic capabilities
- Allows program changes during continuous processes without defaulting to failsafe values
- Access PID parameters with no panel view programming
- Adjustable recipe pool lets you allocate memory for recipes, setpoint profiles, sequences, schedules, and configurations.
- Datalogging for process data and parameter history
- CE, UL, CSA, FM Class I, Div 2 Approvals

### And It Talks to Your Network!

- Peer-to-peer Ethernet communications: Remote racks talk to each other over Cat5 cable with Modbus/TCP protocol
- Interfaces to popular HMIs (Intellution, Wonderware, RSVIEW), data acquisition systems, or OPC servers
- Supports 5 concurrent host connections, so Control Designer software can configure any controller on your LAN
- E-mail alarms for alerting operator to process upsets

### ... But It's So Much Simpler Than a PLC!

See why users call it the most powerful, easy-to-implement control system they've ever touched.

- HC900 uses universal analog inputs — thermocouples, RTDs, 4-20 mA current inputs mix and match on the same card!
- 900 Control Station operator interface has more than 200 pre-programmed displays. Unlike a PLC, the HC900's interface is configured, not programmed. Display functions, like trending historical data in graphic form, are ready right out of the box!
- Inherently process-related functions like auto/manual or alarm acknowledge, are implemented on the OI with a dedicated key — these functions don't have to be programmed either!
- 900 control station operator interface saves data to USB key or Compact Flash card, and displays trends like a recorder.
- Setpoint programming batch processes with ladder logic takes considerable effort. In fact, many furnace and chamber manufacturers still use stand-alone setpoint programmers because of the complexity of setpoint programming on PLCs. HC900 comes with setpoint programming capability: Four setpoint programmers and a scheduler to synchronize them.
- Autotune or adaptive tune functions are standard part of the HC900. They're third party add-ins for PLCs.
- HC900 deals directly in engineering units (° F, °C, PSIG), so you don't have to calculate from A/D values in an input register. You just set the zero and span for your 4-20 mA signals. The HC900 does the rest! No scaling calculations or math errors!
- HC900 has dedicated algorithms for actuator motor drive applications, like three-position step (open feedback) or position proportional (slidewire feedback) control, for specific actuator field wiring.

# Honeywell

## Truly Redundant and Affordable Loop and Logic Control!



**The HC900's redundancy module provides for "no single point for failure" for the controller's CPU, power supply, communications over the network, or to remote I/O racks.**

**Our customers employ redundancy because it's insurance against unscheduled downtime, it increases system or process availability, and it's a great risk-management tool.**

Honeywell's HC900 Hybrid Control System is an advanced loop and logic controller in a modular design, sized to satisfy the control and data management needs of a wide range of process applications.

The HC900 provides superior PID loop control and more robust analog processing than most logic controllers, without compromising logic performance. Logic blocks and analog function blocks can execute in the same scan for time-critical events. They can be fully integrated into a combined analog/logic control strategy for uncompromised performance.

Hybrid Control Designer software simplifies controller and HMI configuration. It provides advanced monitoring functions for debugging, and allows run-mode configuration changes during the process. The software uploads complete graphic controller and user interface configurations over Ethernet, RS232, or modem, and supplies an array of reports for enhanced documentation.

With its new redundant control option, the HC900 creates a cost-effective, secure operational system for under \$16,000. HC900 redundancy provides "no single point of failure" for the controller CPU, power supply, communications to the plant network or I/O modules. It also supports optional redundant power supply for I/O.

All user and process interaction is managed by the lead CPU (first to start). Both CPUs receive inputs and execute function blocks. The lead CPU writes outputs and performs all communication functions. It detects the reserve CPU and automatically configures it. A redundant switch module identifies both modules, and supports manual fail-over to make the switch — providing bumpless transfer between controllers.

Visit our website to learn more about HC900 redundancy. Want to see the HC900 in action? Call our office and request a demo!

### **HC900 redundancy is flexible — you buy only what you need!**

- Redundant power supplies
- Redundant CPUs
- Redundant remote rack or networking communications

### **Redundancy is easy to use!**

- Automatic setup of primary/reserve CPU
- No special configuration
- Automatic conversion of existing configurations
- "Bumpless" transfer between redundant controllers
- Maintains form, fit, and function with non-redundant HC900s

### **Redundancy doesn't make you choose! No trade-offs!**

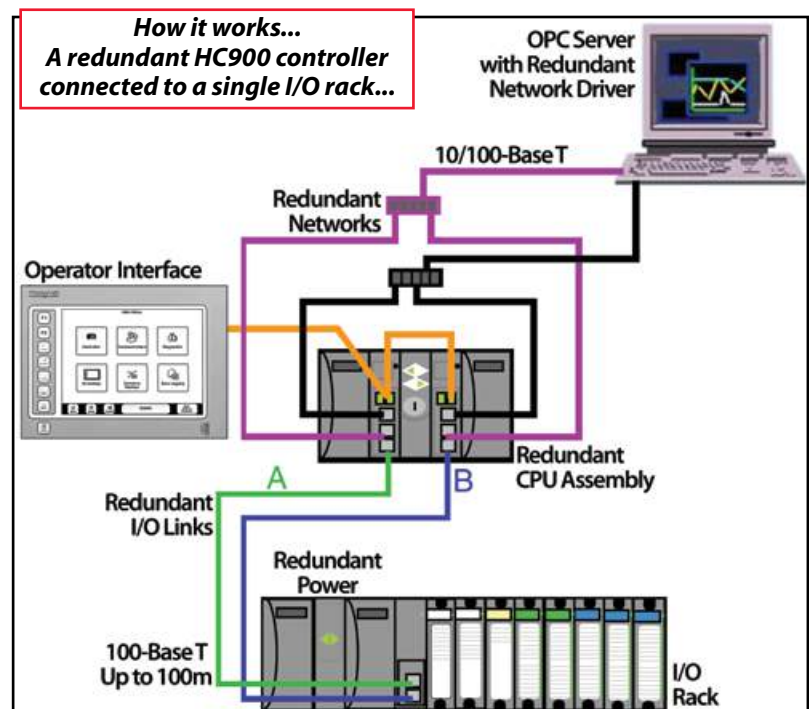
- No changes in system throughput or scan times
- Replicate only the components critical to your application: power, CPU, or networking

### **Redundancy is cost-effective!**

- Redundant power supplies from \$420
- Redundant CPUs and scanners from \$8,100
- Redundant network components from \$600

### **Features**

- Single-rack design
- Synchronized CPU operation
- Distinct lead/reserve controller status indication
- Secure key-lock mode access
- Integrated redundancy switch module



# Honeywell HC900 Hybrid Control System for Process Equipment

The HC900 provides process, logic, and sequence control functions with data acquisition, modular design, and a graphical configuration tool. The simple Windows®-based Hybrid Control Designer software configures the controller and interface, to help you cut setup time and costs.

The HC900's expanded function block library consists of more than 100 block types, and has a capacity of 2000 blocks. The high-accuracy universal analog inputs and PID control algorithms with autotuning ensure accurate control. Setpoint programmer functions allow batch thermal processes, recipes, and profiles to be configured easily.

With your choice of 4, 8, or 12 I/O slot racks and high density I/O cards, you'll save cabinet space. And, peer-to-peer Ethernet-connected remote racks allow I/O distribution, to save on wiring costs. No more running wiring from every rack back to a central host computer.

**Inputs and Outputs:** You can easily remove and insert I/O modules from the card rack without powering down the controller. Each card is hot-swappable and auto-configured on insertion.

- **8-point universal analog input cards:** Inputs can be mixed on a card, including thermocouples, RTDs, ohms, voltage or millivolt types — all assigned using Hybrid Control Designer software.
- **4-point isolated analog output card:** Supports 0-20 or 4-20 mA
- **16-point high level analog input module:** Each point configurable for V or mA, with point-to-point isolation
- **16-point digital input cards:** Contact closure type, VDC and VAC
- **32-point digital input or digital output modules:** DC voltage
- **8-point AC or 16-point DC digital output cards**
- **8-point relay output card:** Four form C and four form A relays
- **8-point or 16-point analog output module:** Isolated in two groups of 4, supports 0-20 mA
- **4-channel pulse/frequency/quadrature input/output module**

## Function Blocks

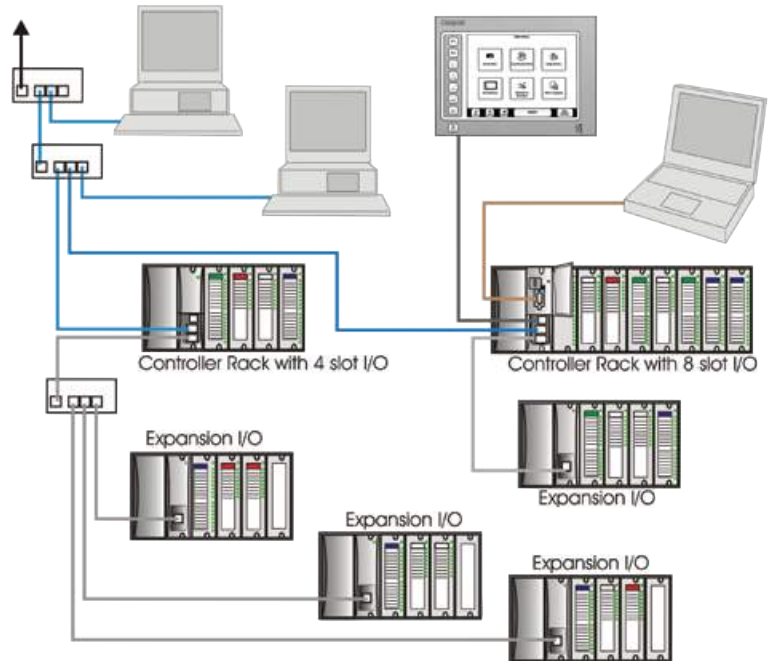
Each HC900 supports up to 2,000 analog or digital function blocks. A function block algorithm can be used any number of times in a control strategy, unless you assign quantity limits. Block types include:

Control loops.....	32	Ramps .....	8
Setpoint programmers.....	8	Hand/off/auto .....	16
Setpoint schedulers.....	2	Device (pump) control.....	16
Sequencers .....	4	Push buttons (4 per block) .....	8
Alternators .....	6	Selector switches (4-position).....	8

**Advanced Control and Math Functions:** Analog function blocks include totalizers, free-form math, average, mass flow, function generator, periodic timers based on real time, carbon potential, RH, dewpoint, signal selection, and comparison. Logic function blocks include And, Or, XOr, Not, latch, flip-flop, on/off delay and resettable timers, counters, and free-form Boolean logic.

**Loop Control:** The 32 robust control loops support configurations from simple PID to interactive cascade, ratio, duplex, three-position step for motor positioning or custom control strategies. Autotuning is standard for every loop using Honeywell's AccuTune II algorithm with fuzzy logic for setpoint overshoot suppression.

The HC900 can consist of a single rack, or can be networked with other controllers via Ethernet links to work in a broad range of complex applications.



**Sequencers:** Each of four sequencers supports up to 16 digital outputs that can be on or off in each of 50 states. Up to 64 sequential steps activate at specific process states, advancing based on time, on event (2 per step), or by manual advance.

**Setpoint Programming:** Up to 99 profiles — up to 50 segments each. Programmer can have up to 16 event outputs for integration with sequence controls. Guaranteed soak, jog, and looping are provided.

**Logic:** The Boolean logic instruction set includes 2-, 4-, and 8-input logic blocks with selectable input inversion plus timers, triggers, latches, and other supporting functions.

**Recipes:** Up to 50 recipes are stored in the controller, up to 50 analog and digital variables for setpoint profile, schedule, or sequencer numbers. You select recipe tag names and descriptors from the operator interface or through a selection block input.

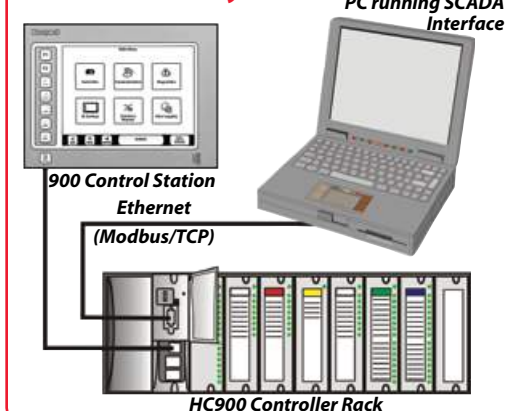
## Alarms and Events

Each control loop has two alarm status outputs, each corresponding to alarm setpoints. Specialized blocks are reserved 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.

Each group of 12 alarms can be assigned an acknowledge function that permits external, panel acknowledge through a digital input or a serial communications write to an internal variable.

Active alarm indication on operator interface displays show alarm status, and permit group acknowledge of active alarms. An alarm detail display indicates the time and date of last occurrence, and offers 48 characters of text for alarm actions or notes. Alarms can also be stored in an alarm file (from 150 to 1,500 records) on the operator interface USB media.

## HC900 SCADA System





## Communications

**Ethernet Communications:** HC900 controllers communicate with their host PC interfaces over an Ethernet 10Base-T network using the Modbus/TCP protocol. Up to 5 hosts (servers or stand-alones) can be supported concurrently for control supervision and data acquisition.

**Ethernet Peer-to-Peer Communications:** Data communications between one HC900 controller and up to eight other HC900 controllers is supported over Ethernet via UDP protocol for process interlocks or data sharing — without specialized software. Digital and analog data exchange are supported using function blocks for up to 1,024 parameters between peers.

**E-Mail Alarming:** HC900 alarms or events can be individually configured to send an e-mail alarm (or event) message to any or all of three e-mail addresses.

**Remote I/O Rack Port:** A second Ethernet port supports expansion I/O racks. This 10Base-T connection supports a single direct-connected expansion rack, or up to four expansion racks when connected through external Ethernet hubs.

**Modbus Master:** Either serial port can operate as a Modbus master, reading or writing data to Modbus RTU slave(s).

**Operator Interface Port:** An RS485 port communicates between the controller and a 900 control station operator interface. This port supports a single interface at distances up to 2,000 feet from the controller.

**Controller Configuration Access:** An RS232 configuration port supports direct PC connection or external modem connection for configuration upload, download, debug, and maintenance. You can load configurations over the TCP/IP network from a host PC. Online monitoring for program debug and edit functions is also supported.

**Supervisory Software:** Use PlantScape SCADA or Vista for PC-based supervisory control and data acquisition. SpecView32 is the ideal supervisory interface for thermal-based applications, offering historical trending, batch reporting, recipe development involving setpoint programs, and simple graphics configuration. HC900 parameters can be selected from categorized lists for placement on displays.

**OPC Server:** The KEPCore OPC server software program simplifies serial communication to the HC900 controller through Modbus/TCP interfaces. Compatible OPC clients can use the Ethernet connection to the HC900 for remote supervision, data collection, or other functions.

## Saving Money on Waste Treatment with HC900

**Application:** Waste treatment processing in an oil recovery processing plant.

**Problem:** Waste treatment isn't a source of profit for the plant, so though an upgrade of the control system was necessary to meet EPA guidelines, funds were limited.

### User's Existing Business Results

- **Rising chemical costs:** With the rising cost of the chemicals used to treat waste, poor control creates higher plant operating cost, which reduces the profitability of the plant.
- **Legacy issues:** Control equipment in place was obsolete, and parts were no longer available.
- **Prohibitive maintenance costs:** The cost to maintain the existing system were excessive due to the number of failure points (from the quantity of discrete devices and the age of the equipment.)
- **User-unfriendliness:** The existing control panel filled with single-loop controllers, pushbuttons, and warning lights made it difficult to train new operators. With so many discrete devices, proper execution of shutdown and emergency procedure was operator-intensive and highly subject to human error.
- **Mistakes erode profitability:** Fines by EPA, cleanup and loss of production because of equipment failure or operator error have a negative impact on plant profitability.
- **Information:** Because plant performance was not in a database, access to historical information was non-existent or extremely labor-intensive to retrieve.



**Solution:** After evaluating all the options, the user saw that PLC engineering, programming, and startup were the most time-consuming and complex. The cost of loop controllers was prohibitive. The HC900 was easy to implement and cost-effective.

The customer implemented the HC900 with the operator interface and Specview software for programming and management.

### Implementation

- Easy "drag and drop" programming allowed the plant engineer to program the complete system locally in less than a day.
- Operator training was completed in less than a day.
- The equipment's small size kept installation cost to a minimum.
- The new system was installed without shutting down the plant.

### Business Results After Installation

- Emergency shutdown is programmed into the system and performed automatically. With the old system, operators followed a manual sequence to ensure shutdown in the proper order.
- Advanced algorithms provide tighter control and reduced chemical usage.
- With on-screen data and automated sequencing, the user has increased safety and reduced potential for operator error.
- Routine control system maintenance has been cut drastically! And, hot-swappable cards will reduce maintenance in the future.
- After removing the old system, the remaining space was large enough to build a break area for employees.

# Honeywell HC900 Hybrid Control System for Process Equipment

A complete HC900 system includes the controller configuration below, HC900 Hybrid Control Designer software, and a 900 Operator Interface. A single license for Control Designer is included with each CPU. For additional licenses, order software on page 221.

## Condensed Specifications

**Rack Sizes:** For local or remote I/O — 4, 8, or 12 I/O slots

**Total I/O:** 1920 I/O total with analog and digital

**Remote I/O:** Up to 4 remote racks, Ethernet-private 10Base-T connection, 328 feet to first remote rack; Hub required for more, 328 feet from hub to rack

**Analog Inputs, Accuracy:** Up to 256 universal analog inputs (8/card),  $\pm 0.1\%$  of span, 400 V input to input isolation, A/D per card, 15 bit resolution, apply mV, V, TC type, RTD type, Ohms on per point basis

**Analog Outputs:** Up to 64 (4/card), isolated outputs, user-specified range from 0 to 20 mA

**Digital I/O:** DI 16 Pt/card: 120/240 VAC, 24 VDC; Contact input DO 8 and 16 Pt/card: 120/240 VAC (2A) 8 Pt, 24 VDC (1A, 8A max.) 16 Pt, relay (4A) 8 Pt

**Scan Times:** 500 ms analog, 27-107 ms logic (logic scan dependent on quantity of function blocks)

**PID, On/Off Control Loops:** 32, support for cascade, ratio/bias, % carbon, dewpoint, RH

**PID Outputs:** Current, time-proportioning, dual output (heat/cool), 3-position step (motor position)

**Setpoint Programmers:** 8 of 50 segments each, 16 event outputs, 99 profiles stored in controller

**Setpoint Schedulers:** 2x50 segments, 8 ramp/soak output, 8 soak-only output, 16 events, 20 schedules

**Sequencers:** 4 of 64 steps, up to 50 states of 16 digital outputs each, 1 analog output, 20 sequences stored

**Recipes:** 50, with 50 variables each (includes SP profile or sequence selection by number)

**Communication Ports:** Ethernet 10Base-T (Host), Ethernet 10Base-T, RS232, RS485

**Ethernet Host Protocol:** Modbus/TCP, support for 5 concurrent host connections (TCP/IP)

**Peer-to-Peer Communications:** Uses Ethernet between controller and up to 8 peers

**Operating Temperature, RH:** 32° to 140° F, 10 to 90% non-condensing

**Approvals:** CE (UL, CSA, FM Class 1, Div 2 planned)

## Accessories

Remote Ethernet Cable, 10 Feet	51451432-010	\$49.45
Remote Ethernet Cable, 20 Feet	51451432-020	55.20
Crossover Cable, 20 Feet	51451996-020	55.20
4-Pack 250 $\Omega$ Resistor (Note 2)	46181080-503	88.55
24 VDC Power Supply	51452041-501	219.65

## Notes

- 1 Operation manuals and HC900 Hybrid Control Designer software are included with CPU 900C51-0001 and CPU 900C31-001. Order software or CD manual only if you did NOT order one of these two models.
- 2 One 250 $\Omega$  resistor required for each mA input.
- 3 Honeywell recommends that all unused I/O slots are covered. Order one cover (900TNF-0001) per unused slot.

## Model Selection Guide

Description	Catalog Number	Price
32 Loop Controller CPU, CD (Config Software, PDF Manual)	900C51-0244-00	\$2108.00
32 Loop Controller CPU (No Software or Manual)	900C52-0244-00	1953.00
8 Loop Controller CPU with CD (Config Software, PDF Manual)	900C31-0244-00	1553.00
8 Loop Controller CPU (No Software or Manual)	900C32-0244-00	1225.00
I/O Scanner for Remote Rack	900C53-0244-00	978.00
Controller, Redundant Networking (Software, PDF Manual)	900C71-0144-00	2836.00
Controller, Redundant Networking (No SW or Manual)	900C72-0144-00	2909.00
Controller, Redundant CPU/Networking (SW, PDF Manual)	900C71R-0100-44	4934.00
Controller, Redundant CPU/Networking (No SW or Manual)	900C72R-0100-44	4983.00
Power Supply	120/240 VAC, 60W 120/240 VAC, 48W 24 VDC, 60W	900P01-0001 617.00 900P02-0001 355.00 900P24-0001 617.00
I/O Board	Analog Inputs (128 Points Max) [ 8 ] High Level Analog Inputs (mA or V) [ 16 ] Analog Outputs (64 Points Max) [ 4 ] Pulse/Frequency/Quadrature Module [ 4 ] Digital Inputs, Contact [ 16 ] Digital Inputs, 24 VDC [ 16 ] Digital Inputs, 24 VDC [ 32 ] Digital Inputs, 120/240 VAC [ 16 ] Digital Outputs, Relay [ 16 ] Digital Outputs, 24 VDC [ 8 ] Digital Outputs, 24 VDC [ 32 ] Digital Outputs, 120/240 VAC [ 8 ]	900A01-0102 835.00 900A16-0001 1152.00 900B01-0201 553.00 900K01-0001 723.00 900G01-0102 424.00 900G02-0102 386.00 900G32-0001 541.00 900G03-0102 349.00 900H01-0102 485.00 900H02-0102 437.00 900H32-0001 703.00 900H03-0102 362.00
[Channels per Card]		
Terminal Block Type (Select Euro or Barrier Style, Matched to Appropriate I/O Board) (Note 3)		
Euro Style	Low Voltage 36-Terminal for 32 I/O Boards Analog Inputs (128 Max) Analog Outputs (64 Max) Digital Inputs, Contact Digital Inputs, 24 VDC Digital Inputs, 120/240 VAC Digital Outputs, Relay Digital Outputs, 24 VDC Digital Outputs, 120/240 VAC	900TCK-0001 64.00 900TEK-0001 45.00 900TEK-0001 45.00 900TEK-0001 45.00 900TEK-0001 45.00 900TER-0001 40.00 900TER-0001 40.00 900TEK-0001 45.00 900TER-0001 40.00
Barrier Style	Analog Inputs (128 Max) Analog Outputs (64 Max) Digital Inputs, Contact Digital Inputs, 24 VDC Digital Inputs, 120/240 VAC Digital Outputs, Relay Digital Outputs, 24 VDC Digital Outputs, 120/240 VAC	900TBK-0001 45.00 900TBK-0001 45.00 900TBK-0001 45.00 900TBK-0001 45.00 900TBR-0001 40.00 900TBR-0001 40.00 900TBK-0001 45.00 900TBR-0001 40.00
Rack Type (5 Racks Maximum)	I/O Scanner, 2-Port (1 per I/O Rack) 4 I/O Slots per Rack 8 I/O Slots per Rack 12 I/O Slots per Rack 8 I/O Slots per Rack, Redundant Power 12 I/O Slots per Rack, Redundant Power Redundant CPU Rack Redundant Switch Module Redundant Power Status Module	900C73R-0100-44 1533.00 900R04-0001 372.00 900R08-0101 483.00 900R12-0101 557.00 900R08R-0101 908.00 900R12R-0101 968.00 900RR0-0001 624.00 900RSM-0001 231.00 900PSM-0001 206.00
Software and Manuals (Note 1)	HC Designer Configuration Software CD HC Utilities Software/Documentation CD Full Documentation Set on CD Full Documentation, Printed	900W01-0060-00 842.00 900W02-0060-00 232.00 900ME1-0060-00 70.00 900ME2-0044-44 129.00
Terminal Board Accessories	I/O Filler Block Terminal Cover (Note 3) 2-Pack Shield Terminal Strip 10-Pack Two-Position Terminal Board Jumpers 10-Pack Ten-Position Terminal Board Jumpers	900TNF-0001 20.00 900TSS-0001 46.00 900J02-0001 21.00 900J10-0001 40.00

See pages 222 and 223 for operator interface.

# HC900 Hybrid Control Designer Software

## Standard Features

- Graphic drag and drop, soft-wire configuration
- Configures controller and operator interface; peer-to-peer data exchange; data storage, recipes, setpoint profiles, schedules, and sequences with online operation; alarms, events, and e-mail warning setup
- Allows function block configuration partitioning using worksheets, up to 400 configuration pages
- Supports configuration edit downloads in Run mode
- Configuration upload includes graphic configuration, interface assignments, and annotations
- Extensive online monitoring tools, including watch windows, multiple block access, and signal trace-back
- Online diagnostic windows for analyzing controller, I/O, network host, and controller peer connections
- Uses Ethernet, RS232 direct, or RS232 modem connection
- Displays power flow indication of digital signals and pins
- Ability to view function block I/O values on per pin, per function block, or per viewable window basis
- Allows uploading, editing, storing, downloading, and printing of *individual* recipe files, setpoint profiles, schedules, and sequences

The HC900 Hybrid Control Designer's user-friendly graphic development environment lets you partition your control strategy into up to 20 worksheets of 20 pages each. You can then organize the configuration according to process function for faster access and improved documentation.

You can select blocks easily from a categorized list, drop them on a selected worksheet page, and soft-wire them to other blocks directly or via tag references. Editing tools such as box copy and paste help make development faster. You can also copy and paste portions of strategies from other configurations.

## Online Monitoring Features

Hybrid Control Designer online monitoring tools allow quick analysis of configuration problems.

You can access the multiple function block monitor on a single display from multiple worksheets. Most internal parameters are available for read/write, and block outputs can be forced, including I/O and logic blocks. Major blocks such as PID, setpoint programmer, and sequencers have dialog boxes to allow operation and test. You can also select stored profiles or sequences online.

Watch window lists can be selected to access digital and analog I/O, signal tags, variables (for write actions), and custom display data groups by tab selection. Watch windows also allow write capability.

You can find the signal sources for quick identification of potential errors using signal trace-back for any input to a block. A Find function lets you locate multiple instances of specific tags across all worksheets.

## Configuration Edits in Run Mode

You can transfer configuration changes to the active configuration during the Run mode, avoiding initialization. All outputs and status are held during a minimal transfer time, after which processing continues at the start of a scan.



## Operator Interface Configuration

Controllers configured for a 900 control station operator interface can provide the necessary display format data with no process interruption. This simplifies maintenance and guarantees compatibility of the controller and interface databases.

Hybrid Control Designer software uses the function block program database to develop operating displays. Just select a display format and apply tags to the format from a drop-down menu. You can choose from a large selection of display templates and assign them to the display access hierarchy of the OI.

Graphic objects identify the different display types to simplify user selection. In addition to creating displays and defining display access, Hybrid Control Designer lets you set up data archiving schedules, create alarm grouping, establish operator security, and define a number of other operator interface attributes.

## Hybrid Control Designer Reports

A variety of report formats support your configuration documentation. Reports can include a summary of the I/O used, function block worksheet selection, function block properties, tag parameters, recipe listings, setpoint profile listings, sequencer listings, setpoint scheduler listings, 1042 operator interface display groups, and controller setup.

## Specifications

**Configuration:** Conducted off-line without controller, supports run-mode editing with controller

**Support:** Graphic soft-wiring/drag and drop (function blocks); hardware, network, operator displays, peer-to-peer configuration; recipes, profiles, sequences, schedules; diagnostics; calibration

**Interface:** Ethernet, RS232 direct, RS232 modem

**Operating System:** Windows® NT, 2000, or ME

**PC:** Pentium 200 MHz, 64 MB RAM (depends on minimum supported by OS), SVGA resolution min. 1024 x 768 recommended

## Model Selection Guide

Description	Catalog Number	Price
HC Designer Configuration Software CD	900W01-0060-00	\$842.00

**Note:** A single license copy of this software is included with controller CPU model numbers 900C51-\* and 900C31-\*. Order software separately only if you did NOT order these models, or if you need an additional license.

Solids Flow and Motion

Controllers and Programmers

Digital Indicators

Recorders and Data Acquisition

Combustion Safety and Efficiency

Process Valves

# 900 Control Station Operator Interface

# Honeywell

## Features

- Time-consuming “Build the Tag Database” is a thing of the past! Connect the 900 Control Station to the HC900 controller, and Station Designer software automatically imports all available tags from the controller’s database.
- Manage HC900 controller function blocks (PID, setpoint programmers, and more); Preset recipe management functions
- View and manage your process from anywhere via web
- 10.4” color VGA (640x480 pixel) LCD display; Resistive analog touchscreen with dedicated keypad buttons
- Predefined display navigation features and pre-assigned function buttons to get on-line quickly
- Built-in legacy screens (like analog input calibration), reduce development and programming costs, and speed up commissioning time; More than 200 standard controller screens improve status monitoring and system troubleshooting
- No dictated limits on screens, channels, or points. Limited only by available internal memory and the amount of data you choose to collect.
- Zoom display feature lets you drill into the details of a tag
- 10BaseT/100BaseTX Ethernet for new installations and RS485 connection for existing HC900 installations

Out of the box, you’ll see how quick setup features and built-in functions of Honeywell’s new 900 Control Station make this interface an affordable, easy-choice upgrade for the HC900 hybrid control system. The 10.4” color display and touchscreen user interface enhances process monitoring while making online controller changes easy.

With the help of Station Designer software to build a custom interface and HC900 Hybrid Controller configuration tools, your control station database will exactly match your controller configuration in no time! Station Designer imports all available controller tags directly from the controller database, eliminating the risk of running out of tag resources in the middle of your project.

With features like automatic connection paths to the HC900 controller, 200 standard controller screens for status monitoring and troubleshooting, plus RS-232, RS-485, Ethernet, and USB ports standard, this new operator interface gives you ultimate flexibility in programming, monitoring, and data collection. The interface offers displays for managing your process (e.g., PID loops and setpoint profiles) and for supervising operator of your controllers (e.g., calibration routines for analog inputs).

## Controller and Operator Displays and Buttons

The 900 Control Station uses membrane buttons to access common operator functions. A combination of display and screen status buttons create the basic navigation structure and framework for all operator displays. Status indicators also provide button access to summary displays for further detail.

Operators will use the displays to verify setup parameters and troubleshoot controller diagnostics. These preset displays become available when a database is downloaded and the interface is connected to an HC900 controller. Status displays include controller Ethernet port setup, local and expansion rack diagnostics, host communications connections, peer connections, redundant system status, Modbus slave status and more.

If the preset displays aren’t sufficient for your use, you can build custom displays from the ground up using drawing tools, predefined or imported graphic objects, action and navigation buttons.

The 900 Control Station supports a full array of custom graphic displays



- Three front-panel LED status indicators confirm operation
- Grab process data on a USB stick for trend analysis or reports
- Initial Control Designer and Screen Designer software purchase prices include free rights to ALL subsequent upgrades. Just download the latest version from Honeywell’s website!

that can be created using objects drawn with basic drawing tools, an assortment of widgets matching controller functions, graphic symbols from the standard image library and imported JPEG, bitmap or WMF files. Visibility controls let you hide or show objects as determined by the state or value of a parameter in the controller or station.

## Alarms and Events

900 Control Station alarms and events are an integral part of the setup of analog and digital signal tags. Two alarms or events per signal tag are standard, and you can add additional levels as your needs dictate. Standard user selections include automatic or manual acknowledgement, delay action, audible output, and emailing of alarm status.

An alarm log object lets you develop custom alarm logging displays to view, silence and acknowledge alarms. When an event action is selected, the system annunciates the alarm data on the display and logs the alarm in an event table. This event table can be combined with other objects on a custom display or it can be set up to fill an entire display window.

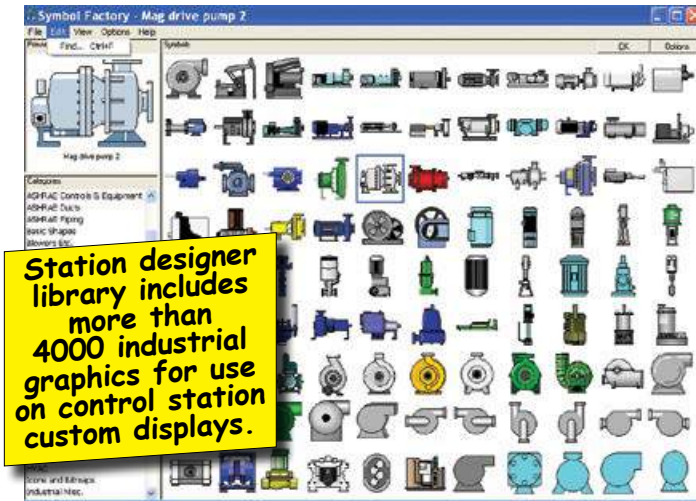
Using 32-bit floating-point math function, you can calculate downtime efficiency, production rates, process measurements for statistical analysis and operational equipment effectiveness (OEE).

## Recipes

Recipes are created using Hybrid Control Designer or Hybrid Control utility software and are stored in the HC900 controller. The 900 Control Station lets operators select the controller recipes for fast and easy product changeover. Recipes can include a list of 50 variables, setpoint schedules, setpoint profiles or sequences.

## Data Logging

The 900 Control Station logs data at specified rates and automatically applies a time/date stamp. Data logs (in comma-separated format) can be stored in volatile RAM memory for short-term, non-critical data viewing or on more secure media like a CF card or USB memory stick. The number of concurrent log files supported depends on the available storage memory, data sample rates and file size allocations.



### Web Access and Security

Station Designer security lets you define which operators have access to which pages, and limit the operators' ability to make changes to specific data through user profiles with password-protected and object-based controls. Security logging can record changes to data values, indicating when the change occurred and by whom it was performed.

The 900 Control Station also supports web access for viewing data and displays and interacting with the controller from remote locations.

Connect to the 900 Control Station via FTP to download or upload files on the CF card. Update recipe files or access log data from your web browser or any FTP client software. The Control Station also supports email alarm messages and SMS messaging function to text message one or more people simultaneously.

### Specifications

**Power:** 24 VDC  $\pm$ 20% @ 29 W max. Requires Class 2 or SELV rated power supply; Front panel LED indication of power on

**Connections:** Via removable three position terminal block. Compression cage-clamp terminal block. 12-30 AWG copper wire

**LCD Display:** 10.4" color active-matrix thin film transistor (TFT) 640 x 480 pixel; *Colors:* 16,000; *Backlight\*:* 50,000 Hr life typical (field replaceable in non-hazardous locations) \*Lifetime at room temperature

**Touchscreen and Keypad:** Analog resistive with optional protective layer over touch panel; *Keypad:* Eight-button keypad on front, six dedicated plus two user-defined keys

**Memory:** *On-Board:* 16 MB non-volatile Flash memory. *Removable Card:* CompactFlash Type II slot for Type I and Type II CF cards (behind panel); Front panel LED indication of activity

**Battery:** Lithium coin cell. Typical lifetime of 10 years.

**Real Time Clock:** Supports alarms, events, displays, trends, and data logging; *Synchronization to controller:* Within 1 second

### Functions

**Security:** Log-on and log-off via user name and password; Remote Web interface and local log-on via user name and password; Up to 50 users with different groups of users and permissions; Audit trail records

**Display Capabilities:** *Graphic objects:* Industrial automation objects (tanks, pipes, pumps), industrial gadgets (buttons, switches, lamps), navigation buttons, drawing objects (circles, lines, etc), importing of images (bmp, tif, jpg), dictionary text objects (language selectable at runtime), widgets (Predefined for controller function blocks); *Animation:* Visible / not visible, flashing, background color change, foreground color change; *Capacity:* Number of screens limited by available memory >50 typical

**Data Entry:** Numeric entry including decimal point; Time and date entry, Audible feedback on data entry / touch

**Scripting:** If-Then-Else statements, Multiple levels (trigger display actions and parameter writes)

**Data Logging:** *Media:* Volatile RAM memory, optional non-volatile flash card memory or removable USB memory module; *Data Types:* Process history, alarms, events, diagnostics, user changes; *Export format:* CSV

### Construction

**Enclosure:** Steel rear metal enclosure with NEMA 4X/IP66 aluminum front plate when correctly fitted with the gasket provided. Installation Category II, Pollution Degree 2.

**Mounting:** For NEMA 4X/IP66 sealing, a steel panel with 0.125" min. thickness is recommended. Panel Mount with gasket using 14 #8-32 studs; *Panel thickness:* 0.25" max. *Mounting Stud Torque:* 17 In-Lb max.; *Depth Behind Panel:* 2.35"; *Front Bezel Thickness:* 0.2"

### Ports and Communications

**USB 2.0.1:** One Type B device port, Two Type A host ports

**RS232 Serial Ports:** One communication port, One programming/comms Port; Format and baud rates individually programmable up to 115,200 baud; 50 ft max. distance; Modbus Master protocol

**RS485 Communications Port:** 2000 ft max. distance, HC900, Modbus Master protocols

**Ethernet Port:** RJ45 wired as a Network Interface Card. 10Base-T / 100Base-TX; Max. Distance 100M; HC900, Modbus TCP protocols

### Configuration Software

**Station Designer:** WYSIWYG displays from PC to operator interface; No software tag limits; Import utility for Hybrid Control Designer. cde files to Station Designer. sds for database transfer; Windows 2000, XP, Vista support

### Environmental

**Temperature:** *Operating:* 32° to 122° F; *Storage:* -4° to 158° F

**Humidity:** 80% max rH (non-condensing) from 0° to 50° C.

**Vibration:** Per IEC 68-2-6. 10 to 55 Hz, in X, Y, Z direction for 1.5 hours, 1 g.

**Shock:** According to IEC 68-2-27; Operational 30 g, 9 msec in 3 directions.

**Altitude:** Up to 2000 meters.

**Safety:** *CE Mark:* General purpose EN 61010-1-2001, EMC requirements for electrical equipment for measurement, control, and laboratory use IEC61326-2005; *ANSI/UL:* General purpose safety 61010-1-2004, Second Edition; *CSA:* General purpose safety C22.2 #1010-1-2004, Second Edition

**Electromagnetic Compatibility (Immunity to Industrial Locations):** *Electrostatic discharge (EN 61000-4-2) Criterion A:* 4 kV contact discharge, 8 kV air discharge; *Electromagnetic RF fields (EN 61000-4-3) Criterion A:* 10 V/m; *Fast transients (burst) (EN 61000-4-4) Criterion A:* 2 kV power, 2 kV signal; *Surge (EN 61000-4-5) Criterion B:* 1 kV L-L, 2 kV L&N-E power; *RF conducted interference (EN 61000-4-6) Criterion A:* 3 V/rms; *Emissions (EN 55011/CISPR11):* Class A

### Model Selection Guide

Description	Catalog Number	Price
900 Control Station Interface	900CS10-00	\$3127.00
900 Station Designer Software (Required)	900SDS-12-44-00	378.00
CompactFlash Memory Module (Required)	50040636-002	135.00
24 VDC Power Supply (Required)	51452041-501	191.00
USB Programming Cable	50038817-001	29.00
Ethernet and RS485 Communication Cable	51451432-010	43.00
Screen Protective Films, Pack of 10	50038816-502	102.00
Replacement Backlight	50038818-501	99.00
Replacement Touchscreen Assembly	50038820-501	285.00
Mounting Plate Adapter (1042 Replacement)	50039118-501	156.00



## Systems for Small and Mid-Sized Control Applications



### Experion LX DCS for Process Management and Control

#### Features:

- Experion C300 controller for robust control
- C300 Simulation for testing control strategies
- Series 8 I/O module design for compact footprint, efficient installation, wiring and easy maintenance
- Optional redundancy at all levels: Server, network, C300 controller, Series 8 I/O modules
- Smart integration through HART, Foundation Fieldbus, Profibus, Modbus, and asset management using Honeywell integrated Field Device Manager software
- Controller-based S88 compliant modular batch control for high throughput and reliability of batch processing
- Profit Loop algorithm for model based predictive control
- High-performance Fault Tolerant Ethernet control network
- Extensive integration of PLC, DCS, RTUs, drives, safety systems and other devices through the SCADA capability of Experion LX and Matrikon OPC servers
- Distributed Server Architecture (DSA) for integrating processes across multiple units, control rooms or locations for optimum flexibility and system maintenance

The specialty chemicals, biofuels, industrial and mid-size power, metals, water, and food and beverage industries are continually looking to reduce costs while meeting more stringent regulations and increased sustainability objectives.

One way to accomplish these goals is through the functionality of a distributed control system (DCS), which can control and automate a plant while providing the system reliability and greater flexibility that traditional PLCs are unable to offer. But many leading DCS systems are just too big, and not cost-effective for smaller mid-size manufacturing operations.

Easy to configure and use, Honeywell's Experion® LX contributes to faster engineering, increased uptime, and lower lifecycle costs, while fully empowering the limited resources of a smaller operation.

Experion LX is a cost-effective DCS that can be easily tailored to address the specific requirements of your mid-size applications. It can be extended at any time to include personnel and assets, and even to integrate entire business operations.

Experion LX manages all continuous process control applications and optimizes batch and sequence-oriented applications. It's scalable from a single HMI and controller to many stations and controllers. It incorporates Honeywell's latest C300 controller technology and an innovative Series 8 I/O platform.

### Experion HS Platform for HMI and SCADA Applications

#### Features:

- Advanced system infrastructure with alarm/event management, built-in displays, configurable reports, extensive history collection and trending
- Real-time database to provide data to client applications, including Experion FLEX Station applications
- Open connectivity to simplify integration with business and information systems
- SCADA interfaces, providing support for devices like the HC900 hybrid process automation controller, safety manager, and MasterLogic PLC plus third-party devices
- Pre-built standard displays — including process group, point detail, trend, alarm, and setpoint programmer displays — reduce configuration time
- Intuitive, flexible HMI meets the most demanding needs for process graphics, display navigation, and alarm presentation
- User-configurable pull-down menus and toolbars promote easier, intuitive navigation to process data
- Enhanced trending for up to 32 pens simultaneously and event markers, to provide operators with a comprehensive view of the plant
- On-board historian collects history and events, enabling instant access to reliable and accurate process data
- Open architecture based on commonly-used industry standards, and a Microsoft Excel add-in to provide flexibility in generating reports from process data
- Integrated configuration environment enables offline and online configuration changes, minimizes process disruption
- Integrated server redundancy without the need for expensive third-party fault-tolerant computing platforms

Experion HS lets operators monitor and control the plant environment using real-time data for displays, trends, and loop faceplates. An onboard historian archives valuable plant data. The system is easy and intuitive, and can be used by plant managers, maintenance engineers, process engineers, and operators to improve efficiency and productivity.

Experion HS enhances user response, and provides readily available information and data for operator effectiveness. It improves the safety management of critical processes and equipment. And it offers productivity tools for faster and more accurate engineering, with automatic documentation creation, improved online modifications and validation — all resulting in better engineering and maintenance efficiency.