

UDC 1000 and UDC 1500 MICRO-PRO SERIES UNIVERSAL DIGITAL CONTROLLERS

EN01-6041 12/99

PRODUCT SPECIFICATION SHEET

OVERVIEW

The UDC 1000 and UDC 1500 are microprocessor-based 1/16 DIN and 1/8 DIN controllers which combine a high degree of functionality and reliability at low cost.

They are fully dedicated to monitor and control temperatures, pressures and levels in a wide range of applications such as the plastics and food industries, furnaces, packaging and environmental chambers. The large and easy-to-read dual 4-digit display and tactile keypad make the UDC 1000 and UDC 1500 easy to configure and use. Their outstanding flexibility enables you to configure any unit for any application and change it if required.

FEATURES

Dual display

Two 4-digit displays with 7 LED segments, each configurable for:

- PV and SP (non adjustable)
- PV and SP (adjustable)
- PV and Ramping SP
- PV only

Easy to configure

Two different configuration levels (configuration mode and set-up mode) provide easy access to parameters. A 4-digit security code prevents unauthorized changes.

Moisture resistant front-face

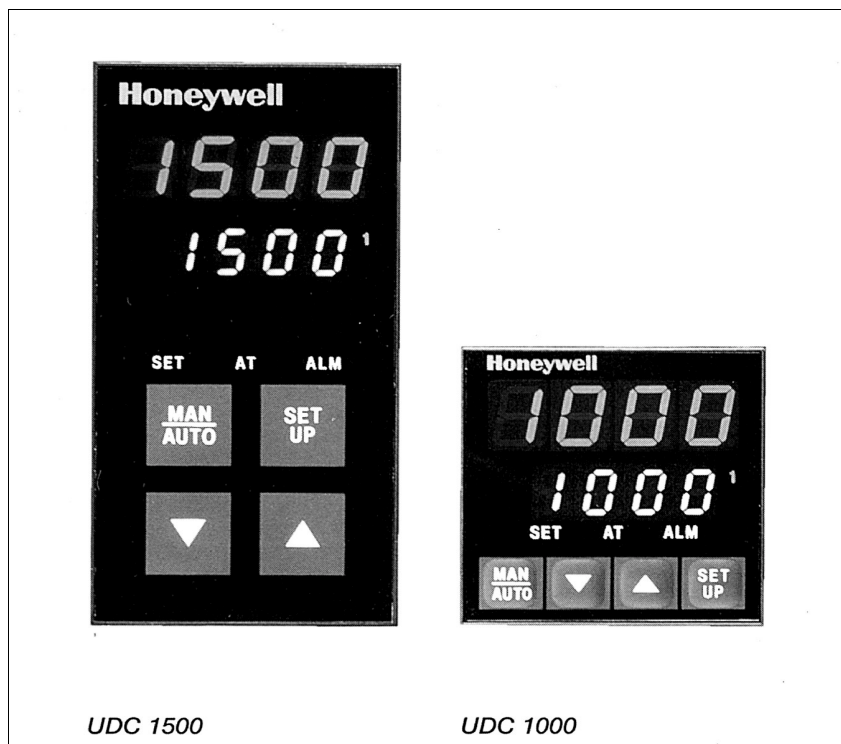
Meets NEMA 3 / IP65 front-face protection against dust and water.

Universal input

Accepts seven different types of thermocouples, RTDs, current and volt linear inputs. All inputs are configurable as standard.

Universal power supply

The UDC 1000 and UDC 1500 can operate on any line voltage from 90 Vac to 264 Vac at 50/60 Hz continuously. A 24/48 Vac/dc model is available as an option.



Easy output selection and upgrade

With only two basic modules (current and relay output) and plug-in options, you can configure the controller as you want for a wide range of applications.

Up to three outputs

The UDC 1000 and UDC 1500 provide up to three outputs for time and current proportioning, duplex mode (heat/cool), PV or SP retransmission, and alarms.

Alarm strategy

Two soft alarms on PV, deviation high/low/absolute. A special loop alarm is also provided to detect faults in the control loop by continuously analyzing the PV response to the control output. Alarm inhibit is available on power up and setpoint switching.

Manual/Automatic mode

Manual control (via bumpless transfer) is enabled by simply pressing the front-face AUTO/MAN key. The "SET" LED flashes and the output power is displayed on the lower display. Output can be adjusted with the upper and lower keys.

Pre-tuning and self-tuning strategy

Pre-tuning is used to set up the PID parameters close to the optimum values which might be used by the self-tuning algorithm to subsequently optimize the tuning parameters.

Limit controller

Packaged in 1/16 DIN, the UDC 1000 limit controller is designed to provide a safety cut-out and optional alarms for use in a wide variety of applications.

Setpoint ramp

According to a defined ramp rate, the SP ramps the current setpoint to the new targeted setpoint.

Dual setpoint

Dual setpoint option is available on the UDC 1000 and UDC 1500. The current setpoint is selected by a digital input. This option is exclusive with UDC 1000 limit model remote alarm reset.

Communication

An optional RS485 communications interface is available on the UDC 1000 and UDC 1500. It provides a link between up to 32 units and a host computer through ASCII or Modbus RTU protocol at up to 9600 baud.

Highly secure

A non-volatile memory based on EEPROM technology ensures data integrity during loss of power supply, with retention of more than 100 years. The design is centered around a battery concept. A 4-digit security code prevents unauthorized or accidental change.

OPTIONAL FEATURES

The following can be selected via the Model selection Guide (see page 7):

- RS485 ASCII communication
- RS485 Modbus RTU communication
- Digital Input
- Output 2
- Output 3
- Power Supply 24/48 Vac/dc

PHYSICAL DESCRIPTION

The UDC 1000 controller is housed in a 110 mm (4.33 inches) deep case with the standard UDC gray bezel. It can be mounted in a 1/16 DIN panel cutout. The UDC 1500 controller is housed in a 100 mm (3.94 inches) deep case and can be mounted in a 1/8 DIN panel cutout. By using the pre-assembled mounting fixture delivered with the unit, you can easily and securely install the controller into the panel cutout. Modular plug-in construction allows rapid access and saves time. All inputs and outputs are connected on the rear terminal block by screws.

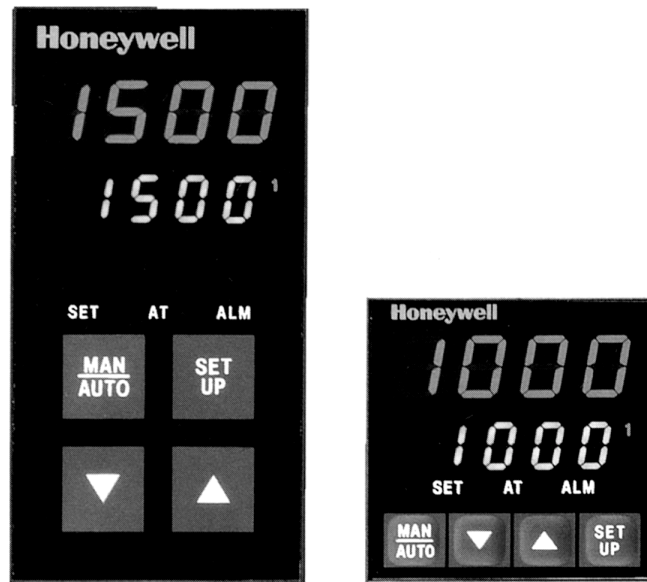
OPERATOR INTERFACE

Four display combinations are offered to the operator. The upper 4-digit 7-segment display is always dedicated to monitor the PV. The lower display can show:

- SETPOINT (read only)
- SETPOINT (adjustable)
- RAMPING setpoint (ramp mode)
- BLANK

UPPER DISPLAY - Four characters dedicated to show the PV. In configuration mode, it shows the parameter value or selection

LOWER DISPLAY - Four characters dedicated in normal operation to display the setpoint. In configuration mode, it displays the parameter name.



SET - LED indicates - that the controller is in configuration mode. When flashing, controller is in manual mode

AT - LED indicates that the controller is in selftune mode. When flashing, controller is in pretune mode

ALM - LED informs that alarm is on. "1" - displays output 1 status. "2" - displays output 2 status.

Figure 2 – Operator interface

Key functions



Selects manual or automatic mode. Becomes "RESET" on UDC 1000 limit model



Allows operator mode parameters to be scrolled. In combination with the "Upper" key, allows configuration mode or set-up mode to be entered.



- Increases setpoint, output or configuration parameter values.



- Decreases setpoint, output or configuration parameter values.

UNIVERSAL INPUTS

All input types are available on any unit. By positioning a jumper on the CPU board, the thermocouples, RTDs or linear input families can be field selected. Selection among the various types of inputs is made by prompt configuration. As soon as the Process Variables reaches a value of the input range limits, the controller displays a message. A sensor break indication is also provided. A configurable digital filter is available from 0.5 seconds to 100.0 seconds.

OUTPUTS

Three types of outputs (RELAY, SSR driver or DC linear) are selectable for three outputs, through the model selection guide or by adding a plug-in module for outputs 2 and 3.

OUTPUTS ALGORITHMS

The UDC 1000 and UDC 1500 are available with the following output algorithms:

- *Time proportional:*
ON/OFF or time proportional with electromechanical relay SPDT 2 A or SSR driver (open collector).
- *Current proportional:*
Supply directly proportional current or volt signal to the final control elements which require 0-20 mA, 4-20 mA, 0-10 V or 0-5 V.
- *Time proportional duplex:*
Three duplex modes can be selected, either ON/OFF duplex or time proportional duplex (heat/cool with two proportional bands, two cycle times and deadband) or TPSC.
- *Current proportional duplex:*
In addition to the first current/volt output, provides a second similar output with its own proportional band.
- *Current/Time or Time/Current duplex:*
Provides a variation of traditional time or current duplex mode by mixing current and time proportioning together.

CONTROL ALGORITHMS

Four control algorithms can be set up through the configuration menu:

- On/Off ▪ PID
- PD + MR ▪ TPSC

The TPSC (Three Position Step Control) control algorithm is dedicated to control valve positioning without slidewire feedback from the motor shaft.

CONFIGURATION

There are two levels of configuration. The SET-UP mode allows modification of current parameters such as tuning parameters, alarm values, setpoint limit, ramp enable, auto-manual mode enable; auto-pretune enable. The CONFIGURATION mode is more oriented to unit personality: input selection, output 2 and 3 usage, alarm type, communication address, lockout code, hardware definition coding.

CONTROL MODE

Manual or automatic mode with bumpless transfer is standard feature. In manual mode, the operator can directly control the output through the two front face keys (raise and lower keys). The output value is monitored on the lower display.

ALARMS

Outputs 2 and 3 can be used as alarms. Two electromechanical single pole double throw relays can activate external equipment when alarm setpoints are reached. An LED is also activated on the front-face. A direct or reverse acting alarm output can be configured. A logical combination of the two alarms: OR, AND or hysteresis (active when both alarms are active, becomes inactive when both alarms are inactive) can be set which associates the two alarms status before energizing the relay. In order to detect a defective control loop, the controller can supply a special loop alarm control by continually monitoring the PV response to output demand. A timer is automatically set up when any output is on saturation mode. When the timer reaches twice the reset time with no PV response, then the loop alarm is activated. With this soft alarm, there is no need for a heater breaker, saving wiring time and costs.

DISPLAY

Dual, four-digit LED display with decimal point location configurable up to three places for linear ranges only.

LIMIT CONTROLLER

The UDC 1000 1/16 DIN limit controller provides a latched relay output which is activated when process parameters either exceed or fall below the desired value, providing a failsafe cut-off which has to be manually reset before the process can continue.

The UDC 1000 limit controller can be configured to be either a "high limit" unit where the delay will de-energize when the PV is above the limit setpoint, or a "low limit" where the relay will drop out when the PV falls below the setpoint.

LED indication shows when limits have been exceeded, and when the relay is latched out.

The optional digital input allows a remote reset function.

SPECIFICATIONS (Apply to both UDC 1000 and UDC 1500)**Technical data**

Accuracy	0.25 % of span \pm 1 LSD
Temperature Stability	0.01 % of span per °C
Input Signal Failure	<p><i>Fail-safe output value:</i> Achieved when burnout is detected. Value depends on configuration.</p> <p><i>For thermocouple and mV input detected by any lead break:</i> Upscale burnout</p> <p><i>For RTD:</i> Burnout detected by any lead break</p> <p><i>Current or volt input:</i> Burnout set by open circuit detection</p>
Input Impedance	<p><i>Volt impedance:</i> 47 Kohms</p> <p><i>Current input:</i> 4.7 ohms</p> <p><i>All others:</i> 100 Mohms</p>
Input Sampling Rate	Four samples per second
Input Filter	<p>Digital filter configurable from front panel</p> <p>0.0 (Off), from 0.5 seconds to 100.0 seconds in 0.5 seconds increment</p>
Input Resolution	14 bits approximately, always four times better than display resolution
Input Isolation	Universal input isolated at 2500 V from all outputs except SSR and from power supply
Stray Rejection	<p><i>Common mode rejection:</i> > 120 dB at 50/60 Hz</p> <p><i>Serial mode rejection:</i> > 500% of span at 50/60 Hz</p>
Approvals	<p>UL</p> <p>FM approval on the UDC 1000 limit model</p> <p>Product design to meet CE MARK requirement</p>
Control Output Type	<p>Type available:</p> <p><i>Output 1:</i> DC, Electromechanical relay, SSR drive (open collector)</p> <p><i>Output 2:</i> DC, Electromechanical relay, SSR drive (open collector)</p> <p><i>Output 3:</i> DC (transmission output only), Electromechanical relay, SSR drive (open collector)</p> <p>DC output:</p> <p>0-20 mA, 4-20 mA, 0-5 V, 0-10 V</p> <p><i>Accuracy:</i> \pm 0.5 % (250 ohms for mA, 2 Kohms for volt)</p> <p><i>Resolution:</i> 80 bits in 250 ms (10 bits in 1 second typical > 10 bits in > 1 second)</p> <p><i>Load impedance:</i> 500 ohms maximum for current output, 500 ohms minimum for volt output</p> <p><i>Isolation:</i> Isolated 2500 V from all other inputs and outputs</p> <p><i>Range selection method:</i> Jumper positioning and front panel code setting</p> <p><i>Temperature stability:</i> 0.01 % / °C</p> <p><i>Electromechanical relay:</i> SPDT contact</p> <p><i>Resistive load:</i> 2 A at 120 V or 240 V</p> <p><i>Life time:</i> > 500000 operations at rated voltage/current</p> <p>SSR drive/TTL:</p> <p><i>Drive capability:</i> SSR > 4.3 Vdc into 250 ohms minimum</p> <p><i>Isolation:</i> Not isolated from input and other SSR output</p>
Alarms	<p><i>Maximum number of alarms:</i> 2 soft alarms setpoint + 1 loop alarm</p> <p>Alarm inhibit available on power up and setpoint switching</p> <p><i>Alarm output:</i> Up to two relays or SSR output on outputs 2 and 3</p> <p><i>Types:</i> PV high or low, band, deviation high or low, loop</p> <p><i>Combination alarms:</i> Logical "OR", "AND" or hysteresis of alarms available to individual hardware output</p>

Technical data (continued)

Loop Control	<p><i>Automatic tuning type:</i> Pre-tune and self-tune</p> <p><i>Proportional bands:</i> 0 (inactive), 0.5 % to 999.9 % of input span with 0.1% increments. Two proportional bands available for duplex mode</p> <p><i>Reset:</i> Off or from 1s to 99 min 59 s</p> <p><i>Rate:</i> From 0 s to 99 min 59 s</p> <p><i>Manual reset:</i> from 0 to 100 % of output (single output), from –100 % to 100 % of output (dual output)</p> <p><i>Deadband:</i> ± 20 of PB1 + PB2</p> <p><i>ON/OFF hysteresis:</i> 0.1% to 10.0 % of input span</p> <p><i>Auto/manual mode:</i> Front key selectable with bumpless transfer between automatic and manual mode</p> <p><i>Cycle times:</i> Up to two cycle times available for time duplex control</p> <p><i>Selection:</i> 0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256, or 512 seconds</p> <p><i>Setpoint ramp:</i> From 1 to 9999 engineering units per hour</p>
Retransmission Output	Current and volt output of output 3 can be selected to retransmit the process value or setpoint
Communication Interface	<p>RS485 – ASCII or Modbus RTU</p> <p><i>Baud rate:</i> 1200, 2400, 4800 or 9600 baud</p> <p><i>Link characteristics:</i> 32 drops maximum, ASCII or Modbus protocols, two wires</p>
Mounting	Plug-in with pre-assembled mounting fixture
Wiring Connection	Screw terminals on the rear of the case (combination head)
Power Consumption	4 W
Physical (UDC 1000)	<p><i>Weight:</i> 210 grams maximum</p> <p><i>Height:</i> 48 mm / 1.89 in</p> <p><i>Width:</i> 48 mm / 1.89 in</p> <p><i>Depth:</i> 110 mm / 4.33 in</p> <p><i>Cut out:</i> 45 mm x 45 mm / 1.77 in x 1.77 in</p>
Physical (UDC 1500)	<p><i>Weight:</i> 250 grams maximum</p> <p><i>Height:</i> 96 mm / 3.78 in</p> <p><i>Width:</i> 48 mm / 1.89 in</p> <p><i>Depth:</i> 100 mm / 3.94 in</p> <p><i>Cut out:</i> 45 mm x 92 mm / 1.77 in x 3.62 in</p>
Environmental	<p><i>EMI Susceptibility:</i> Designed to meet EN55101</p> <p><i>EMI Emission:</i> Designed to meet EN55022</p> <p><i>Safety Considerations:</i> Designed to comply with IEC1010-1as far as applicable</p>
Front Panel Sealing	NEMA 3 / IP65

Input Actuations

Ranges

Thermocouple types (Fixed decimal)		°F	°C
R		32 – 3002	0 – 1650
S		32 – 3000	0 – 1649
J		32.0 – 401.7	0.0 – 205.4
J		32 – 842	0 – 450
J		32 – 1401	0 – 761
T		-328 – 503	-200 – 262
T		32 – 501.0	0 – 260.6
K		-328 – 1399	-200 – 760
K		-328 – 2503	-200 – 1373
L		32 – 402.2	0.0 – 205.7
L		32 – 841	0 – 450
L		32 – 1403	0 – 762
B		211 – 3315	100 – 1824
N		32 – 2550	0 – 1399
RTD: (3 wires connection) PT100 (IEC) $\alpha = 0.00385$ (Fixed decimal)		32 – 1471 32 – 571 -149.7 – 211.9 32 – 213.6 -328 – 402 -149.7 – 999.1	0 – 800 0 – 300 -100.9 – 100.0 0.0 – 100.9 -200 – 206 -100.9 – 537.3
DC linear:		10 – 50 mV 4 – 20 mA 1 – 5 V 2 – 10 V	0 – 50 mV 0 – 20 mA 0 – 5 V 0 – 10 V

Operating Conditions

	Reference Conditions	Operative Limits	Transportation and Storage
Ambient Temperature	20 °C \pm 2 °C (68 °F \pm 4 °F)	0 °C to 55 °C (32 °F to 131 °F)	-20 °C to 80 °C (-4 °F to 176 °F)
Relative Humidity	60-70 %	20-95 % non -condensing	
Voltage	90-264 Vac \pm 1 %	90-264 Vac	
Frequency	50 Hz	50-60 Hz	
Source Resistance	< 10 ohms for thermocouple	1000 ohms maximum for thermocouple	
Lead resistance for RTD	< 0.1 ohm/lead (PT100)	50 ohms per lead maximum balanced	

Model Selection Guide

Key Number							Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8
U	D	C	1	0	0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
U	D	C	1	5	0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INPUT TYPE (Factory selected)

1 RTD or linear mV
2 Thermocouple
3 Linear mA
T TPSC model
L UDC 1000 limit model

TABLE 1: OUTPUT 1

1 Relay
2 SSR driver
7 Linear = 4-20 mA

TABLE 2: OUTPUT 2

0 None
1 Relay
2 SSR driver
7 Linear = 4-20 mA

TABLE 3: OUTPUT 3

0 None
1 Relay
2 SSR driver
7 Linear = 4-20 mA (Retransmission only)

Alarm 1 only

TABLE 4: OUTPUT 4

0 No selection
1 RS485 ASCII serial communication
2 Digital input (SP1/SP2 selection or UDC 1000 limit model remote reset)
3 RS485 Modbus RTU communication

TABLE 8: NONE

0 No Selection

TABLE 7: PACKAGING

0 No Selection

TABLE 6: MANUAL

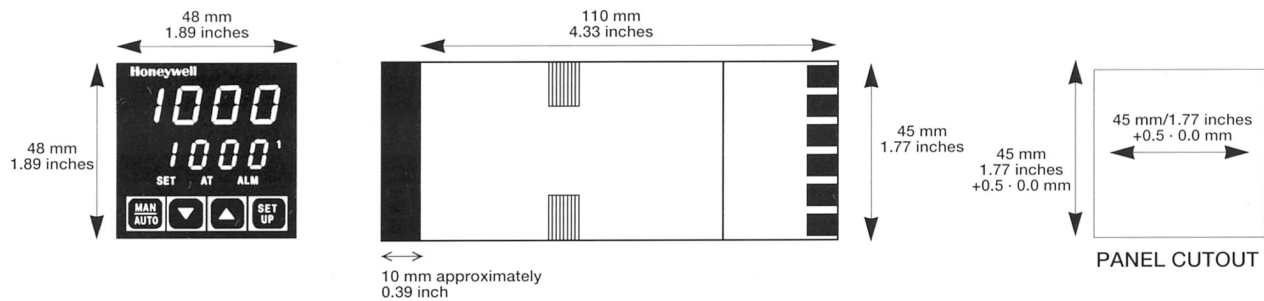
0 English Manual

TABLE 5: OPTION 2

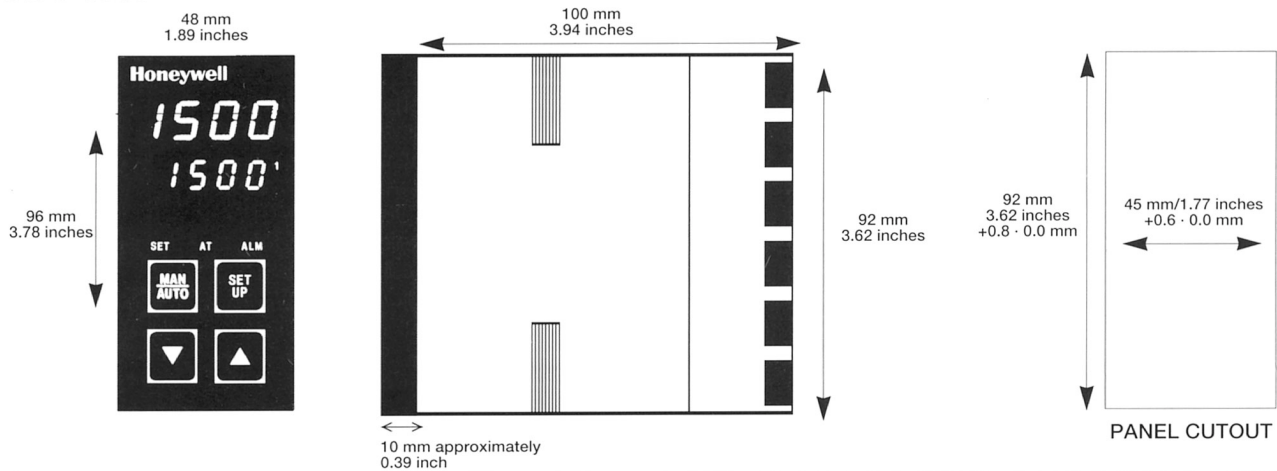
1 Power supply 90-264 Vac
2 Power supply 24/48 Vac/dc

EXTERNAL DIMENSIONS, PANEL CUTOUT

UDC 1000



UDC 1500



For more information, contact Honeywell sales at (800) 343-0228. *Specifications are subject to change without notice.*

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