UDC2000 *Mini-Pro*
Universal Digital Controller

Specification

Overview

The UDC2000 Mini-Pro is a low cost member of Honeywell's Leaderline family of microprocessor-based, digital controllers. It monitors and controls temperatures and other variables in applications such as environmental chambers, plastic processing machines, furnaces and ovens and packaging machinery.

The Mini-Pro is a low cost alternative to more expensive controllers without compromising quality or performance. It can be used to control variables such as temperature, pressure, flow, level, and rotation. A limit control model is also available.

The Mini-Pro has a high degree of functionality. A dedicated configuration display provides multi-language prompts providing unmatched operating simplicity. Programmed sequences of displays assure quick and accurate entry of all configurable parameters. Simple keystrokes let you change the operating parameters to meet your process control needs.

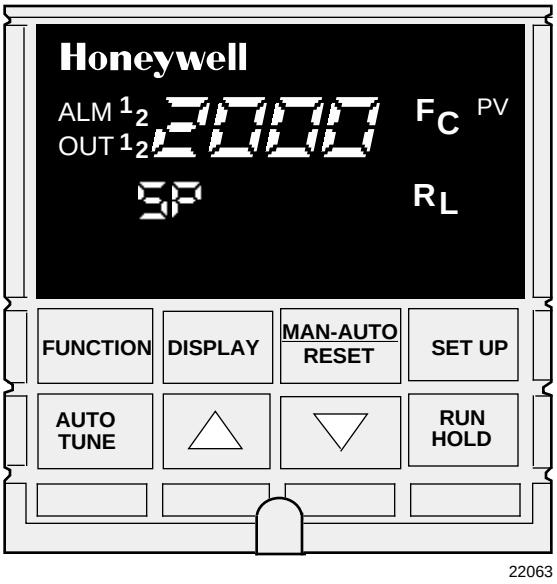

Figure 1 - UDC2000 Mini-Pro Controller

Features

Low-Cost - This Mini-Pro meets Honeywell's high performance standards at a surprisingly affordable price.

Easy to Configure - A bright dedicated configuration display provides straightforward multi-language prompts that allow easy set-up with minimum time and effort.

Universal Inputs - Accepts 10 thermocouple types, RTDs, Radiamatics RH, mA, mV or voltage inputs through simple configuration.

Thermocouple Failsafe - Configurable upscale or downscale burnout or failsafe output level.

Features, continued

Accutune II - This standard feature provides a new, truly plug and play tuning algorithm, which will, at the touch of a button, accurately identify and tune any process including deadtime and integrating processes . This speeds-up and simplifies startup plus allows re-tuning at any setpoint.

Fuzzy Logic- This new feature uses fuzzy logic to suppress process variable overshoot which can result from setpoint changes or externally induced process disturbance.

It operates independently from Accutune Tuning. It does not change the PID constants, but temporarily modifies the internal controller response to suppress overshoot. This allows more aggressive tuning to co-exist with smooth process variable response.

It can be enabled or disabled depending on the application or the control criteria.

Features, continued

UL Recognized Component - This is a standard feature for all models for regulatory use only.

CE *Mark-* Conformity with 73/23/EEC, Low Voltage Directive and 89/336/EEC, the EMC Directive

Dual Setpoints - Simple push-button selection allows quick switchover from primary to alternate setpoint with minimal operator confusion.

Limit Control - This model provides a latching relay which is activated whenever the PV goes above (High Limit) or below (Low Limit) a preset setpoint value. An alarm message will be displayed when the output is activated. Reset is through a key on the front of the controller or an optional external switch. Normal display can be configured to indicate process variable or setpoint. Only T/C or RTD inputs are available on Limit models. FM approval is available.

Features, continued

Moisture Resistant Front Panel - Capable of meeting NEMA 3 and IEC IP65 (i.e. hose down) requirements.

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

Highly Secure - Non-volatile EEPROM memory assures data integrity during loss of power. Keyboard security prevents accidental or unauthorized changes to the display.

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

Quality/Support - The Mini-Pro conforms to Honeywell's high quality standards in design, materials and workmanship. It is covered by a two year warranty and backed up by a toll-free phone number for technical assistance.

Optional Features

Dual Display - Provides the standard upper display dedicated to process variable, plus a lower display which can display output, setpoints or deviation as desired via the "DISPLAY" key.

Second Input - 4-20 mA or 1 to 5 Volt input available for remote setpoint signal.

***Auxiliary Output -** This auxiliary Process Variable output can be scaled from 1 to 5 Volt or 0 to 5 Volt for 0 to 100% for any range desired.

OR

***Digital Input -** Allows remote switching via an external dry contact or isolated solid-state input to select from a menu of discrete mode changes as described on page 6.

* These options are mutually exclusive.

Optional Features, cont.

Auto/Manual Modes - Provides automatic or manual control with bumpless, balanceless switching between modes. This includes the Dual Display option as described above.

Alarm Selection - None, one, or two relays to activate external equipment when preset high/low setpoints are reached. There is an indicator for each alarm on the operator interface. For Duplex or 3 Position Step operation, only one alarm is available.

Timer - Provides a configurable time period of 0 to 99 hours, 59 minutes. Alarm 1 is dedicated to be active at the end of the time-out period. Timer "start" is selectable as either the RUN/HOLD key or Alarm 2. The optional Digital Input can also be configured to start the Timer in addition to either the keyboard or Alarm 2. The Timer display is selectable as either time remaining or elapsed time.

Ramp Soak Programming - Lets you program and run 6 ramp and 6 soak segments for Setpoint Programming. Run or Hold of program is keyboard or remote switch selectable.

FM and CSA Approval - Are optional features.

Solid State External Control Relay Outputs - Optional outputs rated at 2 Amps at 120/240V or 10 Amps at 120/240V. Minimum load 0.1 Amp.

Physical Description

The controller is housed in a 4.2 inch deep, black metal case with an elastomer bezel that can be mounted in a 1/4 DIN cutout. The modular construction of the plug-in chassis allows quick access to minimize down time. All power, input, and output wiring are connected to screw terminals on the rear terminal panel. Standard bezel color is gray. Blue and tan colors are optional.

Inputs

Each analog input is sampled 3 times a second. The sampled signal is amplified and then converted to a digital signal which is passed to the processor. The PV input can be one of various Thermocouple, RTD, Radiamatic or Linear actuations (Table 1). Cold Junction compensation is provided. You can select upscale or downscale sensor break protection. Any range can be field selected via internal switch positions and keyboard selections. A second input provides a remote setpoint function and accepts a 4 to 20 mA or a 1 to 5 Vdc linear signal that can be characterized.

A configurable digital filter of 0 to 120 seconds provides signal smoothing for each input.

Outputs

The following output types are available per the model selection guide:

- Current Output
- Electromechanical Relay
- Solid State Relay
- Open Collector Output

Output Algorithms

The UDC2000 Mini-Pro is available with the following output algorithms:

Time Proportional - provides On-Off or Time Proportional (relay) output. Electromechanical, solid-state or open collector outputs are standard; 2 amp or 10 amp externally mounted solid-state relay outputs are optional.

Current Proportional - supplies proportional direct current output for final control elements that require a 4-20 mA signal.

Time Proportional Duplex (Heat/Cool) - depending on which control algorithm you select, this duplex output type can provide on-off duplex, time proportional duplex or 3 Position Step control. The time proportional duplex output provides independent PID tuning constants and two time proportional outputs: one for heat zone above the 50% output, and one for cool zone below 50% output.

Control Algorithm

Depending on the output algorithm you select, the controller can be configured for the following control algorithms:

On-Off - Whenever the controlled variable deviates a predetermined amount from the setpoint, the controller moves the final control element to either of two extreme positions. Hysteresis: 0 to 100%

PID-A - The controller gives full response to Setpoint and Process Variable (PV) changes involving Gain (Proportional), Reset (Integral), and Rate (Derivative) effects. There is a fixed relationship between the value of the controlled variable and the position of the final control element. The adjustable Gain, Rate, and Reset Time tuning constants let you tailor the controller's response to your process requirements.

PD with Manual Reset - The action is similar to the PID-A algorithm except the reset (Integral) value is entered as Manual Reset tuning constant instead of Reset Time. The manual reset value eliminates offset by shifting the PD calculated output upscale or downscale to return the controller variable to the setpoint.

Three Position Step Control - This is an extension of the On/Off Duplex control and includes internal feedback of the state of the relays. The effect of this control action is that the On and Off times of the output relay change in proportion to the error signal and the Gain and Reset time setting. The Deadband is adjustable in the same manner as the duplex output algorithm.

Configuration

You decide how the controller is to interact with the process by selecting, through simple keystrokes, the functions you want. Multi-language prompts guide the operator through the configuration process assuring quick and accurate entry of all configurable parameters. Multi-language prompts including French, German, Italian, and Spanish are also available via configuration.

Control Modes

The controller can operate in the following modes:

Local Automatic Mode - The controller can operate from one or two local setpoints that can be selected and changed via the keyboard or optional external Contact Input.

Remote Automatic Mode - The controller operates from the setpoint value applied to the second input. This setpoint can have ratio and bias applied. Selection between local and remote setpoint is via the keyboard or optional Digital Input for remote mode switching.

Manual/Automatic Switching (Optional) - The controller can be ordered with bumpless, balanceless transfer between modes using the RESET key. In the manual mode, the operator directly controls the controller output level. In the automatic mode, the controller will operate from a local setpoint, or a remote setpoint provided at the second input.

Alarms

Alarm output terminals are located at the rear terminal panel. One or two alarm relays are available to activate external equipment when preset alarm setpoints are reached. Each of the two alarms can be set to monitor two independent setpoints. Each alarm setpoint can be either high or low alarm. The alarm type can be selected to be either the Process Variable, Deviation, or Setpoint Programming Events. Alarm 1 is dedicated to be activated by the Optional Timer, if enabled.

Diagnostics

The controllers have built -in diagnostic tests to ensure reliable operation. Every time power is applied, the microprocessor initiates tests that check the integrity of the information held in various memory locations, and light all the display segments for a status check. These tests also can be operator initiated through the operator interface. Continuous checks are made to check that the inputs are being sampled, the stored constants are secure, and the measured inputs fall within the established range limits. Test failures are identified by various error indications so the source of the trouble can be easily identified.

Calibration

The UDC2000 is factory calibrated for all ranges listed in Table 1. When desired, you can perform a field calibration by accessing the required calibration group via the SET UP key. To calibrate, you need only to enter the calibration mode, apply the reference signal and press the CAL key. The calibration is automatically established by the microprocessor, eliminating the need for any mechanical adjustment.

Operator Interface (Figure 2)

Status Indicators - They provide the status of the alarm and control relays. There is also indication to show the temperature units and whether Remote setpoint or Local setpoint 2 is active.

Displays - A 4 digit, 9 segment upper display is dedicated to the process variable or setpoint during normal operation, with alternate information displayed during configuration.

A 6 digit, 14 segment lower display can be configured to indicate PV or SP for the normal display. It also provides guidance, through prompts, for the operator during configuration.

Dual Displays - When Dual Display option is specified the upper display is dedicated to the Process Variable. The lower display shows various key selected parameters such as Setpoint 1, Setpoint 2, Deviation, and Output.

Keyboard Lockout - For additional security against inadvertent changes or tampering, the following keys can be disabled by configuration:

- Man-Auto/Reset
- Auto Tune
- Run/Hold
- Setpoint Select
  (Function Key during operation)

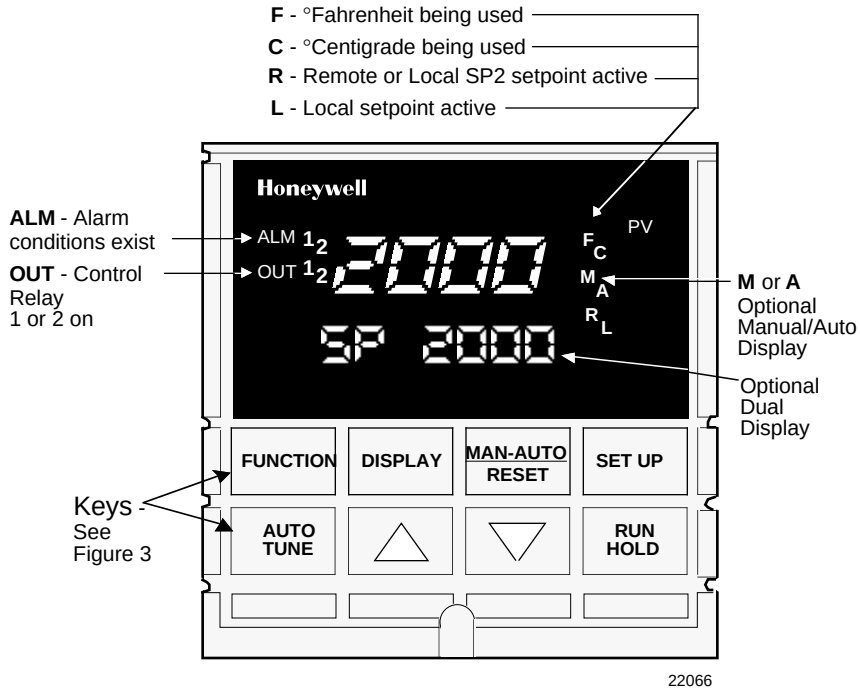

Figure 2 - Operator Interface

Five keys enable complete configuration and operation

FUNCTION	Selects functions within each configuration group. Selects 2nd Setpoint or Remote Setpoint.
DISPLAY	Returns Controller to normal display from Set Up mode. Toggles various operating parameters for display.
MAN-AUTO RESET	In Set Up mode, used to restore original value or selection. Also resets the latching Limit Controller relay. (For Manual/Auto model: selects Manual or Auto mode).
SET UP	Scrolls through the configuration groups.
AUTO TUNE	Initiates Autotune.
▲	Increases setpoint or output value. Increases the configuration values or changes functions in Set Up groups.
▼	Decreases setpoint or output value. Decreases the configuration values or changes functions in Set Up groups.
RUN HOLD	Enables Run/Hold of the SP Ramp or Program plus Timer start.

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Figure 3 - Key Functions

Specifications

Design	
CE Conformity (Europe)	This product is in conformity with the protection requirements of the following European Council Directives: **73/23/EEC**, the Low Voltage Directive, and **89/336/EEC**, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed.
Product Classification:	Class I: Permanently Connected, Panel Mounted Industrial Control Equipment with protective earthing (grounding). (EN 61010-1)
Enclosure Rating:	Panel Mounted Equipment, IP 00, this controller must be panel mounted. Terminals must be enclosed within the panel. Front panel IP 65 (IEC 529).
Installation Category (Overvoltage Category):	Category II: Energy-consuming equipment supplied from the fixed installation. Local level appliances, and Industrial Control Equipment. (EN 61010-1)
Pollution Degree:	Pollution Degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (Ref. IEC 664-1)
EMC Classification:	Group 1, Class A, ISM Equipment (EN 55011, emissions), Industrial Equipment (EN 50082-2, immunity)
Method of EMC Assessment:	Technical File (TF)
Declaration of Conformity:	513093000-000.
Accuracy	±0.3% of span typical (± 1 digit for display) 14 bit resolution typical
Temperature Stability	±0.8% for 50˚F (28˚C) change
Input Signal Failure Protection	*Thermocouple Inputs:* Upscale or downscale burnout *Burnout Current:* 0.2 microamps *Failsafe Output Level:* Configurable 0-100%
Input Impedance	*4-20 Milliampere Input:* 250 Ohms *All Voltage Inputs:* 200K Ohms *Thermocouples:* 10 Megohms *Resistance Temperature Detector:* 10K Ohms
Stray Rejection	*Common Mode:* AC (50 or 60 Hz): 120dB (with maximum source impedance of 100 Ohms) or ± 1 LSB (least significant bit) whichever is greater. *Normal Mode* AC (50 or 60 Hz): 60 dB (with 100% span peak-to-peak maximum)

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Specifications, continued

Design (continued)	
Controller Output Types	***Current Output*** Range can be set between 4 to 20 mA, and as direct or reverse action. Minimum output level is 3.2 mA dc. *Resolution:* 11 bits for 4 to 20 mA *Accuracy:* 0.5% full scale *Temperature Stability:* 0.03% / ˚C *Load Resistance:* 0 to 750 ohms (ungrounded) ***Electromechanical Relay*** SPST contacts. Normally Open or Normally Closed contacts selectable by jumper. Internally socketed (Control Output #1) *Resistive Load:* 5 amps @ 120 Vac, 30 Vdc, 2.5 amps @ or 240 Vac *Inductive Load:* 50 VA @ 120 Vac, or 240 Vac *Motor:* 1/6 H.P. ***Solid State Relay*** SPST solid state contact consisting of a triac N.O. output. Internally socketed *Resistive Load:* 1.0 amp @ 25 ˚C and 120 or 240 Vac 0.5 amp @ 55 ˚C and 120 or 240 Vac *Inductive Load:* 50 VA @ 120 Vac or 240 Vac ***Open Collector Outputs*** *Maximum Sink Current:* 20 mA *Overload Protection:* 100 mA Internally powered @ 34 Vdc Opto-isolated from all other circuits but not from each other. Socketed jumper assembly replaces relay. ***Solid State Relays (2 amps or 10 amps)*** Externally mounted triac N.O. output for use with open collector output. *2 amp Relay* *Resistive Load:* 3 amps @ 25 ˚C and 120 or 240 Vac 2 amps @ 55 ˚C and 120 or 240 Vac *10 amp relay* *Resistive Load:* 15 amps @ 25 ˚C and 120 or 240 Vac 10 amps @ 55 ˚C and 120 or 240 Vac *Inductive Load:* 50 VA @ 120 Vac or 240 Vac *Motor Rating:* 1 HP @ 25 ˚C 0.75 HP @ 55 ˚C
Alarm Output (Optional)	One SPST electromechanical relay. Normally Open or Normally Closed contact is selectable by jumper. A second alarm is available except with Time Proportional Relay Duplex, Three Position Step and Limit Control Models. Alarm 2 can start the optional timer. Up to four setpoints are independently set as high or low alarm, two for each relay. Setpoint can be either Process Variable, Deviation, or Setpoint Programming Events. Timer Output: Alarm 1. *Alarm Relay Contacts* *Resistive Load:* 5 amps @ 120 Vac or 30 Vdc, 2.5 amps @ 240 Vac *Hysteresis:* Adjustable: 0 to 100% of (PV) Input Span

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Specifications, continued

Design (continued)	
Controller Output Algorithms	**On-Off or Time Proportional** One SPST relay or open collector output. Control action can be set for direct or reverse. On/Off Control Hysteresis: Adjustable 0 to 100% of (PV) Input Span. **On-Off Duplex, Three Position Step Control, or Time Proportional Duplex** Two SPST relays. Control action can be set for direct or reverse. **Current Proportional** 4 to 20 mA dc maximum into a load of 0 to 750 ohms. Output range can be set direct or reverse action. **Limit Control** One SPST electromechanical latching relay. Control relay action Normally Open. (Normally Closed contact selectable by jumper.)
Auxiliary PV Output (Optional)*	The Process Variable Output can be scaled for any PV range from 0 to 5 Volts for 0 to 100%, with an overrange capability of 5.25 Volts at 105% output. The scale selection is configured through the operator interface. *Voltage:* 1 to 5 Volts (can be field calibrated to 0 to 5 Volts) *Minimum Impedance:* 2500 Ohms *Resolution:* 12 bits over 0 to 5.25 Volts *Accuracy:* 0.4% Full Scale at 2500 Ohm load *Temperature Stability:* 0.06% / ˚C
Digital Input (Optional)*	+20 Vdc source for external dry contact or isolated solid state contact. Contact closure selects one of the following actions: • Local setpoint 1 from Remote setpoint • Local setpoint 2 from Local setpoint 1 • Reset of Limit Controller • To Hold from Run (SP Ramp or SP Programming) • Disabled Keyboard • To Run - contact closure starts Setpoint Program or Single SP Ramp. Re-opening contact returns to Hold. The following Digital Input selections are available on models that contain the pertinent options: • Timer Start - momentary contact closure will start timer. • To Manual - contact closure switches to Manual mode. Re-opening contact switches back to Automatic mode. • To Manual /Failsafe Output - contact closures switches to Manual mode plus configured Failsafe Output value. Re-opening contact switches back to Automatic.
Setpoint Ramp/Soak Programming (Optional)	Lets you configure 6 ramp and 6 soak segments to be stored for use as one program or several small programs. You designate the beginning and end segments to determine where the program is to start and stop allowing several small programs. Each ramp segment can be configured to be run in Hours and Minutes or degrees per minute. Soak segments can have a guaranteed soak deviation which guarantees the time for each soak and will not start until the PV is reached.
Sampling Rate	Inputs sampled 3 times per second
Input Filter	*Software*: Single pole lowpass section with selectable time constants, off to 120 seconds for each input.

* Auxiliary Output and Digital Input are mutually exclusive.

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Specifications, continued

Design (continued)	
Digital Displays	Vacuum fluorescent, 9 segment and 14 segment, alphanumeric. A four digit display dedicated to the process variable, setpoints, deviation or output depending upon the model number. Alternate information displayed during configuration mode. A six character display primarily provides guidance during controller configuration.
Status Indicators	Alarm Relay Status (ALM 1 or 2) Temperature Units (F or C) Remote Setpoint or Local Setpoint 2 Active (R) Control Relay Status (OUT 1 or 2)
Dimensions	See Figure 5.
Mounting	Panel-mounted, 4.2 inch depth
Wiring Connections	Screw terminals on the rear of the case (6-32)
Power Consumption	6 VA
Weight	1 kg (2.2 lbs.)

Environmental and Operating Conditions				
Parameter	**Reference**	**Rated**	**Operative Limits**	**Transportation and storage**
Ambient Temperature	22 ± 3°C 72 ± 5°F	15 to 55°C 58 to 131°F	0 to 55°C 32 to 131°F	-40 to 66°C -40 to 151°F
Relative Humidity	10 to 55*	10 to 90*	5 to 90*	5 to 95*
Vibration Frequency (Hz) Acceleration (g)	 0 0	 0 to 70 0.1	 0 to 200 0.5	 0 to 200 0.5
Mechanical Shock Acceleration (g) Duration (ms))	 0 0	 1 30	 5 30	 20 30
Voltage (Vac)	120 ± 1 240 ± 2	102 to 132 204 to 264	102 to 132 204 to 264	- - - -
Frequency (Hz)	50 ± 0.2 60 ± 0.2	49 to 51 59 to 61	48 to 52 58 to 62	- - - -

* The maximum rating only applies up to 40°C (104°F). For higher temperatures, the RH specification is derated to maintain constant moisture content.

General Reference Data

Data	
Isolation (Functional)	No isolation between analog input and analog output circuits. *AC Power :* is electrically isolated from all other inputs and outputs to withstand a HIPOT potential of 1900Vdc for 2 seconds per Annex K of EN61010-1.
Radio Frequency Interference (RFI)	*Immunity:* No effect on performance from a 5 W walkie-talkie operated at 27, 151 or 450 MHz, one meter from the controller.
Surge Withstand Capability (SWC)	ANSI/IEEE C37.90.1, Surge Withstand Capability (SWC) (Formerly IEEE 472) Mains power input and relay contact outputs: 2.5 kV, Common Mode and Differential Mode. All other circuits: 1.0 kV, Common Mode and Differential Mode.

Table 1 - Field Selectable Input Actuations

	Range	
PV Input	**˚F**	**˚C**
Thermocouples		
B	150 to 3300	66 to 1815
E	-100 to 1832	-73 to 1000
E (low)	-100 to 1100	-73 to 593
J	0 to 1600	-18 to 871
J (low)	0 to 900	-18 to 482
K	0 to 2400	-18 to 1316
K (low)	-20 to 1000	-29 to 538
Nicrosil Nisil	0 to 2372	-17.8 to 1300
NiNiMoly (N)	32 to 2500	0 to 1371
R	0 to 3100	-18 to 1704
S	0 to 3100	-18 to 1704
T	-300 to 700	-184 to 371
T (low)	-80 to 500	-63 to 260
W5W26	0 to 4200	-18 to 2316
RTD (IEC)		
100 Ohm Pt.	-300 to 900	-184 to 482
100 Ohm Pt. (low)	0 to 300	-18 to 149
Radiamatic RH	1400 to 3400	760 to 1871
Linear		
Milliamps dc	4 to 20	*Linear Ranges not available on Limit Control Models*
Millivolts dc	0 to 10	
	0 to 100	
Volts dc	0 to 1	
	0 to 5	
	1 to 5	
	0 to 10	

Model Number Interpretation

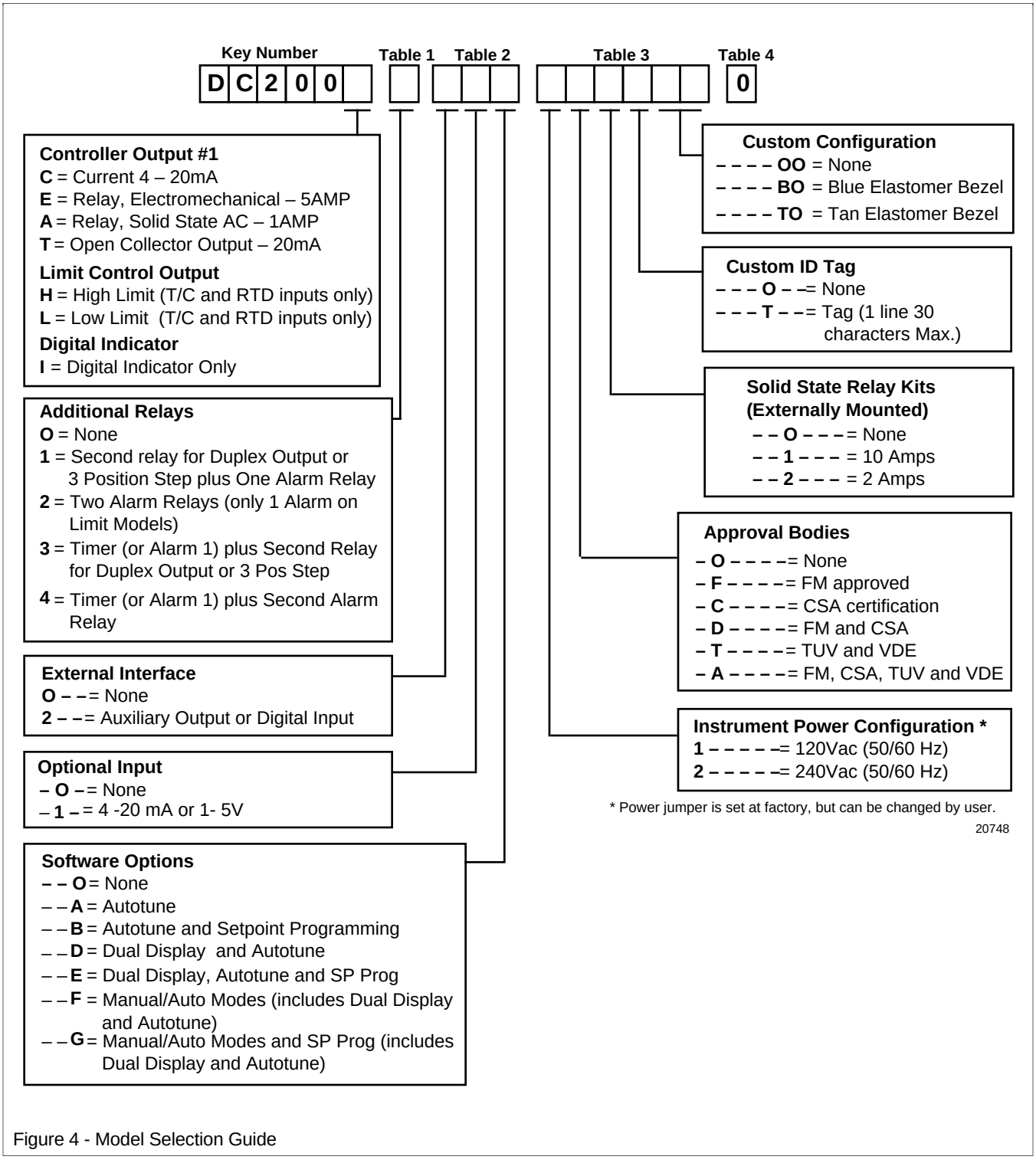

Figure 4 - Model Selection Guide

Dimensions

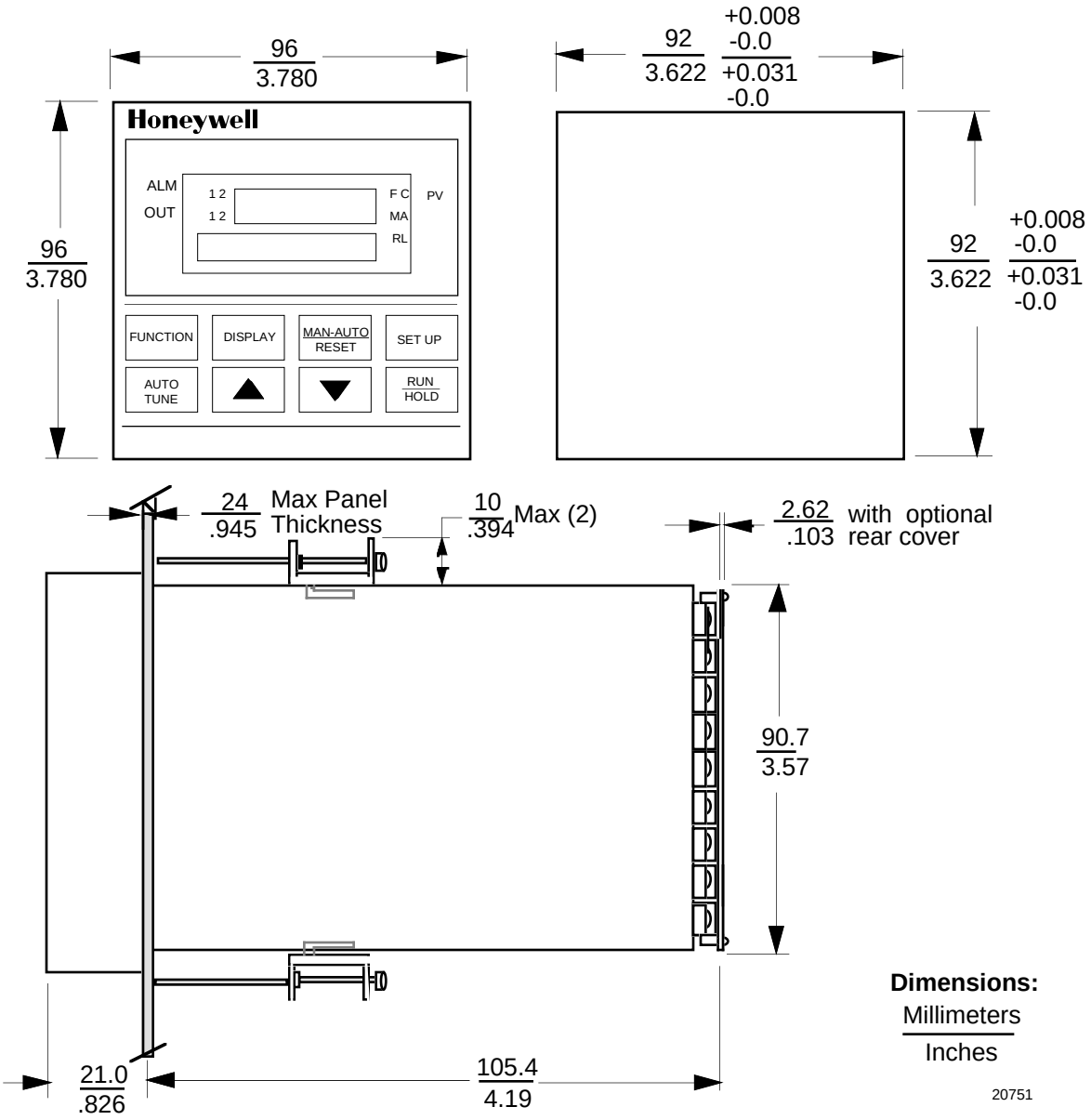

Figure 5 - UDC2000 Mini-Pro Controller dimensions - not to scale

Ordering Information

For the complete ordering information, request Model Selection Guide:
51-51-16-33 for UDC2000 Controller.

Honeywell offers a full line of Sensors, Transmitters, and Final Control Devices for use with the UDC2000 Controller. These devices include:
Thermocouples, RTDs
Digital Panel Indicator,
Pressure Transmitters,
Flow Transmitters,
Liquid Level Transmitters.
Valve, Actuators, and Electric Motors.

Specifications are subject to change without notice.

Distributor :

For more information, contact your nearest Honeywell Response Center listed below.

Industrial Automation and Control
Honeywell Inc.
In the U.S.A.: Honeywell Industrial Automation and Control, 1100 Virginia Drive., Ft. Washington, PA 19114, (800) 343-0228
In Europe: Honeywell S.A., 80084 Amiens Cedex 2, (33) 22.54.56.56
Honeywell Control System Ltd., Honeywell House, Bracknell, UK-RG 12 1 EB, (44) 1344 826000
In Japan: Yamatake-Honeywell Co. Ltd., Nagai Int'l Bldg., 2 - 12 - 19 Shibuya-Ku, Tokyo 150 Japan, 81-3-3486-2051
In Asia: Honeywell Asia Pacific Inc., Room 3213-3225, Sun Hung kai Centre, No. 30 Harbor Road, Wanchai, Hong Kong, (852) 829-8298
In the Mediterranean: Africa and Middle East Region, Honeywell SpA, Via Vittor Pisani 13, 20124 Milano, Italy (39-2) 67731
Honeywell Pacific Division: Honeywell Pty Ltd., 5 Thomas Holt Drive, North Ryde Sydney, NSW Australia 2113, (61-2) 353 7000
In Canada: The Honeywell centre, 155 Gordon Baker Road., Ontario M2H 3N7, 1-800-461-0013
In Latin America: Honeywell Inc.,14505 Commerce Way, Suite 500, Miami Lakes, Florida 33016-1556, (305) 364-2300