

DCP100 DIGITAL CONTROL PROGRAMMER

EN01-6028 12/99

PRODUCT SPECIFICATION SHEET

OVERVIEW

The DCP100 is a microprocessor based ¼ DIN programmer/controller for process variable versus time control of temperature, humidity, flow, pressure and other variables. Designed to meet a wide range of application needs, the DCP100 provides 0.25% accuracy, up to 7 digital outputs for event and time sequencing and 6 digital inputs for remote program selection and operation. Set up and operation is quick and easy with the specifically designed dedicated man-machine interface.

The DCP100 can store up to 8 programs, each of which can include up to 16 segments. You can join programs together and build profiles for complex applications. (up to 121 consecutive segments total).

FEATURES

High functionality at low cost

The DCP100 combines state-of-the-art technology at a very competitive price.

Easy to use

Three large displays and user friendly keys make the DCP100 easy to use. The message display guides you through the setup, configuration and operation.

Profile capability

The DCP100 can store up to 8 programs with 16 segments per program. These 128 segments can be configured as ramps, soaks, end of program or join to another program. To meet sophisticated profiling needs, «cycling», and «program link» feature are available. «Cycling» consists of repeating the whole program. The «program link» feature offers the possibility to link several programs and get a longer sequence.

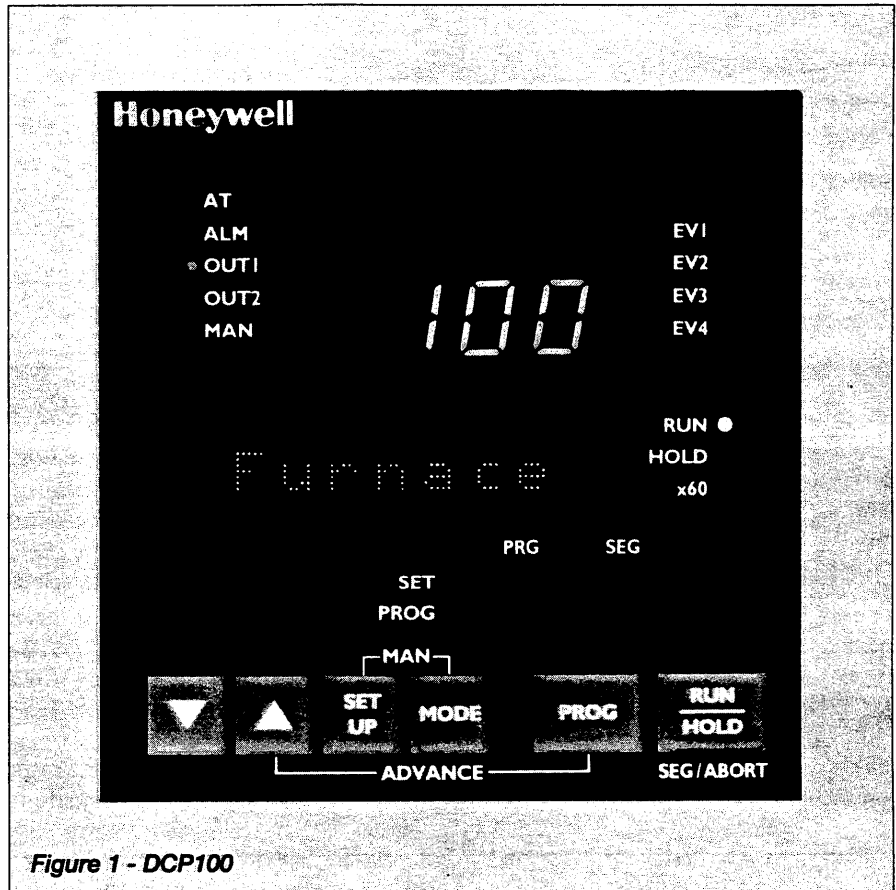


Figure 1 - DCP100

Guaranteed soak

The guaranteed soak facility ensures that your soak is completed over the timing you had specified. This function is also applicable on ramp or on both ramp and soak. You can define a band above and/or below the setpoint that will hold the program when the PV is outside of the band.

PV START

This function offers the possibility to define setpoint values at start of each program. It could be either the current controller setpoint value (LSP) or the current process variable value (PV).

Power failure recovery

For critical application, the DCP100 allows you to select the response after a power failure. The restoration mode

could be either a cold start (return to Local Setpoint) or a hot start (resume from the point where power failed).

PC Configuration and profile editor

Software has been developed to configure the DCP100 through its internal communication port. Through the profile editor, you can simply draw profiles, you can save them in your PC, and you can download them to the DCP.

Any programs can be labeled and the name will be displayed in the front of the DCP (message display).

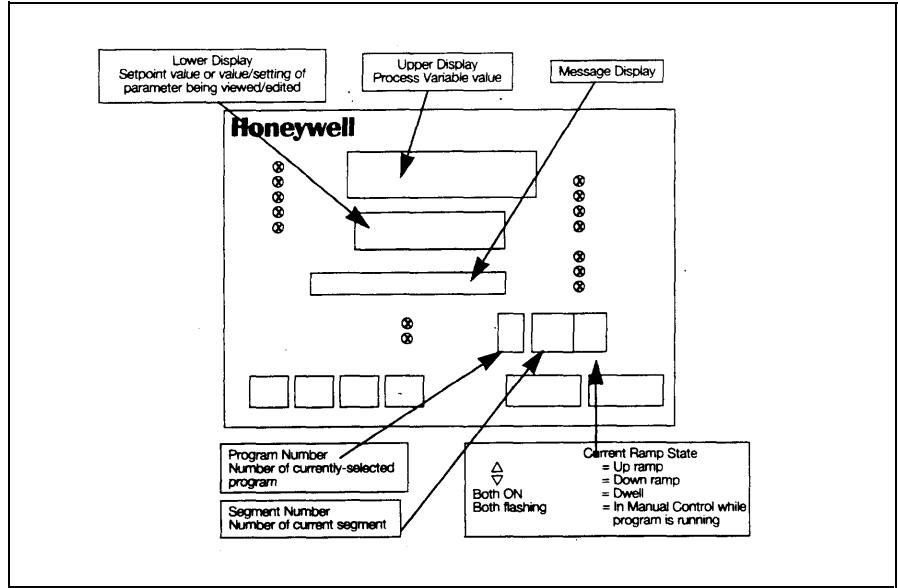
Real Time Clock

Any program can start at a certain predetermined time on a certain day of the week.

OPTIONAL FEATURES

The following can be selected via the model selection guide (see page 9).

- Output 2 (Relay, SSR driver, linear)
- Output 3 (Relay, SSR driver, linear)
- RS485 ASCII Communication
- Low voltage power supply (24 to 48 Vac/dc)
- Events outputs (4 relays)
- Remote program control (6 dry contact inputs)
- Real Time Clock



Operator Interface (LED)

- ❖ AT
- ❖ ALM
- ❖ OUT 1
- ❖ OUT 2
- ❖ MAN

Control Status Indicators

AT - ON when Self-Tune is active; flashes when Pre-Tune is active.
 ALM - Flashes when any alarm is active.
 OUT1 - ON when primary control output is active.
 OUT2 - ON when secondary control output (if fitted) is active.
 MAN - ON when Manual Control is selected.

- RUN ❖
- HOLD ❖
- x60 ❖

Run Status Indicators

RUN : ON - Program running or (If HLD ON also) held - Flashing - Program in Delayed state
 HLD: ON - Program held - Flashing - Program in Auto-Hold
 x60 : OFF - timebase = hours/minutes -ON - timebase = minutes/seconds

- EV1 ❖
- EV2 ❖
- EV3 ❖
- EV4 ❖

Event Indicators

Each indicates the status (active or inactive) of a user-defined event (OFF = inactive, ON = active).

- SET ❖
- PRG ❖

Mode Indicators

SET - ON when Controller Define Mode or Program Define Mode is entered; flashes when viewing parameters in Controller Define Mode or Program Define Mode after entry from Base Mode.
 PRG - ON when Program Define Mode is entered.

Key Functions

MODE

MODE Key

Changes mode of instrument

PROG

Program Key

Cycles through Program Numbers

SETUP

Set Up Key

Displays the next parameters in sequence
(indicated by Message display)

RUN
HOLD

Run/Hold Key

Runs, holds or aborts current program



Down Key

Decrements displayed parameter
value/cycles through options



Up Key

Increments displayed parameter
value/cycles through options



+

MODE

Selects/de-selects Self-Tune and
Pre-Tune (when Message Display shows
appropriate message)



+

PROG

Jumps to next segment, when a
program is running

SETUP

+

MODE

Selects/de-selects Manual Control



+



Sets a segment to soak when
defining a program

PHYSICAL DESCRIPTION

The DCP100 is a 1/4 DIN (96 x 96 mm) programmer/controller housed in a 100 mm (4.33 in) deep case. By using the mounting bracket that comes with the unit, you can easily install the programmer into a 1/4 DIN panel cutout. The modular plug-in construction allows easy upgradability, rapid access and saves time. All inputs and outputs are connected on the terminal block with screws.

UNIVERSAL INPUT

Accepts several types of thermocouples, RTDs, current and linear voltage inputs. All inputs are configurable through keyboard and jumper selections. A configurable digital filter is available from 0.5 sec to 100.0 sec.

UNIVERSAL POWER SUPPLY

The DCP100 can operate at any line voltage from 90 Vac to 264 Vac at 50/60 Hz continuously. A 24/48 Vac/dc model is also available as an option.

OUTPUT ALGORITHMS

The DCP100 is available with the following output algorithms:

- Time proportional ON/OFF or time proportional with electromechanical Relay SPDT 2A or SSR driver (open collector)
- Current proportional: Supply directly proportional current or volt signal to the final control elements which require 0-10 V, 0-5 V or 4-20 mA, 0-20 mA.
- Time Proportional Duplex: Two different modes can be selected, either ON-OFF duplex or time proportional duplex (heat/cool with 2 proportional bands), two cycle times and dead band.
- 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 algorithm: Three control algorithms can be set up through the configuration menu:
 - ON-OFF PID PD + MR
- TPSC: Three Position Step Control (TPSC) provides floating control of a valve or other final control element with an electric motor driven by two output control relays (Out 1 and Out 2) without using a feedback slidewire linked to the motor shaft. Relay Out 1 drives the motor upscale, and Relay Out 2 drives the motor downscale.

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. In order to detect a defective control loop, the programmer controller can apply a special loop alarm or heater break alarm by continually monitoring the PV response to output demand. A timer is automatically set when any output is in saturation mode. For PID control, when the timer reaches twice the reset time with no change in PV, the alarm is activated. For ON/OFF control, the loop alarm time is user-definable. This heater break alarm saves wiring, time and cost.

A specific relay is provided (standard) to indicate the end of program.

DIGITAL INPUTS

(optional board)

Six dry contact digital inputs provide facilities for remote program selection and Run/Hold/Abort/x60 operation.

DIGITAL OUTPUTS

(optional board)

In addition to the 2 Alarm Relays assigned to the PV, deviation and band alarms, the DCP100 offers 4 additional event outputs relative to the time scale. The state of each event output can be user-defined for each segment.

COMMUNICATION

(optional board)

The DCP100 can be equipped with a serial ASCII communication interface. The selectable rates are 1200, 2400, 4800, or 9600 baud. A specific master communication mode can be selected in order to automatically send the current program setpoint to each (up to 32) slave instruments (like the UDC1000/1500 or DCP100 in slave mode). The Master unit will detect all connected slave instruments and will automatically skip addresses with no instrument connected. This specific Master/Slave communication mode updates all setpoint devices 10 times per second at 9600 baud or 5 times per second at 4800 baud.

RS485 Modbus™ RTU Communications

The Modbus communication protocol supports Function Codes 01, 02, 03, 04, 05, 06, 08, and 16. Up to 32 addresses can be configured on one master/slave link. Available baud rates are 1200, 2400, 4800, or 9600. The multi-parameter Read function supports a maximum of 10 parameters per message. The multi-parameter Write function support is limited to Function Code 16 and permits only one parameter write per message. This new Modbus communication option also provides RS485 ASCII serial communication. The user can enable either Modbus or RS485 ASCII from the keypad during configuration and set-up of the device.

SPECIFICATIONS

Technical Data

Program facility	N° of programs	8 programs cascadable
	N° of segments	16 segments per program
	Total N° of segments	128 segments free format (max. length :121 segments)
	Segment type	RAMP, SOAK, JOIN, REPEAT and END
	Program cycling	1 to 9999
	Delayed start	0 to 99:59 (hours: minutes)
	Segment time	0 to 99:59 (hours: minutes or minutes: seconds)
	Ramp-rate	1 to 9999 per hour or per minute
	Guaranteed SOAK	OFF, below or above setpoint both applicable on SOAK, RAMP or both from 1 to input span
	START Mode	From current process variable or controller Set point value
	END Mode	To final programmer setpoint or controller setpoint
	Control Mode	RUN, HOLD, ABORT, X60 (local or remote) Select program (local or remote) Jump to next segment
	Input	Accuracy
T° Stability		0.01 % of span per °C
Sampling Rate		Four samples per second
Input Filter		Digital filter configurable from front panel. 0.0(OFF), from 0.5 s to 100.0 seconds in 0.5 s increment
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
Input Signal Failure		- For thermocouple, detected by any lead break within 2 seconds control output set to OFF (0%), upscale burnout - For RTD, detected by any lead break within 2 seconds control output set to OFF (0%), downscale burnout - For DC linear: 4-20 mA, 1-5 V and 2-10 V only detected within 2 seconds control output set to OFF (0%), downscale burnout
Input impedance		Volt: 47 Kohms Current: 4.7 ohms Others: 100 Mohms
Stray rejection	Common Mode	>120 dB at 50/60 Hz giving negligible effect at up to 264 Vac 50/60 Hz
	Serial Mode	>500 % of Span (at 50/60 Hz) causes negligible effect
Control	Output type	<i>Type available:</i> Output 1: DC, Electromechanical relay, SSR drive (open collector) Output 2: DC, Electromechanical relay, SSR drive (open collector) Output 3: DC (transmission output only), Electromechanical relay, SSR drive (open collector) <i>DC output:</i> 4-20 mA Accuracy: \pm 0.5% (250 ohms for mA, 2 kohms for Volt) Resolution :8 bits in 250 ms (10 bits in 1 second typical> 10 bits in >1 second) Load impedance: 500 ohms max. for current output Isolation: isolated 2500 V from all other inputs and outputs Range selection method : jumper positioning and front panel code setting Temperature stability: 0.01 % / °C

Technical Data (continued)

Control	Output types	<i>Electromechanical relay:</i> SPDT contact Resistive load: 2 A at 120 V or 240 V Life time: > 500000 operations at rated voltage/current <i>SSR drive/TTL:</i> Drive capability: SSR > 4.3 Vdc into 250 ohms minimum Isolation: not isolated from input and other SSR output	
	Output algorithm	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 s to 99 min 59 s Rate: From 0 to 99 min 59 s Manual reset: From 0 to 100 % of output (single output), from -100 % to 100 % of output (dual output) Deadband: ± 20 % of PB1 + PB2 ON/OFF hysteresis: 0.1 % to 10.0 % of input span Auto/Manual mode: User selectable with bumpless transfer between automatic and manual mode Cycle times: Up to two cycle times available for time duplex control Selection: 0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256, or 512 seconds	
Remote Program Control	No. of inputs	6 contacts voltage-free or TTL compatible	
	Program selection	3 contacts binary coded (2^0 , 2^1 , 2^2)	
	Program control	3 contacts RUN/HOLD, x60, ABORT	
Time Event Output	No. of outputs	4 relays (SPDT) 5 A resistive load (120/240 Vac)	
	Triggering cause	Time EVENT programmable to either OFF or ON for each segment	
End of Program	Output type	1 relay SPDT 5 A resistive load (120/240 Vac)	
Alarm Control	No. of alarms	2 soft alarms setpoint + 1 loop alarm	
	Output type	Up to two relays or SSR output on outputs 2 and 3	
	Alarm type	PV high or low, band, deviation high or low, loop	
	Combination	Logical "OR" or "AND" of alarms to an individual hardware	
Retransmission	Output type	Current or Volt output of output 3 can be selected to retransmit the process variable or setpoint.	
Communication	Protocol	RS485 ASCII Half Duplex	RS485 Modbus™ RTU
	Baud rate	1200, 2400, 4800, 9600 baud	1200, 2400, 4800, 9600 baud
	Link characteristics	32 drop maximum (2 wires)	32 drop maximum (2 wires)
	Data format	Even parity, 7 data bits and 1 stop bit	Parity selectable (none or even), 8 data bits and 1 stop bit
	Mode	Slave or Master	Slave or Master
Physical	Dimension	Depth: 100 mm/3.94 in Height: 96 mm/3.78 in Width: 96 mm/3.78 in	
	Weight	210 grams maximum	
	Cut out	92 x 92 mm/3.62 x 3.62 in Plug-in with panel mounting fixing strap	
	Terminals	Screw type (combination head)	
Front Panel	Sealing	IP65/NEMA 3	
Power	Type	90-264 Vac 50/60 Hz 20-50 Vac 50/60 Hz or 22-65 Vdc (option)	
	Consumption	4 watts	
Environmental	EMI susceptibility	Designed to meet EN50082-1: 1992 and EN50082-2: 1995	
	EMI Emissions	Designed to meet EN50081-1: 1992 and EN50081-2: 1994	
	Safety	Designed to comply with EN61010-1: 1993	
Approval	Europe	CE Mark Conformity with 72/23/EEC / Low voltage directive Conformity with 89/336/EEC / EMC directive	

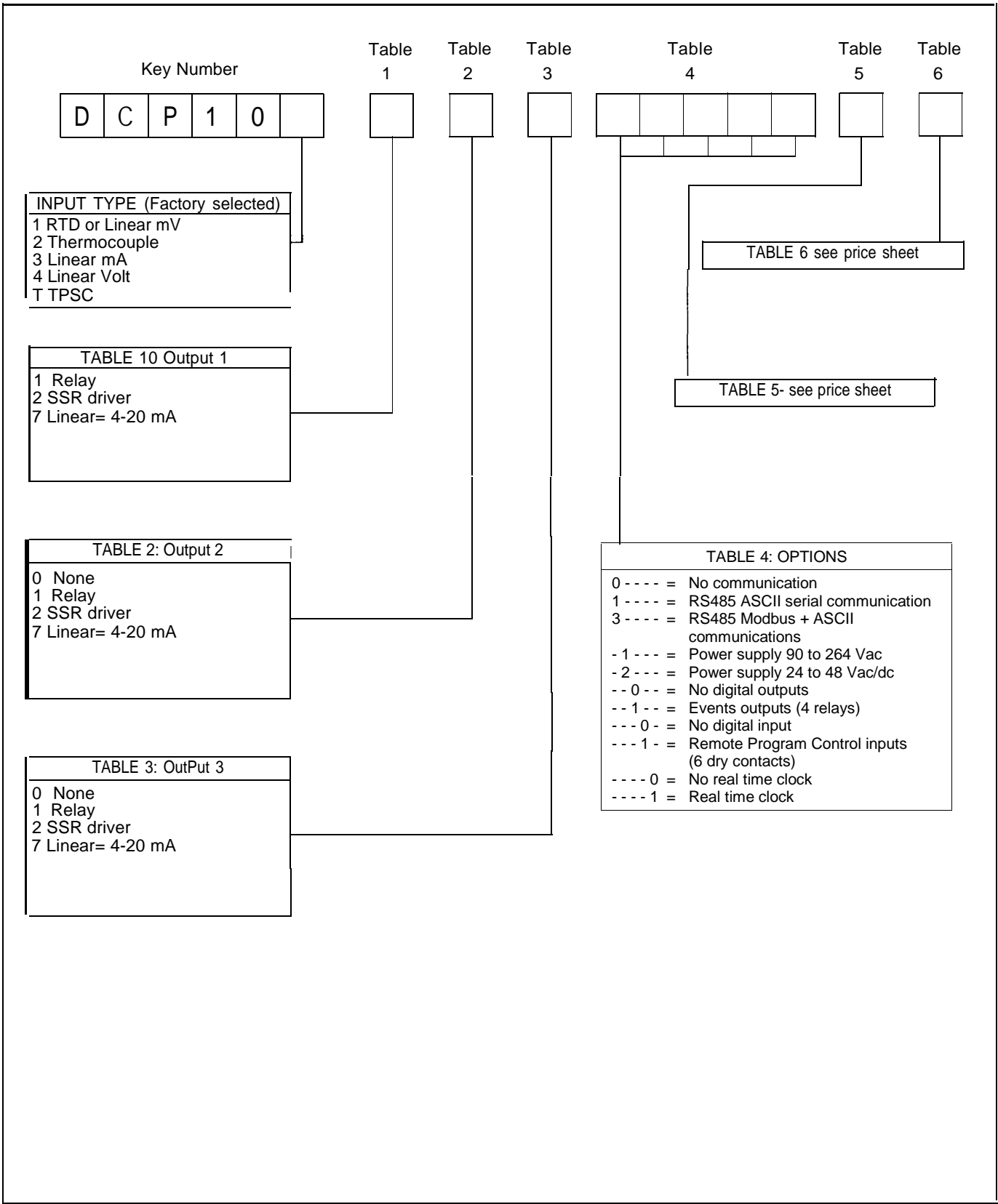
Input Actuations

		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	0.0- 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) (= 0.00385 (Fixed decimal)			
		32-1471	0-800
		32-571	0-300
		-149.7 -211.9	-100.9-100.00
		32-213.6	0.0- 100.9
		-328-402	-200-206
		-149.7 -999.1	-100.9 -537.3
DC linear: (Decimal point location configurable up to three places)			
		10-50mV	0-50mV
		4-20mA	0-20mA
		1-5V	0-5V
		2-10V	0-10v

Operating Conditions

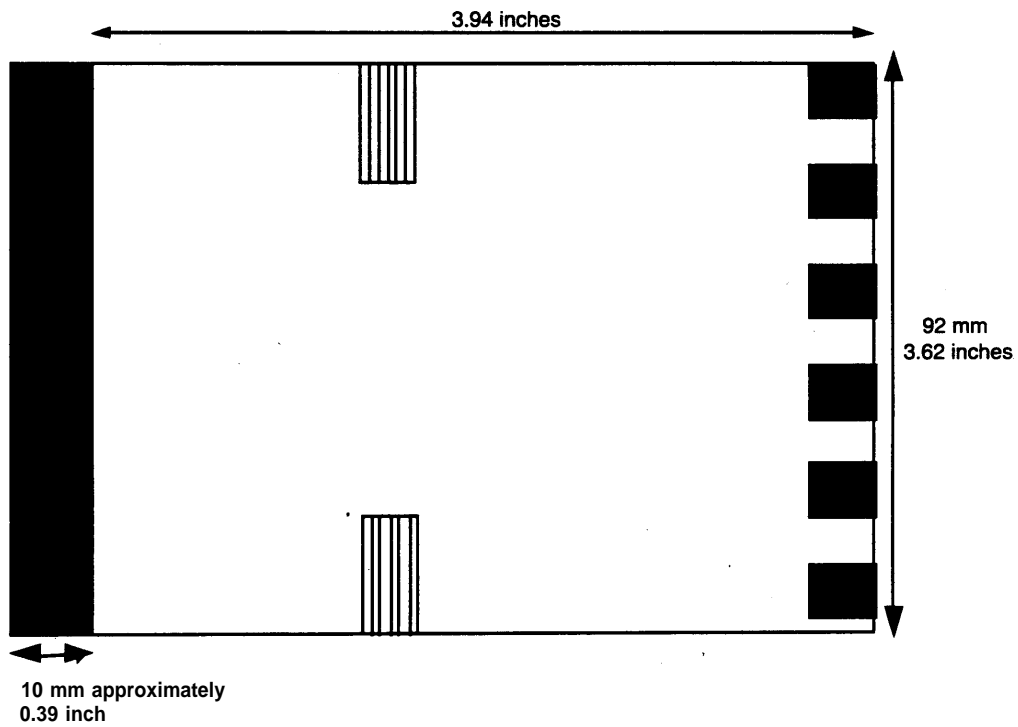
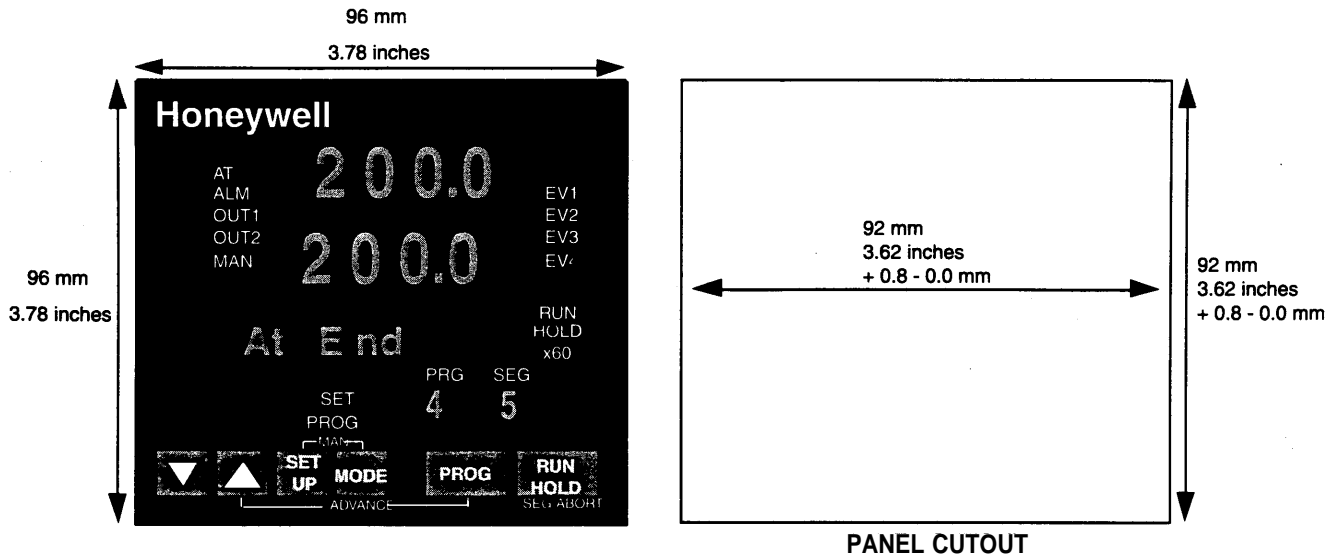
	Reference Conditions	Operative Limits	Transportation and Storage
Ambient temperature	2°C ± °C (68°F ± 4°F)	0°C to 5°C (32°F to 131°F)	-20° to 80° (-4°F to 176°F)
Relative Humidity	60-70%	20-95% non -condensing	
Voltage	90-264 Vac ± 1%	90-264 Vac 20-50 Vac or 22-65 Vdc	
Frequency	50 Hz	50-60 Hz	
Source resistance	<10 ohms for thermocouple	1000 ohms max for thermocouple	
Lead resistance for RTD	<0.1 ohm/lead (PT100)	50 ohms per lead maximum balanced (PT100)	

Model Selection Guide

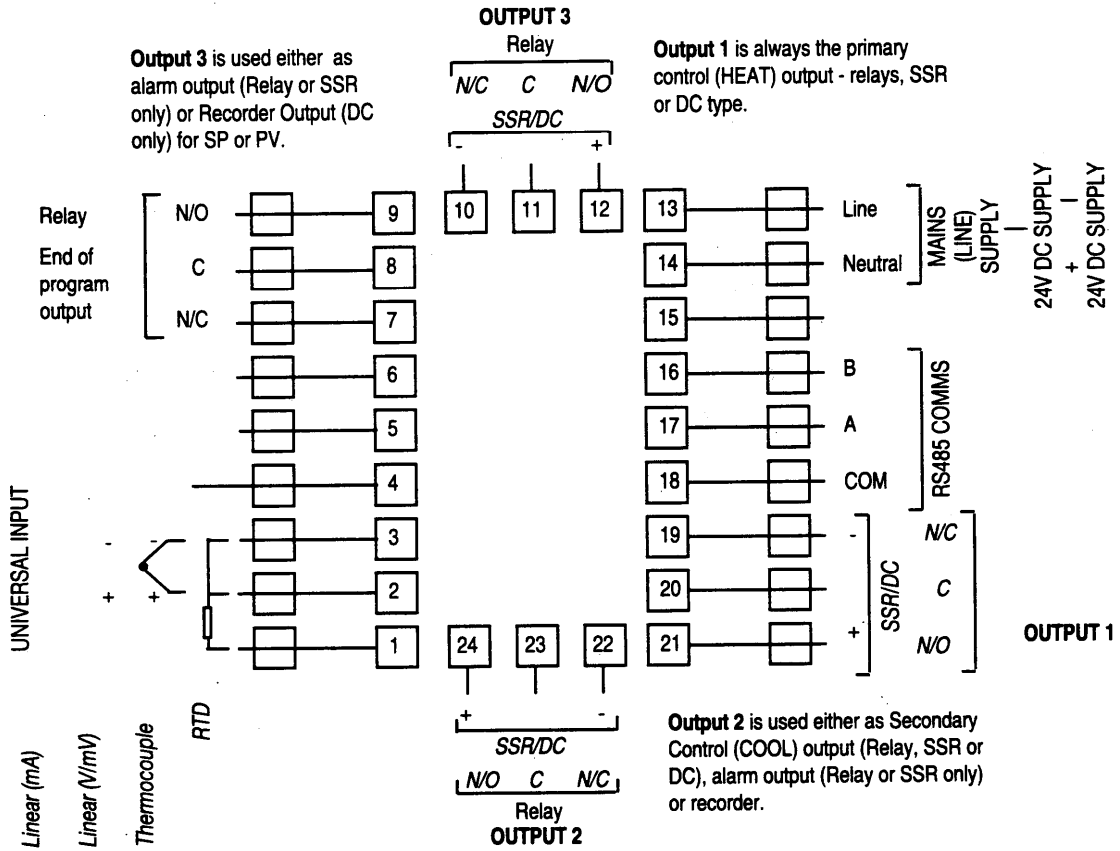


EXTERNAL DIMENSIONS AND PANEL CUTOUT

DCP100



WIRING DIAGRAMS



WIRING DIAGRAMS (continued)

