

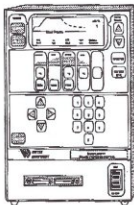
User's Manual
990-227
Revision A: October 1998



UNIFLOW™ PULSED THERMODE CONTROL (BIPOLAR LOGIC)

Including

<u>Model</u>	<u>Model</u>
1-290-01	1-291-02
1-290-01-02	1-291-02-02
1-290-01-03	1-291-02-03



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CHAPTER 2

SYSTEM DESCRIPTION

In general, a Uniflow joining system includes five elements:

- Parts to be joined.
- Uniflow Control (power supply), which controls the application of heat.
- Thermode, which generates and applies pulsed heat for joining the parts.
- Reflow solder head or heat seal head, which carries the thermode into contact with the parts to be joined.
- Tooling nest, which aligns the parts to be joined with the thermode.

Uniflow Control

The Uniflow[®] Pulsed Thermode Control (Figure 2-1) is a power supply designed for reflow soldering or heat sealing electronic interconnections using a precisely controlled temperature profile.

Reflow soldering is a multi-step metal joining process where:

1. Two solder-coated parts are brought into intimate contact, using a preset force.
2. The temperature of the two parts is raised to a preheat temperature for a preset time to activate the pre-applied flux. The flux removes the surface oxides from the solder-plated parts.

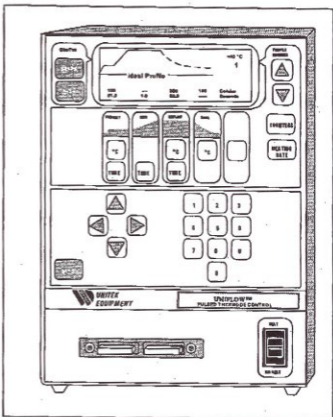


Figure 2-1. Uniflow[™] Pulsed Thermode Control

UNIFRONT.WPG

Uniflow Control (continued)

- The temperature is then raised to the reflow temperature for a pre-set time to melt the solder between the parts.
- Cooling is then initiated to allow the solder to solidify.
- Upon reaching the pre-set cool temperature, the reflow head can be retracted, removing force from the parts.

The design of the Uniflow Control is directed toward compactness, reliability, safety and simplicity, and ease of repair. The operator is coached by simple statements displayed on a screen if out-of-range entries are made, or when alarm/error conditions occur. Up to 15 heat profiles (the records containing the joining parameters to be used during the joining cycles) can be programmed, stored, and recalled for use.

Uniflow Control Models

The standard model of the Uniflow Control, as illustrated in Figure 2-1, has a front panel with controls and a display for operator control of the Uniflow Control. Optionally, a model with a blank front panel is available that can be controlled remotely by a host computer through digital data interface ports on the rear panel. Refer to Table 2-1 for the list of Uniflow Control models and their applications.

Front Panel Control. The local operator control interface – the front panel – has simplified key clusters and on-screen data fields for programming the Uniflow Control. The SETUP MENU screen (Figure 2-2) allows you to select all of the system setup options for the Uniflow Control, and for working with inputs from external equipment.

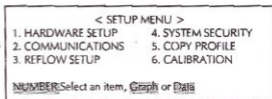
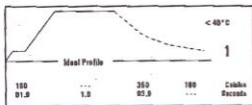


Figure 2-2. SETUP MENU Screen



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Figure 2-3. Graphics Screen

The graphic screen (Figure 2-3) allows you to easily modify any time period or temperature value with the front panel data editing keys. The screen also provides an instant visual profile for the last joining cycle.

Uniflow Control Models (continued)

Table 2-1. Uniflow Control Models

Model/Part No.	Type of Operation	Ac Input Voltage	Output Heating Capability
1-290-01	Remote. No front panel controls or display. Programmed and controlled by a remote host computer through a digital interface port on the rear panel.	120	2 KVA. For thermodes up to 2.3 in. (60 mm) long.
1-291-02	Front panel or remote. Has front panel controls and display for local operator programming, and a digital interface port on the rear panel for programmed control by a host computer.		
1-290-01-02	Remote. No front panel controls or display. Programmed and controlled by a remote host computer through a digital interface port on the rear panel.	240	2 KVA. For thermodes up to 2.3 in. (60 mm) long.
1-291-02-02	Front panel or remote. Has front panel controls and display for local operator programming, and a digital interface port on the rear panel for programmed control by a host computer.		
1-290-01-03	Remote. No front panel controls or display. Programmed and controlled by a remote host computer through a digital interface port on the rear panel.	240	4 KVA. For thermodes up to 4 in. (100 mm) long.
1-291-02-03	Front panel or remote. Has front panel controls and display for local operator programming, and a digital interface port on the rear panel for programmed control by a host computer.		

CHAPTER 2: SYSTEM DESCRIPTION

Uniflow Control Models (continued)

The data screen (Figure 2-4), which is updated automatically after each joining cycle, displays the joining cycle parameters in numeric format. When enabled, it also displays important information about the state of the thermode: whether to clean it or replace it.

TEMPERATURE:	Thermode = < 40°C	
Peak = 353°C	Final = 349°C	Average = 350°C
TIME: (Seconds)	Preheat = 01.0	Rise = 01.0
Heat = 03.0	Cool = 05.9	Total = 010.9
Profile: 2	RATE: Medium	Energy: 98%
	System Ready	
Reflows before cleaning		= 0000100
Reflows before replacement		= 0000500

Figure 2-4. Data Screen

Remote Control. Remote control of the Uniflow Control is accomplished through an RS-485 digital communications link, with ports on the rear panel. Through this link, joining profiles can be selected and operating modes set by an external host computer or a PLC (programmed logic controller). An RS-232 digital communications port on the rear panel can be used to record performance information on a PC. Please refer to Unitek Equipment Manual PN 990-341 for details of the data links.

System Variations and Extensions

Typical extended systems are shown in Figures 2-5 and 2-6.

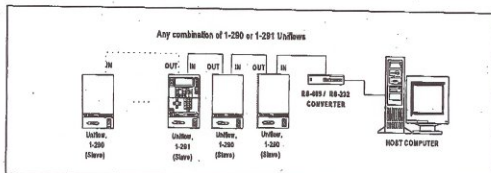


Figure 2-5. RS-485 Communication

8D46GLK WPO

System Variations and Extensions (continued)

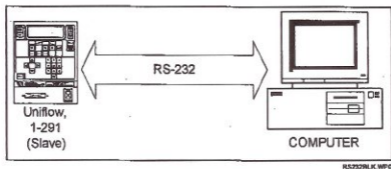


Figure 2-6. RS-232 Communication

Heads, Thermodes and Accessories

For details of solder reflow and heat seal heads, thermodes and accessories available from Unitek Equipment, please refer to the manual titled, *Applying Process Control to Pulse Heated Reflow Soldering*, Part No. 990-230.

APPENDIX A: TECHNICAL SPECIFICATIONS

ELECTRICAL MAINS

Ac Voltage Ranges:

Models 1-290-01, 1-291-02	90 to 132 Vac
Models 1-290-01-02, 1-290-01-03, 1-291-02-02, 1-291-02-03	180 to 264 Vac

Line Frequency 50 or 60 Hz

Line Phase Single

Input Circuit Breaker Rating 15 A

Power Cord Connection European CE Harmonized Wiring Code,
or NEMA Wiring Code

ENVIRONMENT

Location Indoor Use

Ambient Temperature:

Maximum	40°C (104°F)
Minimum	15°C (59°F)

Relative Humidity, Maximum 93% at 40°C (104°F)

DIMENSIONS

Height × Width × Depth 12.5 in. (317 mm) × 10 in. (254 mm) × 20.75 in. (527 mm)

Weight:

4 KVA Models	58 lbs (26.31 kg)
2 KVA Models	46 lbs (20.86 kg)

PERFORMANCE

User Programmable Heat Profiles 15

Heat Profile Memory Backup Replaceable Lithium Battery
(10 year minimum life)

APPENDIX A: TECHNICAL SPECIFICATIONS

PERFORMANCE (continued)

Thermocouple Inputs (automatic recognition):

Type E	For temperatures below 900°C
Type J	For temperatures below 750°C
Type K	For temperatures below 1000°C

Thermocouple Calibration

Input Standards	User provided NIST standard (separate calibration required for each thermocouple type)
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Temperature Control

Accuracy:

600°C and below	$\pm 6^\circ\text{C}$ or $\pm 2\%$ of reading, whichever is greater
Above 600°C	$\pm 3\%$ of reading

Repeatability	$\pm 1\%$ of setting
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Display Range	40°C to 1,000°C
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Settings:

Preheat	60° to 300°C
Reflow (default)	60° to 600°C
Reflow (extended mode operation)	60° to 999°C

Periods:

Preheat	0 to 99.9 seconds
Rise	0.0 to 9.9 seconds
Reflow	0.1 to 99.9 seconds

Heating Rate Control

Coarse	Fast, medium, slow, very slow
Fine	0 to 98%

SWITCHED INPUT ELECTRICAL REQUIREMENTS

Form and Rating	Switch or sensor inputs must be normally open SPST switches, transistors or opto-isolators rated at 24 VDC, 20 MA minimum
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APPENDIX A: TECHNICAL SPECIFICATIONS

SWITCHED INPUT ELECTRICAL REQUIREMENTS (continued)

Heat Profile Select	Select 15 heat profiles using four inputs activated in a binary coded pattern
Operator Initiation Switch	1-level or 2-level foot switch
Heat Initiation Sensor	Heat force or Uniflow head down sensor for initiating thermode heating
No Heat Switch	Heat only inhibit
Emergency Stop (CE Requirement)	SPST switch open to remove valve driver power and retract head

ANALOG INPUTS

Thermocouple	E, J, or K type
Thermocouple Extension Cables, Omega Standard:	
Type E, Unitek PN 10-355-01	60 in. (152.4 cm)
Type J, Unitek PN 10-355-01-01	60 in. (152.4 cm)
Type K, Unitek PN 10-355-01-02	60 in. (152.4 cm)

OUTPUTS

Audible Alarm	Buzzer, duration and volume adjustable
Amplified Thermocouple Signal Range	See Appendix C
Coarse Heating Output Voltage (nominal) at 120 VRMS or 240 VRMS transformer primary voltage and 98% Fine Heating Rate:	
Fast	3.81 VAC
Medium	1.90 VAC
Slow	1.27 VAC
Very Slow	0.95 VAC

APPENDIX A: TECHNICAL SPECIFICATIONS

OUTPUTS (continued)

Course Heating Output Power (nominal):

Models 1-290-01, 1-290-01-02, 1-291-02, 1-291-02-02	2.0 KVA
Models 1-290-01-03, 1-291-02-03	4.0 KVA

Solid State Relays:

Power (Uniflow control provided)	24 VAC or +24 VDC
Contact Rating	24 VAC/24 VDC, 0.3 A
Head Cool Valve	ON/OFF for cooling thermode holder
Solder Cool Valve	ON at COOL period, OFF at PREHEAT period

Programmable Electromechanical Relays:

Relays Available	4
Power	User provided
Contact Rating	5 A at 250 Vac or 30 VDC

Programmable Electromechanical Relays Functions:

Reflow	On/Off during heating process cycle
Preheat	On/Off for continuous preheat
Alarm	On/Off for any alarm condition
Clean Thermode	On/Off when clean thermode counter expires
Replace Thermode	On/Off when replace thermode counter expires
End of Reflow	On/Off when heating process cycle is complete
Head is Up	On/Off when reflow head is in home position
System Ready	On/Off when Uniflow Control is ready for reflow operation
Output Timing	See Appendix B

RS-232/RS-485 DATACOM

Refer to Manual 990-341

FRONT PANEL SWITCHES

User Interface Buttons	27 membrane keys
HEAT/NO HEAT Switch	Heat only inhibit

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