

OWNER'S MANUAL
for
Equipment Serial #BSM-2

*Model #TFF142-8-90A24 Furnace
with PC DIU Controller*



BTU International, Inc.

23 Esquire Road, N. Billerica, MA 01862 U.S.A.
Telephone: (508) 667-4111, Facsimile: (508) 667-9068
24-Hour Assistance: 1-800-998-0666

MANUFACTURED FOR:
Cooper Industries Inc., Bussman Division
Ruck Road at Manchester
Ellisville, Missouri 63021

BTU Sales Order #MN4176

Your Custom Furnace Specifications

The following list shows all of the specialized items (or selectable items) that you purchased for your TFF furnace.

- Electrical: 240V, 50/60Hz, 3 Phase
- Optional Separation Joint for Max Shipping Length of 10' 6"
- Optional Profiling Thermocouple, Ceramic Bead 20' Long
- Optional Panasonic Color Printer

Standard Furnace Specifications

The following specifications are standard, generic specifications for the TFF furnace. Most of these specifications pertain to your specific furnace, however, your furnace options and custom specifications supercede these standard specifications where necessary.

The TFF furnace is a continuous conveyor furnace used for thick film firing and other processes requiring air operation up to 1000°C. Open chamber design allows for rapid heat up and unlimited cycling.

Fully enclosed coil (FEC) heaters are manufactured by BTU utilizing iron, chrome, aluminum alloy coil enclosed in ceramic fiber plates. Heaters are located in the top and bottom of the process chamber.

Furnace Specifications

Maximum Temperature Rating	1050°C
Operating Temperature	200–1000°C
Number of Controlled Heated Zones	8
Belt Working Width	14"
Product Clearance Above Belt	2"
Heated Length	90"
Belt Height Above the Floor	36"
Furnace Atmosphere	Air

Furnace Layout

The system dimensions for your specific furnace are as follows:

Load Table	24"
Entrance with Air Curtain, Baffle Assembly	18"
and Venturi-Controlled Exhaust	
Zone #1	9"
Shadow Wall	1"
Zone #2 with Venturi Exhaust Stack	9"
Shadow Wall	1"
Zone #3	9"
Zone #4	9"
Zone #5	18"
Zone #6	18"
Shadow Wall	1"
Zone #7	9"
Shadow Wall	1"
Zone #8	9"
Insulated Cooling Section with Separation Joint	11"
Free Cooling Section	15"
Exit with Air Curtain and Baffle Assembly	18"
Unload Table	24"
Approximate Total Overall Length of Furnace	170"

Conveyor System

Belt Type, Material	Nichrome V Mesh
Belt Type, Width	14"
Belt Speed, Range	1-6 IPM
Suggested Belt Design Speed (30-Minute Profile)	4 IPM
Suggested Belt Design Speed (60-Minute Profile)	1.7 IPM
Belt Loading	1 lb/ft ²
Belt Speed Control	Programmable with the Microprocessor in IPM

The belt speed is programmable through the microprocessor in either English or Metric units.

Range of speeds specified refers to the adjustability of the belt speed only and does not imply compliance with the load and temperature requirements over the entire range of belt speed adjustability.

Belt deviation detection is via programmable deviation alarms.

Redundant belt stop detection is through an alarm.

Cooling

Case cooling exhaust fans maintain a comfortable exterior panel temperature. The spent process exhaust may be removed from the building by a separate exhaust duct system (see *Checking the Furnace Exhaust Requirements* in Section 3 – System Installation).

Product cooling is accomplished by natural free air cooling section consisting of an stainless steel muffle.

System Controls

Temperature Controls

Each zone is controlled by the following items:

- 1 Temperature control loop of the microprocessor control system
- 1 Type “K” thermocouple
- 1 Solid state relay

Overtemperature Protection

An independent, factory set overtemperature protection instrument provides protection of each zone in the event of an overtemperature condition. This instrument is isolated from the furnace control microprocessor to provide redundant protection.

In the event of an overtemperature condition, power to the heaters is removed and an audible alarm sounds. The conveyor continues to operate in this condition.

The overheat system is required to validate heater warranty.

Control Features

Controls are located on the right hand side of the furnace, as viewed from the furnace entrance.

Temperature Control Accuracy ±0.5
 Cross Belt Temperature Uniformity ±2

The system includes three thermocouple ports mounted at the furnace entrance. These ports connect to the microprocessor so that profiling thermocouples can be connected and used with the profile software to capture, display, print, and store profiles.

Emergency power off buttons are provided at the tops of the loading and unloading tables.

The PC DIU Controller and Software Package

BTU's PC DIU personal computer and software package provide for full temperature, conveyor speed, monitoring and setpoint, profiling, and recipe storage.

Your computer control system includes the following items:

- A high resolution VGA 14 inch color monitor
- MS-DOS operating system, 4 meg main memory, 120MB internal hard drive, one 3-1/2" high density floppy drive, two RS-232 serial ports, and one parallel port
- TFF furnace software program (preloaded), including a backup program stored on a 3-1/2 inch floppy disk (located in the back cover of one of your Owner's Manuals)
- Recipe storage for over 1000 recipes
- RS-232 interface capability for remote host computer operation

The computer is located on a swing arm at the exit end of the furnace.

Atmosphere Control System

The firing section atmosphere is introduced at the cooling section and flows counter to product travel. Venturi exhaust stacks in the entrance and zone 1 aid in the removal of exhaust gases.

The furnace is usually provided with 6 flowmeters for operating in air as follows:

NOTE

If the furnace is configured with optional mass flow controllers, some flowmeters may be omitted.

- 1 ... Entrance Curtain
- 1 ... Entrance Venturi Exhaust
- 1 ... Burnout Section Atmosphere
- 1 ... Burnout Section Venturi Exhaust
- 1 ... Furnace Atmosphere
- 1 ... Exit Curtain

Gas Sample Ports

Gas sample ports are designed for gas tight furnaces and are not available for an air type TFF furnace.

Process Gas

The process gas in an air type TFF furnace is only designed for air. It cannot be retrofitted as a gas tight furnace.

Electrical Specifications

The heater power listed below is approximate and should not be used for design purposes. Actual loading (KVA) is determined when the system is configured for the power supply at the purchaser's site (see the Furnace Installation Drawing).

Approximate Heater Power	35 KW
Voltage Options	480V, 3Ø, 3-Wire, 50/60 Hz
.....	440V, 3Ø, 3-Wire, 50/60 Hz
.....	240V, 3Ø, 3-Wire, 50/60 Hz
.....	208V, 3Ø, 3-Wire, 50/60 Hz
.....	200V, 3Ø, 3-Wire, 50/60 Hz
.....	415/240V, 3Ø, 4-Wire, 50/60 Hz
.....	380/220V, 3Ø, 4-Wire, 50/60 Hz

The system is provided with a power fail relay that transfers 115V system power source from the supply control transformer to an external 115V supply (typically a UPS) in case of a loss of power. This allows for continuous operation of the personal computer, microprocessor, overtemperature system, conveyor speed control, host communications, printer, and power hood lift.

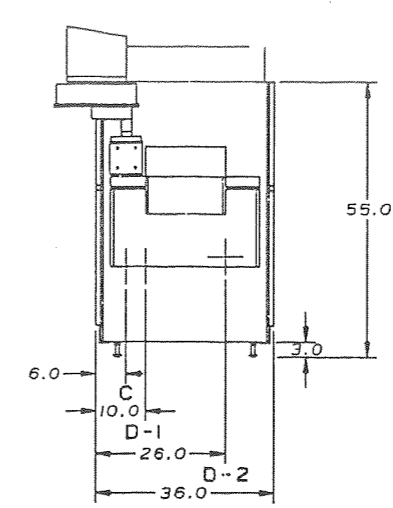
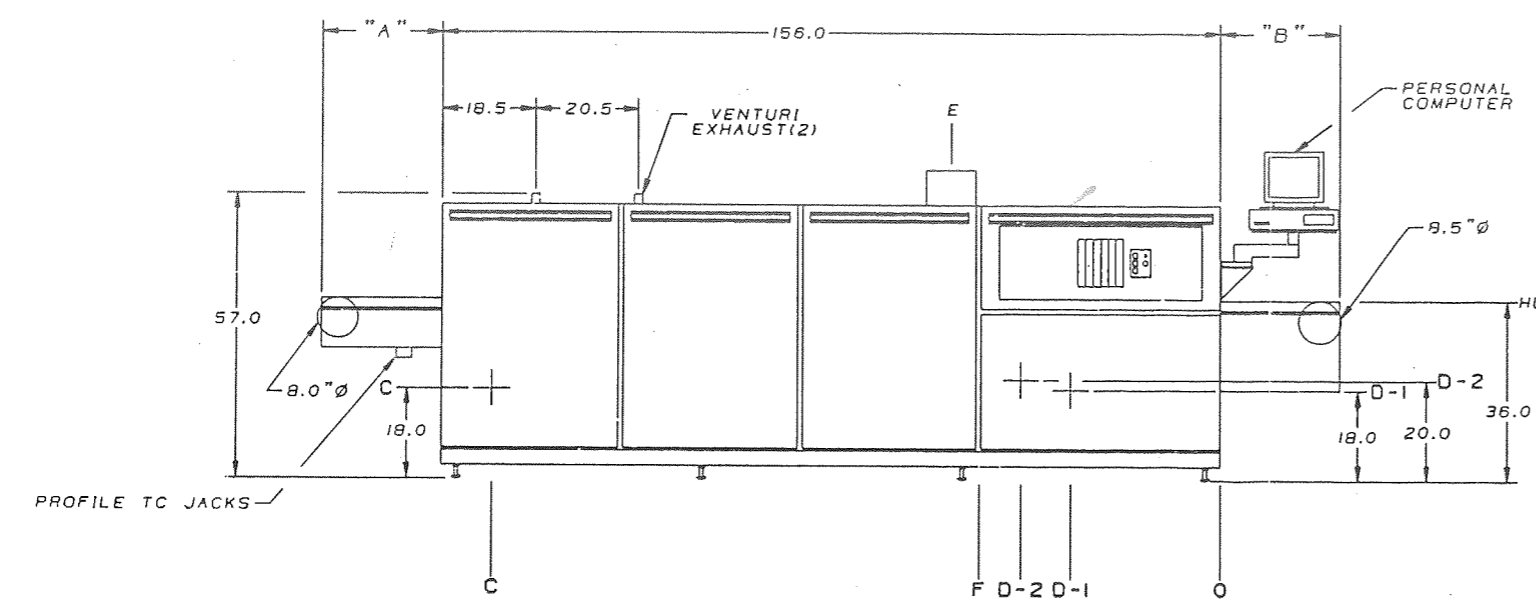
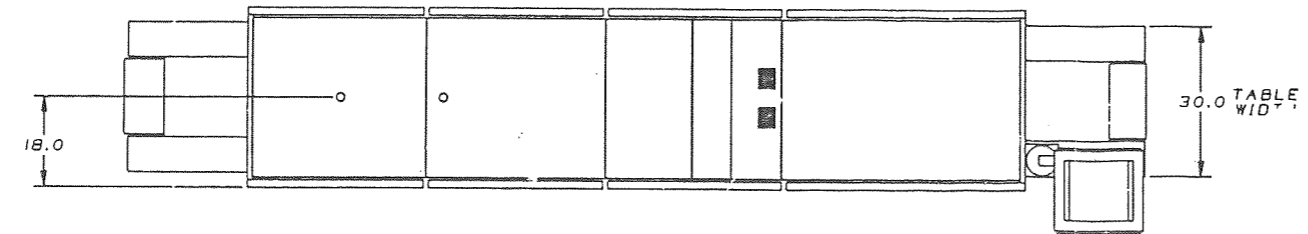
A duplex 120V receptacle is provided for the personal computer and printer power.

Physical Characteristics

Furnace Color	Dark Brown and Beige
Approximate Shipping Weight	3000 lb.

8 7 6 5 4 3 2 1

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE



ENTRANCE TABLE OPTIONS		PURCHASER TO SUPPLY CIRCUIT BREAKER OR FUSED DISCONNECT SWITCH FOR: 240 VOLTS 200 AMPERES 3POLES 3WIRES 3PHASES 50 KILOVOLT-AMPERES 50/60HZ FURNACE CASE MUST BE GROUNDED PER LOCAL CODES						MAXIMUM TEMPERATURE 1050 DEGREES CELCIUS OPERATING TEMPERATURE 200-1000 DEGREES CELCIUS					
DIMENSION "A"		MAXIMUM LOAD DATA						UTILITIES	APPROX. CONNECT LOCATION	PRESSURE	CONN SIZE	REMARKS	
LINE CURRENT-AMPERES		VOLTS	BLACK	RED	BLUE	NEUTRAL	TOTAL						
1. 24"	STANDARD	200	116	127	134		43	C	ELECTRIC POWER	148"	N/A	N/A	
2. 38"		208	121	132	140		49	D-1	AIR - 530LPM MAX.	30"	10-20PSIG	.5NPT	
3. 48"		220	128	139	148		55	D-2	AIR - 530LPM MAX.	40"	80-100PSIG	.5NPT	W/AIR PURIFIER
4. 60"		230	134	146	154		60	E	CASE COOLING EXHAUST	53.5"	N/A	10" X 32"	500CFM
5. 72"		240	139	152	161		66	F	SEPARATION JOINT	48"	N/A	N/A	OPTIONAL
EXIT TABLE OPTIONS		AVERAGE HEATER LOAD 40KW											
DIMENSION "B"		OVERHEAT TC IN ZONES 1 THRU 8											
DIMENSION "A"													
DIMENSION "B"													

TOLERANCES		APPROVALS		DATE	BTU International, Inc. N. BILLERICA, MASSACHUSETTS 01852
DECIMALS	ANGLES	CHECK	ENGR.	DATE	
.X ± .1	21°	FAB	FAB	7/8/93	TITLE INSTALLATION DRAWING TFF142-890A24
.XX ± .03		FAB	FAB		
.XXX ± .010		FAB	FAB		
DO NOT SCALE DRAWING		THIRD ANGLE PROJECTION		SCALE 1/16"	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		DRAWN		SIZE D	
		DATE		DRAWING NO. 5041635	
		TITLE		SHEET 1 OF 1	

8 7 6 5 4 3 2 1