



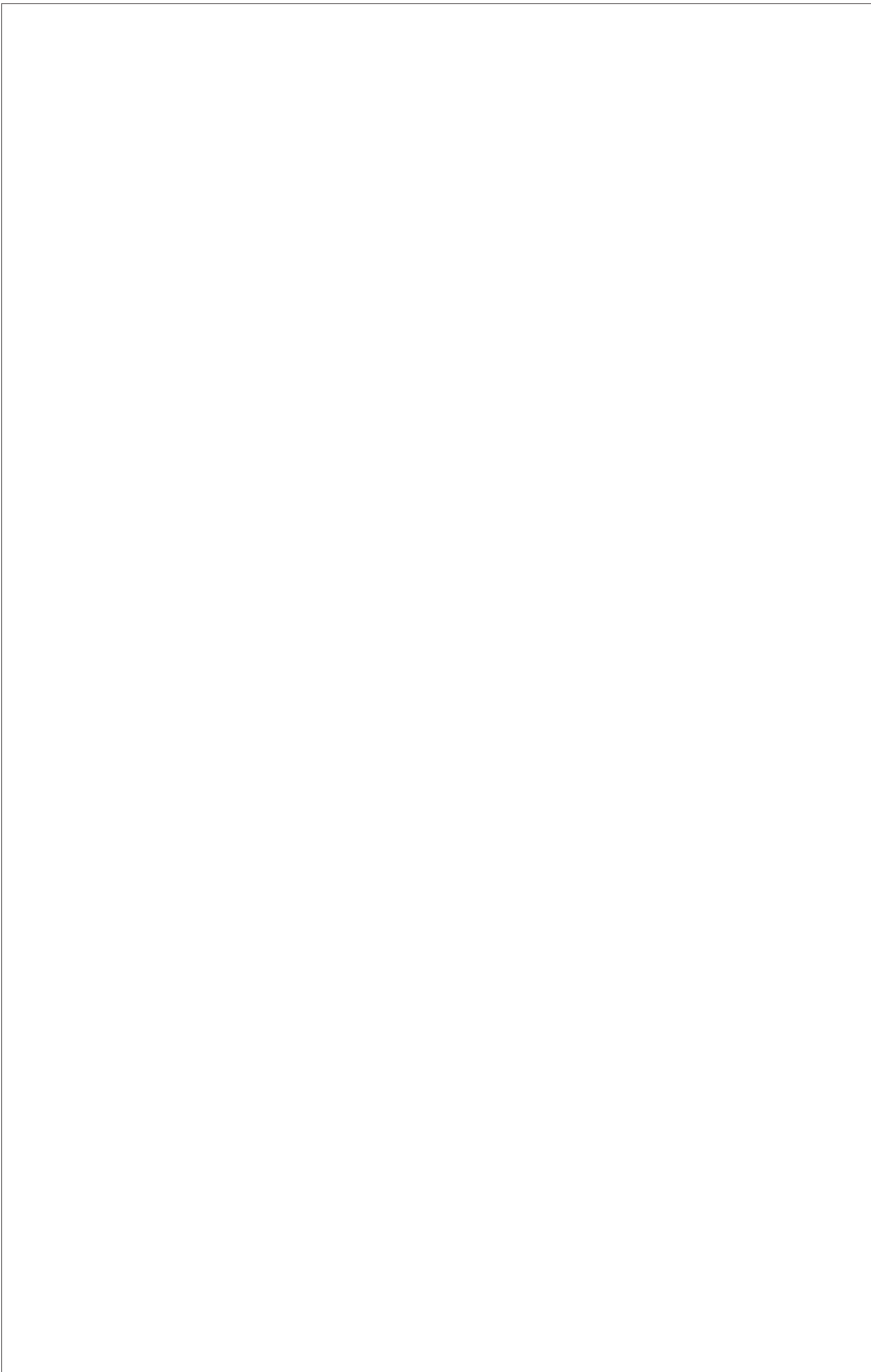
FB-08LT

OPERATOR'S MANUAL

Issue 9.
Date of issue:
23rd July 2003
® The Techne logo is the trademark of
Techne and Techne Inc.
© Techne , 2003

CONTENTS

FB-08LT Operator's Manual	page
SAFETY AND INSTALLATION	<i>page</i>
Declaration of conformity	3
English	4
Français	5
Deutsch	6
Español	7
INTRODUCTION	8
Application	8
Operator Safety	9
Warning	9
Guarantee	9
Specification	10
Contact information	11
Installation	12
Controls	14
OPERATION	15
Introduction	15
Start Up	15
Calibration	18
Maintenance	19
SERVICING	21
Fault finding	25
Spares List	28
Accessories	28





Techne
Duxford
Cambridge
CB2 4PZ



Declaration of Conformity

Techne Unit FB-08LT has been designed to comply with the following European Standards:

EN 50081-1:1992 Electromagnetic Compatibility; Generic emission standard.

EN 50082-1:1992 Electromagnetic Compatibility; Generic immunity standard (Performance criterion B).

EN 61010-1:1993 Safety requirements for electrical equipment for measurement, control and laboratory use.

EN 61010-2-010:1995 Particular requirements for laboratory equipment for the heating of materials.

I have made all reasonable enquiries regarding the unit stated and its conformance to the following EU directives:

Low Voltage directive, 73/23/EEC and amendment 93/68/EEC, and
EMC Directive 89/336/EEC and amendments 92/31/EEC.

To the best of my knowledge and belief these units conform to these directives.

This Declaration is controlled under an ISO 9001:2000 system certificated by BSI Quality Assurance, certificate number FM13585.

Signature

B C Coombes

Name

B C Coombes

Position

Quality Manager

Issue 4

23/07/2003

Introduction

Please read all the information in this booklet before using the unit.

Warning

HIGH TEMPERATURES ARE DANGEROUS: they can cause serious burns to operators and ignite combustible material. Techne have taken great care in the design of these units to protect operators from hazards, but users should pay attention to the following points:

- USE CARE AND WEAR PROTECTIVE GLOVES TO PROTECT HANDS;
- DO NOT put hot objects on or near combustible objects;
- DO NOT operate the unit close to inflammable liquids or gases;
- DO NOT place any liquid directly in your unit;
- At all times USE COMMON SENSE.

Operator Safety

All users of Techne equipment must have available the relevant literature needed to ensure their safety. It is important that only suitably trained personnel operate this equipment, in accordance with the instructions contained in this manual and with general safety standards and procedures. If the equipment is used in a manner not specified by Techne the protection provided by the equipment to the user may be impaired.

All Techne units have been designed to conform to international safety requirements and are fitted with an overtemperature cutout. On some models, the cutout is adjustable and should be set to suit the application. On all other models the cutout is preset to protect the unit. If a safety problem should be encountered, switch off at the mains socket and remove the plug from the supply.

Installation

1. All Techne units are supplied with a power cable. This may be integral or plug-in.
2. Before connecting the mains supply, check the voltage against the rating plate. Connect the mains cable to a suitable plug according to the table below. **Note that the unit must be earthed to ensure proper electrical safety.**

<i>Connections</i>	220/240V	110/120V
Live	Brown	Black
Neutral	Blue	White
Earth	Green/yellow	Green

The fused plug supplied with the mains lead for use in the UK is fitted with the following value fuse to protect the cable: 230V UK 13 AMP

The fuse in the unit protects the unit and the operator. Note that units marked 230V on the rating plate work at 220V; units marked 120V work at 110V. In both cases, however, the heating rate will degrade by approximately 8%. The rating plate is on the rear of the unit.
- 3. Plug the mains cable into the socket on the rear of the unit.
- 4. Place the unit on a suitable bench or flat workspace, or in a fume cupboard if required, ensuring that the air inlet vents on the underside are free from obstruction.
- 5. Note that the following symbol next to the indicator lamp on the front panel of the units and has the following meanings:

~ : the power indicator

6. Symbols on or near the power switch of the unit have the following meanings:

I	: mains switch On
O	: mains switch Off

After use

When you have finished heating samples, remember that parts of the unit – the tubes, blocks and associated accessories – may be very hot. Take the precautions listed earlier.

Guarantee

The unit is guaranteed against any defect in material or workmanship for the period specified on the enclosed guarantee card. This period is from the date of purchase, and within this period all defective parts will be replaced free of charge provided that the defect is not the result of misuse, accident or negligence. Servicing under this guarantee should be obtained from the supplier.

Notwithstanding the description and specification(s) of the units contained in the User's Manual, Techne hereby reserves the right to make such changes as it sees fit to the units or to any component of the units.

This Manual has been prepared solely for the convenience of Techne customers and nothing in this Instruction Book shall be taken as a warranty, condition or representation concerning the description, merchantability, fitness for purpose or otherwise of the units or components.

User maintenance

NOTE THAT THIS EQUIPMENT SHOULD ONLY BE DISMANTLED BY PROPERLY TRAINED PERSONNEL. REMOVING THE SIDE, FRONT OR REAR PANEL EXPOSES POTENTIALLY LETHAL MAINS VOLTAGES. THERE ARE NO USER MAINTAINABLE PARTS WITHIN THE EQUIPMENT.

In the unlikely event that you experience any problems with your unit which cannot easily be remedied, you should contact your supplier and return the unit if necessary. Please include any details of the fault observed and remember to return the unit in its original packing. Techne accept no responsibility for damage to units which are not properly packed for shipping: if in doubt, contact your supplier. See the Decontamination Certificate supplied with your unit.

1. **Cleaning**
Before cleaning your unit ALWAYS disconnect from the power supply and allow to cool below 50° C. Your unit can be cleaned by wiping with a damp soapy cloth. Care should be exercised to prevent water from running inside the unit. Do not use abrasive cleaners.
2. **Fuses**
Your unit is protected by one or two fuses. These should only be changed by suitably qualified personnel. If the fuses blow persistently, a serious fault is indicated and you may need to return the unit to your supplier for repair.

Contact Information

For technical, sales or servicing information, contact your local Techne dealer or,

Techne, Duxford,
Cambridge, CB2 4PZ, United Kingdom.
Telephone: +44(0)1223 832401
Fax: +44(0)1223 836838
Service: +44(0)1223 836950 Out of office hours
e-mail: sales@techne.com
Web site: www.techne.com

or,

Techne Inc, 3 Terri Lane,
Suite 10, Burlington,
New Jersey 08016, USA.
Telephone: 609-589-2560
Toll free: 800-225-9243 ext 306
Fax: 609-589-2571
e-mail: labproducts@techneusa.com
Web site: www.techneusa.com

Introduction

Veillez lire attentivement toutes les instructions de ce document avant d'utiliser l'appareil.

Avertissement

DANGER DE TEMPERATURES ELEVEES: les opérateurs peuvent subir de graves brûlures et les matériaux combustibles risquent de prendre feu.

Techne a apporté un soin tout particulier à la conception de ces appareils de façon à assurer une protection maximale des opérateurs, mais il est recommandé aux utilisateurs de porter une attention spéciale aux points suivants :

- **PROCEDER AVEC SOIN ET PORTER DES GANTS POUR SE PROTEGER LES MAINS.**
- **NE PAS** poser d'objets chauds sur ou près de matériaux combustibles.
- **NE PAS** utiliser l'appareil à proximité de liquides ou de gaz inflammables.
- **NE PAS** verser de liquide directement dans l'appareil.
- **FAIRE TOUJOURS PREUVE DE BON SENS.**

Sécurité de l'opérateur

Tous les utilisateurs de produits Techne doivent avoir pris connaissance des manuels et instructions nécessaires à la garantie de leur sécurité.

Important : cet appareil doit impérativement être manipulé par un personnel qualifié et utilisé selon les instructions données dans ce document, en accord avec les normes et procédures de sécurité générales. Dans le cas où cet appareil ne serait pas utilisé selon les consignes précisées par Techne, la protection pour l'utilisateur ne serait alors plus garantie.

Tous les appareils Techne sont conçus pour répondre aux normes de sécurité internationales et sont dotés d'un coupe-circuit en cas d'excès de température. Sur certains modèles, ce coupe-circuit est réglable pour s'adapter à l'application désirée. Sur d'autres modèles, il est pré-réglée en usine pour assurer la protection de l'appareil.

Dans le cas d'un problème de sécurité, coupez l'alimentation électrique au niveau de la prise murale et enlevez la prise connectée à l'appareil.

Installation

1. Tous les appareils Techne sont livrés avec un câble d'alimentation qui peut être intégré à l'appareil ou à raccorder.
2. Avant de brancher l'appareil, vérifiez la tension requise indiquée sur la plaque d'identification. Raccordez le câble électrique à la prise appropriée en vous reportant au tableau ci-dessous. **Il est important que l'appareil soit relié à la terre pour assurer la protection électrique requise.**

Connexions	220/240 V	110/120 V
Phase	Marron	Noir
Neutre	Blue	Blanc
Terre	Vert/juane	Vert

Le fusible à l'intérieur de l'appareil est destiné à assurer la protection de l'appareil et de l'opérateur.

Remarque : les appareils dont la plaque indique 230 V peuvent fonctionner sur 220 V, et ceux dont la plaque indique 120 V peuvent fonctionner sur 110 V. Dans les deux cas cependant, la capacité de chauffage diminuera d'environ 8 %. La plaque d'identification se trouve à l'arrière de l'appareil.

3. Raccordez le câble d'alimentation à la prise située à l'arrière de l'appareil.
4. Placez l'appareil sur un plan de travail ou surface plane, ou le cas échéant, dans une hotte d'aspiration, en s'assurant que les trous d'aération situés sous l'appareil ne sont pas obstrués.

5. Les symboles ci-dessous situés à côté des témoins lumineux sur la face avant de l'appareil ont la signification suivante:

~ : témoin d'alimentation

6. Les symboles situés sur ou à côté de l'interrupteur de l'appareil ont la signification suivante :

I : arrêt

O : marche

Après utilisation

Lorsque vous avez fini de chauffer les échantillons, n'oubliez pas que certaines parties de l'appareil - les éprouvettes, leurs supports et autres accessoires - risquent d'être très chaudes. Il est donc recommandé de toujours prendre les précautions citées plus haut.

Garantie

L'appareil est garanti contre tout défaut ou vice de fabrication pour la durée figurant sur la carte de garantie, à compter de la date d'achat de l'appareil. Au cours de cette période, toutes les pièces défectueuses seront remplacées gratuitement, dans la mesure où la défaillance n'est pas due à une mauvaise utilisation, un accident ou une négligence. Toute réparation sous garantie sera effectuée par le fournisseur.

Malgré la description et les spécifications de l'appareil données dans le manuel de l'utilisateur, Techne se réserve le droit d'effectuer les changements nécessaires à l'appareil ou à tout élément qui entre dans sa composition.

Ce manuel a été exclusivement rédigé à l'attention des clients de Techne, et aucun élément de ce guide d'instructions ne peut être utilisé comme garantie, condition ou représentation concernant la description, commercialisation, adaptation aux conditions d'utilisation ou autre des appareils ou de leurs composants.

Entretien utilisateur

IMPORTANT: CET APPAREIL NE PEUT ETRE DEMONTE QUE PAR DU PERSONNEL QUALIFIE.

LORSQUE LES PANNEAUX AVANT, ARRIERE ET LATERAUX SONT DEMONTES, L'OPERATEUR EST EXPOSE A DES TENSIONS QUI PEUVENT ETRE MORTELLES.

CET APPAREIL NE CONTIENT AUCUN ELEMENT QUI DEMANDE UN ENTRETIEN DE LA PART DE L'UTILISATEUR.

Dans le cas peu probable où votre appareil présente un défaut de fonctionnement auquel il est difficile de remédier, il est alors préférable de contacter votre fournisseur et, le cas échéant, de renvoyer le matériel. Veuillez inclure une description détaillée du problème constaté et retourner l'appareil dans son emballage d'origine. Techne ne sera pas tenu responsable des dommages subis par tout appareil dont l'emballage est inadéquat pour le transport. Pour plus de sûreté, contactez votre fournisseur. Voir le certificat de décontamination livré avec le produit.

1. Nettoyage

Avant de nettoyer l'appareil, assurez-vous TOUJOURS que le câble d'alimentation est déconnecté et laissez la température redescendre en dessous de 50 °C.

Utilisez un chiffon imprégné d'eau savonneuse pour nettoyer l'appareil. Veillez à ne pas introduire d'eau dans l'appareil. N'utilisez pas de produits abrasifs.

2. Fusibles

La protection de l'appareil est assurée par un ou deux fusibles dont le remplacement ne peut être effectué que par un personnel qualifié.

Si les fusibles sautent sans arrêt, il s'agit d'un problème sérieux. Nous vous conseillons dans ce cas de prendre contact avec votre fournisseur pour réparation.

Einleitung

Bitte lesen Sie diese Bedienungsanleitung komplett bevor Sie dieses Gerät benutzen.

Warnung

HOHE TEMPERATUREN SIND GEFÄHRLICH: sie können dem Bediener ernsthafte Verletzungen zufügen und brennbare Materialien können sich leicht entzünden. Techne hat bei der Konstruktion dieses Gerätes sehr darauf geachtet, daß der Bediener vor Gefahren geschützt ist. Dennoch sollten Sie auf die folgenden Punkte achten:

- SEIEN SIE VORSICHTIG UND TRAGEN SIE SCHUTZHANDSCHUHE
- Legen Sie heiße Gegenstände NICHT auf oder in die Nähe von leicht brennbaren Materialien; vermeiden Sie Arbeiten in der Nähe von leicht entzündbaren Flüssigkeiten oder Gasen.
- Bringen sie KEINE Flüssigkeiten direkt in Ihr Gerät.
- Benutzen Sie immer den normalen Menschenverstand

Sicherheit des Anwenders

Alle Benutzer von Techne Geräten müssen Zugang zu der entsprechenden Literatur haben, um ihre Sicherheit zu gewährleisten. Es ist wichtig, daß diese Geräte nur von entsprechend geschultem Personal betrieben werden, das die in dieser Gebrauchsanweisung enthaltenen Maßnahmen und allgemeine Sicherheitsbestimmungen und -vorkehrungen beachtet. Wenn das Gerät anders eingesetzt wird als vom Hersteller empfohlen, kann dies die persönliche Sicherheit des Anwenders beeinträchtigen. Die Geräte von Techne entsprechen den internationalen Sicherheitsbestimmungen und sind mit einem automatischen Übertemperaturabschalter ausgestattet. Bei einigen Modellen ist der Übertemperaturabschalter verstellbar und sollte je nach Anwendung entsprechend eingestellt werden. Bei allen anderen Modellen ist der Temperaturschutz voreingestellt um Schäden am Gerät zu vermeiden. Wenn ein Sicherheitsproblem auftreten sollte, muß das Gerät ausgeschaltet und vom Stromnetz getrennt werden.

Installation

1. Alle Techne Geräte werden mit einem Stromanschlußkabel geliefert. Dieses ist entweder fest mit dem Gerät verbunden oder zum Einstecken.
2. Vergleichen Sie, ob die Spannung Ihrer Stromversorgung mit den Angaben auf dem Typenschild des Gerätes übereinstimmen. Verbinden Sie das Stromanschlußkabel mit einer geeigneten Stromversorgung gemäß der nächstehenden Tabelle. Achtung: Das Gerät muß geerdet sein, um die elektrische Sicherheit zu gewährleisten!

<i>Verbindungen 220/240V</i>	<i>110/120V</i>
Stromführend Braun	Schwarz
Neutral Blau	Weiß
Erde Grün/Gelb	Grün

Geräte, die für 230 Volt ausgelegt sind, können auch bei 220 Volt arbeiten, Geräte für 120 Volt auch bei 110 Volt. In beiden Fällen verringert sich die Aufheizrate um ca. 8%. Das Typenschild befindet sich hinten am Gerät.

3. Stecken Sie das Stromkabel in die vorgesehene Buchse hinten am Gerät.
4. Stellen Sie das Gerät auf eine ebene Arbeitsfläche bzw. (falls erforderlich) unter einen Laborabzug. Beachten Sie, daß die Entlüftungsrippen an der Geräteunterseite immer frei zugänglich sind.
5. Wenn die Anzeigenlämpchen an der Vorderseite leuchten, hat dies folgende Bedeutung:

~ : Gerät ist eingeschaltet

6. Die Symbole auf oder neben dem EIN/AUS-Schalter an der Geräterückseite bedeuten:

I	: An
O	: Aus

Nach dem Gebrauch

Vergessen Sie nicht, daß Teile des Gerätes (die Gefäße, die Blöcke und andere Zubehörteile) nach dem Erhitzen von Proben noch sehr heiß sein können. Bitte beachten Sie die oben genannten Vorsichtsmaßnahmen.

Garantie

Die Garantiedauer des Gerätes ist auf der beiliegenden Garantiekarte angegeben und schließt Fehler im Material oder der Verarbeitung ein. Die Garantiedauer beginnt am Tag des Einkaufs. Sämtliche defekte Teile werden innerhalb dieses Zeitraumes kostenlos ersetzt unter der Voraussetzung, daß dem Defekt keine unsachgemäße Handhabung, Fahrlässigkeit oder ein Unfall zugrundeliegt. Der unter diese Garantie fallende Service wird vom Lieferanten geleistet. Ungeachtet der in dieser Gebrauchsanweisung enthaltenen Beschreibungen und Spezifikationen, behält sich Techne hiermit das Recht vor, Änderungen an den Geräten bzw. an einzelnen Geräteteilen durchzuführen. Diese Gebrauchsanweisung wurde ausschließlich dazu erstellt, um Kunden die Handhabung der Techne-Geräte zu erleichtern. Nichts in dieser Gebrauchsanleitung darf als Garantie, Bedingung oder Voraussetzung verstanden werden, sei es die Beschreibung, Marktgängigkeit, Zweckdienlichkeit oder sonstiges bezüglich der Geräte oder deren Bestandteile.

Wartung durch den Bediener

BEACHTEN SIE, DASS DIESES GERÄT NUR VON TECHNISCHEN FACHKRÄFTEN GEÖFFNET UND DEMONTIERT WERDEN DARF.

DURCH ENTFERNEN DES GEHÄUSES ODER GEHÄUSETEILEN SIND BAUTEILE MIT LEBENGEFÄHRLICHEN SPANNUNGEN FREI ZUGÄNGLICH. IM INNEREN DES GERÄTES BEFINDEN SICH KEINE TEILE, DIE VOM ANWENDER GEWARTET WERDEN MÜSSEN.

Falls Ihr Gerät nicht ordnungsgemäß arbeitet, wenden Sie sich an Ihren Lieferanten oder senden Sie das Gerät wenn nötig zurück. Fügen Sie eine genaue Beschreibung des Defektes bei. Verpacken Sie das Gerät möglichst im Originalkarton. Bitte beachten Sie, daß Techne keine Haftung bei Transportschäden aufgrund unzureichender Verpackung übernehmen. Setzen Sie sich im Zweifelsfall mit Ihrem Lieferanten in Verbindung. Bitte beachten Sie die Entgiftungsbescheinigung, die Sie mit dem Gerät erhalten haben.

1. **Reinigen**
Bevor Sie Ihr Gerät reinigen, sollten Sie
 - zuerst den Netzstecker ziehen
 - das Gerät unter 50°C abkühlen lassen.
 Ein feuchtes Tuch mit Seifenlösung reinigt Ihr Gerät am besten. Achten Sie darauf, daß kein Wasser in das Gerät gelangt. Verwenden Sie keine Scheuermittel.
2. **Sicherungen**
Die Stromzuleitung ist durch ein oder zwei Sicherungen geschützt. Diese sollten nur durch qualifiziertes Fachpersonal ausgetauscht werden. Wenn die Sicherung wiederholt durchbrennt, liegt ein größerer Defekt vor. Das Gerät muß zur Reparatur an Ihren Lieferanten eingeschickt werden.

Introducción

Le rogamos lea cuidadosamente la información contenida en este folleto antes de manipular el aparato.

Aviso

LAS TEMPERATURAS ELEVADAS SON PELIGROSAS: pueden causarle graves quemaduras y provocar fuego en materiales combustibles.

Techne ha puesto gran cuidado en el diseño de estos aparatos para proteger al usuario de cualquier peligro; aún así se deberá prestar atención a los siguientes puntos:

- EXTREME LAS PRECAUCIONES Y UTILICE GUANTES PARA PROTEGERSE LAS MANOS;
- NO coloque objetos calientes encima o cerca de objetos combustibles;
- NO maneje el aparato cerca de líquidos inflamables o gases;
- NO introduzca ningún líquido directamente en el aparato;
- UTILICE EL SENTIDO COMUN en todo momento.

Seguridad del usuario

Todos los usuarios de equipos Techne deben disponer de la información necesaria para asegurar su seguridad. De acuerdo con las instrucciones contenidas en este manual y con las normas y procedimientos generales de seguridad, es muy importante que sólo personal debidamente capacitado opere estos aparatos. De no ser así, la protección que el equipo le proporciona al usuario puede verse reducida.

Todos los equipos Techne han sido diseñados para cumplir con los requisitos internacionales de seguridad y traen incorporados un sistema de desconexión en caso de sobretemperatura. En algunos modelos el sistema de desconexión es variable, lo que le permite elegir la temperatura según sus necesidades. En otros, el sistema de desconexión viene ya ajustado para evitar daños en el equipo.

En caso de que surgiera un problema de seguridad, desconecte el equipo de la red.

Instalación

1. Todos los aparatos Techne se suministran con un cable de alimentación. Puede ser fijo o independiente del aparato.
2. Antes de conectarlo, compruebe que el voltaje corresponde al de la placa indicadora. Conecte el cable de alimentación a un enchufe adecuado según la tabla expuesta a continuación. El equipo debe estar conectado a tierra para garantizar la seguridad eléctrica.

<i>Conexiones</i>	220/240V	110/120V
Línea	Marrón	Negro
Neutro	Azul	Blanco
Tierra	Verde/amarillo	Verde

El enchufe suministrado con el cable de alimentación viene equipado con un fusible del siguiente valor para proteger el cable:

230V Reino Unido	5AMP
------------------	------

El fusible una vez instalado protege tanto al equipo como al usuario.

Asegúrese de que los equipos marcados 230V en la placa indicadora funcionan a 220V y de que los equipos marcados 120V funcionan a 110V. No obstante, en ambos casos la velocidad de calentamiento se verá reducida en un 8% aproximadamente. La placa indicadora está situada en la parte posterior del equipo.
3. Conecte el cable a la toma de tensión en la parte posterior del equipo.
4. Sitúe el aparato en un lugar apropiado tal como una superficie de trabajo plana, o si fuera necesario incluso en una campana con extractor de humos, asegurándose de que las entradas de aire en la parte inferior no queden obstruidas.

5. Los símbolos, que pueden aparecer junto a las luces indicadoras en el panel frontal del equipo, tienen los siguientes significados:
 - ~ : Indicador de potencia
6. Los símbolos que se encuentran en o cerca del interruptor de alimentación tienen los siguientes significados:
 - I : Interruptor principal encendido
 - O : Interruptor principal apagado

Después de su uso

Cuando haya finalizado el calentamiento de muestras, recuerde que las piezas del equipo, tales como tubos, bloques y demás accesorios, pueden estar muy calientes. Tome las precauciones mencionadas anteriormente.

Garantía

Este aparato está garantizado contra cualquier defecto material o de fabricación durante el periodo especificado en la tarjeta de garantía adjunta. Este plazo inicia a partir de la fecha de compra, y dentro de este periodo todas las piezas defectuosas serán reemplazadas gratuitamente siempre que el defecto no sea resultado de un uso incorrecto, accidente o negligencia. Mientras se encuentre bajo garantía las revisiones las debe llevar a cabo el proveedor.

A pesar de la descripción y las especificaciones de los aparatos contenidas en el Manual del Usuario, Techne se reserva por medio de este documento el derecho a efectuar los cambios que estime oportunos tanto en los aparatos como en cualquier componente de los mismos.

Este manual ha sido preparado exclusivamente para los clientes de Techne y nada de lo especificado en este folleto de instrucciones se tomará como una garantía, condición o aseveración de la descripción, comerciabilidad o adecuación para cualquier fin específico de los aparatos o sus componentes.

Mantenimiento

ESTE APARATO DEBE SER DESMONTADO SOLO Y EXCLUSIVAMENTE POR PERSONAL DEBIDAMENTE CAPACITADO.

EL RETIRAR LOS PANELES LATERALES, FRONTALES O TRASEROS SUPONE DEJAR AL DESCUBIERTO TENSION DE LA RED PELIGROSA.

EL EQUIPO NO CONSTA DE NINGUNA PIEZA DE CUYO MANTENIMIENTO SE PUEDA ENCARGAR EL USUARIO.

En el caso improbable de que experimentara algún problema con su aparato que no pudiera resolver con facilidad, debería ponerse en contacto con su proveedor y devolverlo si fuera necesario. Indique de forma detallada todos los defectos que haya notado y devuelva el equipo en su embalaje original. Techne no aceptará responsabilidad alguna por daños causados en equipos que no estuvieran debidamente embalados para su envío; si tuviera alguna duda, póngase en contacto con su proveedor. Sírvase consultar el Certificado de Descontaminación suministrado con su aparato.

1. **Limpieza**

Antes de limpiar su aparato, desconéctelo SIEMPRE de la fuente de alimentación y permita que se enfríe por debajo de los 50°C.

Este aparato se puede limpiar pasándole un paño húmedo enjabonado. Hágalo con cuidado para evitar que caiga agua dentro del mismo. No utilice limpiadores abrasivos.
2. **Fusibles**

Su aparato está protegido por uno o dos fusibles. Sólo deben cambiarlos personal debidamente capacitado. Si los fusibles se fundieran repetidamente, esto indicaría una avería grave y puede que tuviera que devolverle el aparato a su proveedor para su reparación.

INTRODUCTION

The Techne FB-08LT employs the principle of fluidisation of a mass of finely divided particles to provide a safe, essentially isothermal environment with a high rate of heat transfer.

To achieve a state of fluidisation, a gas stream is forced to pass vertically through the bed of fine powder; chromatographic alumina (a specially refined grade of aluminium oxide) is the fluidising medium used in the FB-08LT. At, and above, a certain critical value of flow rate the particles become separated from each other and the whole mass behaves like a liquid. In this state the powder will flow and move as though it were a liquid; low density objects will float on it, while more dense ones will sink; more importantly, though, the individual alumina particles will circulate within the bath giving an essentially uniform temperature distribution throughout the working volume of the bath, and a high degree of thermal coupling between the heat source and load.

In addition, the mass of fluidised powder changes its basic characteristics very little over a wide temperature range, has no freezing point and no practical boiling point and therefore by suitable choice of fluidising media, the principle of fluidisation can be used to temperatures over 1700°C and below -120°C.

The most commonly used fluidising gas is compressed air, it is important that it should be clean, dry, free from oil and at a constant pressure. Techne can supply an additional filter/regulator assembly for compressed air which does not comply with the above requirement. Techne are alternatively able to offer a suitable free standing air compressor complete with the necessary filtration system for installations where a compressed air supply is not available. Any other gas could be used for special applications provided appropriate precautions are taken. The FB-08LT specification applies only when compressed air is used.

Application

The characteristics of the FB-08LT in terms of thermal uniformity and heat transfer make it a useful tool in the calibration and testing of a very wide range of temperature sensors; however, the unit is applicable to many other processes, such as thermal testing of sensitive components e.g. semiconductor devices, wire product, delicate transducers - and can be used as a constant temperature environment for chemical reactions.

Because the fluidised bed is composed of a fine dry powder, it does not display the surface tension effects of liquid baths, and does not wet any objects immersed in it; the basic electrical insulating property of the alumina used in the FB-08LT is not affected by fluidisation, making it possible to conduct electrical measurements on immersed objects such as assembled printed circuit boards. If the FB-08LT is to be used below ambient see later sections.

OPERATOR SAFETY

It is important that only suitably trained personnel operate this equipment. It must also be used in accordance with the instructions contained in this manual and with proper safety standards and procedures.

It is imperative that all personnel who may come into contact with our equipment have available such of our literature as they require to ensure their safety.

If there is any doubt whatsoever relating to the proper use of this equipment we will be pleased to assist you.

It is advisable to read the whole of this book before commencing work with the unit.

Warning

THE HANDLING OF LIQUID GASES PROVIDES SOME SERIOUS HAZARDS TO PERSONNEL. IT IS THEREFORE RECOMMENDED THAT THIS EQUIPMENT IS USED ONLY BY SUITABLY EXPERIENCED PERSONNEL. IT IS RECOMMENDED THAT ANY SECTION OF PIPEWORK CAPABLE OF CONTAINING LIQUID NITROGEN SHOULD NOT BE ISOLATED AT BOTH ENDS WITHOUT PROVISION FOR PRESSURE RELIEF BEING MADE. DURING OPERATION THE LIQUID NITROGEN CONSUMED EVAPORATES INTO NITROGEN GAS, WHICH IS NORMALLY HARMLESS, BUT IN CONFINED AREAS THE NITROGEN CONTENT OF THE AIR COULD INCREASE AT THE EXPENSE OF THE OXYGEN CONTENT WITH SERIOUS RESULTS FOR ANY PERSONNEL PRESENT. IT IS THEREFORE RECOMMENDED THAT THE EXHAUST GASES ARE DUCTED TO A WELL VENTILATED AREA.

Guarantee

The unit is guaranteed against any defect in material or workmanship for the period specified on the enclosed guarantee card. This period is from the date of purchase, and within this period all defective parts will be replaced free of charge provided that the defect is not the result of misuse, accident or negligence. Servicing under this guarantee should be obtained from the supplier.

Notwithstanding the description and specification(s) of the units contained in the User's Manual, Techne hereby reserves the right to make such changes as it sees fit to the units or to any component of the units.

This Manual has been prepared solely for the convenience of Techne customers and nothing in this Instruction Book shall be taken as a warranty, condition or representation concerning the description, merchantability, fitness for purpose or otherwise of the units or components.

Specification

GENERAL CHARACTERISTICS

Temperature range	-100°C to +200°C
Temperature stability at -100°C	+0.5°C
Temperature stability at +200°C	+0.2°C
Nominal heater power	3 KW
Heat up time	20°C to 200°C 30
mins	
Cool down time	20°C to -100°C 90
mins	

ELECTRICAL SUPPLY 220/240V 50 or 60 Hz

AIR SUPPLY

Pressure	420 kPa (60 PSI)
Maximum consumption	170 l/min

LIQUID NITROGEN

Maximum liquid nitrogen consumption	7 l/hour
-------------------------------------	----------

NOMINAL OVERALL DIMENSIONS

Width	770 mm
Depth	615 mm
Height	600 mm

INTERNAL DIMENSIONS

Diameter	165 mm
Depth (to porous plate)	493 mm
Usable depth (below surface of fluidised medium to porous plate)	385 mm

FLUIDISING MEDIUM

FO855 aluminium oxide	16 kg
-----------------------	-------

Contact Information

If there is any doubt whatsoever relating to the proper use of this equipment our Sales or Technical Departments will be pleased to assist you. Similarly our Service Department will be pleased to assist you with any queries about servicing your FB-08LT.

For technical, sales or servicing information, contact your local Techne dealer or,

Techne, Duxford,
Cambridge, CB2 4PZ, United Kingdom.

Telephone: +44(0)1223 832401

Fax: +44(0)1223 836838

Service: +44(0)1223 836950 Out of office hours

e-mail: sales@techne.com

Web site: www.techne.com

or,

Techne Inc, 3 Terri Lane,
Suite 10, Burlington,
New Jersey 08016, USA.

Telephone: 609-589-2560

Toll free: 800-225-9243 ext 306

Fax: 609-589-2571

e-mail: labproducts@techneusa.com

Web site: www.techneusa.com

Installation

Avoid siting the FB-08LT in a laboratory environment which contains instruments that are sensitive to dust. Although the fluidised bath has its own dust extraction system, a small amount of fine dust may still be emitted during operation.

Power

The FB-08LT requires a power supply of 240V 50Hz at 3KW; thus it can be run from a standard 13A socket.

Connect the mains cable to a suitable supply as follows:

CONNECTIONS	220/240V
Live	Brown
Neutral	Blue
Earth	Green/yellow

Air

The FB-08LT is supplied with integral filters and regulators suitable for normal clean dry air line supply between 60 and 125 PSI. If the air supply is excessively dirty Techne can supply an additional external filter/regulator assembly which, if used, must be adjusted to its maximum setting of 60 PSI. The air supply should be connected via suitable flexible hose to the air input connection of the filter/drier assembly at the rear of the unit.

Liquid nitrogen

A supply of liquid nitrogen is required for operation below 50°C; connection should be made from a suitably sized liquid nitrogen dewar to the LN₂ input port on the left hand side of the unit. Pipework between the dewar and the bath should be insulated.

Nitrogen gas produced when the liquid evaporates is expelled from the LN₂ exhaust at the rear of the unit. A suitably sized hose should be connected to the exhaust port and the exhaust gases ducted to a well ventilated area.

Mechanical

The unit should be mounted on a firm level surface. Normal operation only requires access to the front of the units, but periodic maintenance and servicing requires access to the left hand side also; this should be borne in mind when positioning the unit initially.

A bubble level is built in to the frame at the base of the front panel; this should be accurately levelled by adjusting the four corner feet. After final adjustment, all four feet should be firmly grounded and the unit should be level. Failure to do this can impair the operation of the unit. The surface should also be heat resistant.

Alumina

The bath should be filled with sufficient of the alumina supplied so that when fluidised the surface should be approximately 30 mm (1 1/4") below the dust extraction collar. The dust extraction system should be turned on during filling in order to minimise the amount of dust given off.

Should the fluidised bath be stored for long periods of time under damp conditions, or humid moisture may be absorbed by the alumina which is hygroscopic. To avoid violent fluidisation which occurs when damp alumina is heated above 100°C, **operate the bath for a period of approximately 8 hours at 90°C prior to operation at elevated temperatures.**

Controls

Mains On/Off

Controls the mains input to the unit. This should be used in preference to the interlocks (see "heater indicator") when switching the unit off.

Mains Fuse

Main fuse for the unit, rating 15A @ 240V AC.

Temperature Controller

When the mains switch is set to the ON position the fluorescent indicator panel will display the measured value of temperature and the set temperature in digital form.

To alter the set point depress the respective UP/DOWN button and after a delay of two seconds the set point will change in the required direction.

Fluidisation Air

The valve at the bottom of the flowmeter controls the amount of air for fluidising the bed, the amount of flow being indicated by the float in the tube on a 10 to 100 l/min scale.

Nitrogen Control

The valve at the bottom of the flowmeter controls the amount of nitrogen evaporated in the heat exchanger by metering the nitrogen gas flow, the flow rate being indicated by the float in the tube on a 10 to 100 l/min scale.

Extraction Air Switch

Turns the forced dust extraction system on and off. The extraction system should be used when the fluidised bath is being operated above +50°C, without dust extraction at high temperatures, fine dust from the bath could escape into the workroom atmosphere and although harmless, it has a nuisance value.

Dust Extraction Indicator

Lights green when the forced dust extraction system is working.

Nitrogen Extraction System Lever

When in the vertical position directs fluidising gas to nitrogen exhaust output at rear of unit. Should be used when operating below +50°C in conjunction with the acrylic probe plate and with the forced dust extraction system turned off.

Heater Indicator

Lights orange when the heaters are on. Heaters are interlocked so that they will only turn on when fluidising air is also on and exceeds a factory preset value.

OPERATION

Introduction

The FB-08LT calibration Fluidised Bath is capable of precise performance, but for reliable and consistent results it must be used by personnel conversant with its operation.

For temperature stability the heat input to the bath must exactly equal heat losses; the heat input from the immersed heaters is controlled by the controller. To cool the bath and operate at temperatures below +50°C liquid nitrogen is evaporated within a heat exchanger on the outside of the inner container. The amount of liquid nitrogen evaporated is manually determined by adjusting the nitrogen flowtrol. The temperature controller then adds heat to the system to maintain the bath at the selected temperature.

The heat losses from the bath are due to:-

- 1 heating fluidising air
- 2 radiation from the top of the bath
- 3 conduction through the insulation
- 4 conduction along loads inserted into the bath
- 5 heating the mass of cold objects placed in the bath.

Changing any of these will affect the temperature of the bath, but it will recover under the controller's influence; this does mean, however, that after any parameter is changed or the load in the bath is changed, there is a delay before the bath temperature re-stabilises.

Start Up

- 1 Check that the unit has been set up as described earlier and that required services are available.
- 2 Check that alumina level is correct and adjust if necessary. Never add new, cold alumina (which may contain moisture) to a hot bath.
- 3 Check that fluidising air control valve and dust extraction control valve are both closed.
- 4 Connect bath to the electrical, nitrogen and compressed air supplies.
- 5 Turn on mains power switch. The switch neon should illuminate.

For operation above +50°C

- 6 Turn on dust extraction system switch, and the green lamp should illuminate.
- 7 Ensure that the nitrogen extraction system lever has been turned anticlockwise and is in the horizontal position, with the handle pointing towards the right.

8 Open the fluidising air control valve until the flowmeter indicates approximately 25 litres/min. The surface of the alumina will rise and start to move with a gentle flowing action like boiling cream. Both the temperature controller and the heater indicator should illuminate when the fluidising air exceeds a preset pressure.

9 The temperature controller is microprocessor based and allows the operator to alter the control time constants if required. The Eurotherm instruction manual details a method of determining the optimum control parameters for any set condition. We recommend that you perform an "Autotune" at an appropriate temperature, say mid-range, or if you are using one temperature for long periods at that temperature.

Alternatively set the desired operating temperature and control parameters on the temperature controller. The following control parameters have been found to provide performance within the system's specification:

Proportional Band	(pb)	=	9
Integral Time	(ti)	=	580
Derivative Time	(td)	=	96
Low cut back	(Lcb)	=	20
High cut back	(Hcb)	=	15
Heat Cycle Time	(Hc)	=	0.3 Do not Adjust
Heat power Limit	(HL)	=	100

10 As the fluidised bath heats up, the fluidising air flow should be reduced; excess fluidising air does not improve control performance, but does increase the risk of dust emission from the bath. The following fluidisation air flow rates have been found to provide performances within the system's specification:

-100°C	70 l/min
+20°C	25 l/min
+200°C	15 l/min

11 When the fluidised bath reaches the set temperature, the temperature controller will indicate the set temperature, the deviation meter to the left of the indicated temperature will appear as a single bar, and the heater indicator will cycle on and off.

For operation below +50°C

- 12 Turn off the forced dust extraction system switch; the green lamp should be extinguished.
- 13 Ensure that the nitrogen extraction system lever has been turned clockwise and is in the vertical position with the handle pointing downwards.
- 14 Open the nitrogen flowtrol valve, ensuring that the liquid nitrogen supply is connected, a flow rate 100 l/min will rapidly cool the bath (after an initial time delay while the pipework, etc is cooled).
If you are using cooled dry air a flow rate of approximately 70 l/min will maintain the bath at -100°C.
If you are using a compressor supplied by Techne or if the air is warm you will need nearer 95 l/min to maintain the bath at -100°C.
When operating below +50°C with the forced extraction system turned off, the secondary acrylic probe plate should be fitted on top of the probe plate carrier, this assembly being positioned on top of the fluidised bath.
- 15 Open the fluidising air control valve until the surface of the fluidising medium rises and starts to move with a flowing motion like boiling cream. Both the temperature controller and the heater indicator should be illuminated.
- 16 Again, the temperature controller is microprocessor based and allows the operator to alter the control time constants if required. The Eurotherm instruction manual details a method of determining the optimum control parameters for any set condition. We recommend that you perform an "Autotune" at an appropriate temperature, say mid-range, or if you are using one temperature for long periods at that temperature.
Set the desired operating temperature and control parameters on the temperature controller. The previous control parameters have been found to provide performance within the system's specification.
The control parameters may be adjusted to suit particular requirements.
- 17 As the fluidised bath cools down, the air flow should be increased to maintain the level of fluidisation as it was initially set.
- 18 The fluidising medium is hygroscopic and therefore may tend to freeze into a solid block. To avoid this situation it is recommended that the bath be heated above +100°C for 20 mins before sub-ambient operation. If the performance deteriorates the bath should be heated for a short period to drive off any moisture absorbed.

Calibration

- 1 When using the FB-08LT to calibrate thermal sensors such as thermocouples and platinum resistance thermometers, it is important to ensure that the working volume of the bath is thermally stable. Use an independent temperature sensor, such as a reference thermocouple, to check the temperature.
- 2 The temperature stability of the fluidised bath at any operating temperature may be improved by tuning the control parameters of the temperature controller to match the performance of the system under any set conditions. Adjustment details are contained within the manufacturers instruction manual for the Eurotherm temperature controller, we recommend that you "Autotune" at the appropriate temperature.
- 3 For precise calibration the actual temperature of the fluidised bath should be measured with an independent calibrated reference sensor; the temperature indicated by the temperature controller should only be used as a guide and not as an indication of absolute temperature.
- 4 The number of sensors calibrated in the fluidised bath at any one time should be kept to a minimum so as not to disturb the flow pattern within the bath. Typically up to 10 sensors of approximately 10 mm diameter may be calibrated without loss of performance.
- 5 The probe plate supplied with the FB-08LT may be machined to allow the sensors being calibrated access to the bath. This probe plate should always be positioned above the surface of the bath in the probe plate carrier so as to inhibit the loss of fine alumina particles from the surface of the bath.
- 6 Techne are able to offer a work basket which ensures that the probes being calibrated are held within the working volume of the bath, alternatively custom built probe holders are available. Probe holders locate the sensors being calibrated at a known position within the bath and act as equalising blocks so that the basic isothermal properties of the fluidised bath are further enhanced.

Dead Bed Calibration

- 1 Temperature stability during calibration may be further improved by using a dead bed calibration technique. This technique involves heating the bath to the required calibration point, then allowing the temperature of the bath to stabilise for a period of approximately 20 minutes, dependent upon the actual calibration temperature and the thermal mass of the sensors being calibrated.
- 2 The fluidised bed is collapsed by cutting off the fluidising air, the mains power and the liquid nitrogen supply (when in use) to the FB-08LT so that the sensors being calibrated are surrounded by a solid bed of alumina which acts as a thermal insulator. After a period of approximately 2 minutes at set temperature a stability of 0.01°C can

be achieved for a further period of approximately 8 minutes, dependent upon heat loss along the stem of the sensors being calibrated.

- 3 At the end of the required period of dead bed it is necessary to reconnect the fluidising air, mains power and liquid nitrogen (if required) to the FB-08LT.

Close Down

- 1 Ensure that the temperature of the fluidised bath is above the ambient temperature to inhibit the ingress of moisture into the fluidising medium.
- 2 Turn off the liquid nitrogen supply.
- 3 Turn off the mains power switch.
- 4 Close the fluidising air and nitrogen control valves.
- 5 Turn off the dust extraction system.

Maintenance

Daily Maintenance (or as Necessary)

Empty the cyclone collector bottle as follows (can be done whilst bath is hot):

- 1 Turn off fluidisation air.
- 2 Turn off dust extraction system.
- 3 Unscrew bottle from base of cyclone unit.
- 4 Screw on empty spare bottle.
- 5 Turn on dust extraction system.
- 6 Turn on fluidisation air until bath is just fluidised.
- 7 Carefully and slowly empty full bottle into top of bath. (Except for first bottle of new charge which should be thrown away).

Note: During normal operation the collector bottle should only become partially full during an 8 hour period. An excessive amount of alumina in the collector bottle suggest that the fluidised bath has been overfilled with alumina, check level in both. Add enough from the bottle to bring bath to correct level and keep remainder as spare material.

- 8 Increase fluidisation up to correct working level.
- 9 Check filter and clean or replace if necessary, when extraction system is switched off. (Note screw and filter may be hot).

Periodic Maintenance

The fluidised bath requires the following periodical inspection to be carried out to ensure trouble-free operation:

The condition of the alumina should be regularly checked during operation at sub-ambient temperatures. If the fluidised medium shows any signs of freezing, the bath should be heated above +100°C to drive off any moisture present.

The condition of the alumina should be checked to make sure that there are no lumps and, if practical, sieved occasionally. A fresh charge of alumina should be used if the medium is contaminated in any way.

Should the fluidised bath be stored for long periods of time under damp or humid conditions, moisture may be absorbed by the alumina which is hygroscopic. To avoid violent fluidisation which occurs when damp alumina is heated above 100°C, operate the bath for a period of approximately 8 hours at 90°C prior to operation at elevated temperatures.

The heaters should be checked for discolouration, oxidation or to determine if any build-up of alumina particles has taken place on the surface. The condition of the porous plate should be checked to see whether there are any oil stains or discolourations: if so, and fluidisation is impaired, replace the porous plate.

The air supply filter should be checked to ensure that the auto drain system is working and that the filters are in good condition.

SERVICING

Draining the Alumina Fluidising Medium

This is best done when the bath is cool as hot alumina can cause severe burns.

Ensure that the fluidisation air is turned off at the valve on the flowmeter, remove the drain cap situated at the bottom rear of the unit. **CAUTION, CAP MAY BE HOT.** If the flowmeter has not been turned off and the unit is connected to the air supply, a jet of alumina will be released when the cap is removed.

Fit the drain extension tube. Avoid over-tightening. The bath may now be drained by very slowly turning on the fluidising air at the flowmeter until a steady flow of alumina is obtained. Hot alumina should be drained into a well insulated container of suitable material to avoid fire hazards. Remove drain extension tube, clean thread of drain cap, and refit.

Note: Before replacing the platinum resistance thermometer sensor, or the heater elements the fluidised bath should be emptied of alumina, see para. 1 above. The air, nitrogen and electrical supplies must be disconnected at all times when servicing the system.

Replacing the PRT

- a) Remove nitrogen extraction system lever. Remove top front panel.
- b) Remove top cover.
- c) Remove the three screws securing the front panel along upper edge. **DO NOT DISTURB SCREW WITH EARTH SYMBOL ALONGSIDE IT.** Remove knurled nut from the extraction air switch and lower panel.
- d) Remove the two top half plates.
- e) Disconnect PRT leads from the rear of the temperature controller.
- f) Remove insulation adjacent to PRT entry in inner container.
- g) Slacken the PRT lock nut back about 10mm. Unscrew the parallel bush and remove the PRT.
- h) Reverse the operation for replacing the PRT ensuring that it does not touch the heater and that the sheath is clear of any electrical parts.

Replacing the Heaters

- a) Remove upper front panel as 2a) b), c) and d) above.
- b) Remove insulation locally to gain access to heater terminations.
- c) Disconnect wiring from heater and remove nuts and washers from heater unions.
- d) Withdraw heater through top aperture.
- e) Reverse the operation to replace the heater fitting new seal washers to the heater unions. It may be necessary to spring the heater in order to pass the terminations through the holes. Should the heater lay too close to the wall of the inner container at the bottom, pull it away gently.

Controller

To remove the controller from the panel open the small panel at the bottom of the front face of the controller and with a screwdriver turn the screw in the bottom right hand corner counter clockwise. The instrument will start to withdraw from the sleeve and once the screw has been turned to its furthest extent the instrument can be withdrawn by hand.

To replace the controller ease the instrument by hand into the sleeve to its furthest extent. About 10mm will be left protruding. With a screwdriver turn the screw in the bottom right hand corner clockwise until tight. The instrument will be pulled completely into the sleeve, engaging the rear terminals and be fully secured.

Should it be necessary to remove the sleeve, first remove the controller as above, then gain access to the rear of the front panel as above. Remove wiring from the rear of the sleeve, loosen the two retaining screws until it is possible to lift the screws outwards and push the mounting clamps into the sleeve. Replacement of the sleeve is in the reverse order.

Air Filters

Access to the compressed air filters can be gained through the front panel as above or through the bottom of the units. To replace the particle filter element or the oil filter element, unscrew the transparent filter bowl, then unscrew the filter element. Note when replacing the oil filter element the small "O" ring between the element and the housing should also be changed.

When refitting filter bowls, ensure that the rubber seal is in place.

NOTE: REGULATORS ARE FACTORY SET AND SHOULD NOT BE ADJUSTED.

Porous Plate

It should be noted that replacement of the porous plate is rarely necessary; however, should the plate become blocked or damaged the following instructions should be followed.

- a) Empty the unit of alumina as in 1 above.
- b) Remove the top front panel, top cover, and top plates as above.
- c) Remove the loose fill thermal insulation surrounding the inner container assembly. Do not remove the blanket insulation which is attached to the inner container assembly.
- d) Note the order in which the internal pipework is connected to the inner container assembly and carefully disconnect each of the pipes which connect to the inner container. Disconnect the large bore black flexible hose that connects the output of the extraction system air mover to the input of the cyclone.
- e) Note the order of and disconnect the wires from the terminal strip to the heater elements.
- f) Note the order of and disconnect the wires from the rear of the temperature controller to the platinum resistance thermometer.
- g) Remove the inner container assembly from the outer wrapper by carefully lifting the inner container.
- h) Turn the inner container assembly upside down and remove the nuts, bolts and washers which secure the plenum chamber to the inner container. Pull the plenum chamber clear of the inner and remove the porous plate.
- j) Clean any sealant from the flanges of the plenum chamber and inner container. A seal of Red Hermetite should be placed on both of the above flanges when fitting a new porous plate. Fit the porous plate while the seal is still wet, ensure that the porous plate and plenum chamber are correctly aligned with the offset hole in the inner container assembly.
- k) Then fit the nuts, bolts and washers and tighten them to a torque of 2.75-2.7 Nm (20-24 lb ins).
- l) Reassemble the unit in the reverse order to the above ensuring that all pipe connections are correctly made and that the thermal insulation is evenly packed around the inner container assembly.

Flowmeter Tube

- a) Remove the protective cover.
- b) Remove flow tube by first removing plastic clip at top of flow tube, lift flow tube up and remove bottom of tube clear of flowmeter assembly. Pull tube downwards from top insert.
- c) Fit float with the pointed end down, into the tube.
- d) Push tube on to top insert, line tube with bottom insert, pull flow tube and top insert down until flow tube is fully engaged on bottom insert, refit plastic clip.
- e) Refit protective cover.

Fluidisation Pressure Switch

This is preset to cut off the electrical supply to the heater element and the temperature controller should the fluidisation air flow be interrupted. It is secured to the central wrapper; access is gained via the front panel as above.

Fuse

A quick blow fuse is fitted in the fuse holder on the front panel.

Solid State Relay

Gain access to rear of front panel as above. Remove the top right hand front panel; the solid state relay is mounted on the inside face of this panel. Remove wiring from the solid state relay, the base of the relay should be smeared with heat sink compound. Refit wires and replace front panel.

FAULT FINDING

The following guide has been prepared should a fault develop with the fluidised bath. The procedures laid down should be followed using only the specified replacement parts. If the fault cannot be located by using this guide, Techne carry full service facilities.

If the unit fails to operate, check the fuse, electrical and air supplies.

FAULT

CHECK

POOR FLUIDISATION

- a) Unit not level
- b) Inadequate air flow
- c) Inadequate air supply
- d) Air filters blocked
- e) Fluidising medium frozen
- f) Defective air flow meter
- g) Bath overfilled with alumina
- h) Fluidisation restricted by large mass placed in bath
- i) Porous plate blocked

POOR TEMPERATURE CONTROL

It should be noted that in order to achieve good thermal conditions within the fluidised bath, it is important that the bath is properly fluidised. If all the instructions have been followed concerning the fluidisation in the operating procedure, there could be a fault with:

- a) The temperature control unit. A separate leaflet is provided which covers fault finding and service of this unit
- b) The Solid State Relay.

POWER ON BUT CONTROLLER

DOES NOT ILLUMINATE

- a) **Check there is no restriction in the air supply. Supply to the unit must be at 60 psi with 130 L/min flow.**
- b) Check blue silicone rubber tube, from plenum chamber to the pressure switch, is in place. Check the stud in the centre of the plenum chamber is in place.
- c) Check the bath is filled with media to correct level.
- d) With extraction switch off, switch on air supply, open valve on flowmeter until float is at the top of the tube.

- e) If the float does not rise:
 - 1 Check the air supply again.
 - 2 Check the pipework for kinks and leaks.
NOTE: The oil filter has a continuous bleed of air on drain pipe.
 - 3 Check the regulator in the unit has not been closed. NB. If the regulator is changed, air must be re-calibrated to 10psi. See booklet.
- f) If the float does rise, check the bed is fluidising.
- g) If the bed does not fluidise:
 - 1 Check for leaks in the pipework
 - 2 Check for leaks in blue silicone tube
- h) If the bed does fluidise, switch on extraction air.
- i) Check that the flowmeter float does not drop more than 5 L/min.
- j) If the float drops:
 - 1 Air supply is insufficient
 - 2 Air mover is out of adjustment
- k) If the float does not drop, switch on power with the mains switch.
- l) Check switch illuminates.
- m) If the mains switch does not illuminate:
 - 1 Check the mains supply
 - 2 Check fuse
 - 3 Check wiring
 - 4 Check switch
- n) If the mains switch does illuminate check the controller display illuminates
- o) If the controller does not illuminate:
 - 1 Check wiring
 - 2 Check micro switch is lifting (on pressure switch).
 - 3 Lift micro switch lever; if controller illuminates then there is insufficient air; start again.
 - 4 If the controller does not illuminate when the micro switch is lifted the pressure switch is faulty or the controller is faulty
 - 5 Replace the pressure switch and test again.
 - 6 If the fault persists replace the controller.

TEST SPECIFICATION

Equipment necessary for the test:

a Millivolt source, a DVM and a Precision Thermometer

1 Initial Checks

- a Carry out visual check on overall finish and that the general construction complies with the main assembly drawings.
- b Release front panel of unit and carry out tug test on all wiring connections.
- c Check that the wiring is tidy and that the general layout inside the unit complies with the assembly drawing wiring diagram.
- d Check that the fuse is fitted and that it is of the correct value.

2 Electrical Test

Always complete any safety checks, Earth Leakage, Heater Insulation, etc after servicing the FB-08LT.

3 Operation

- a Connect a suitable air supply to the inlet at rear of air unit.
- b Connect LN₂ input to LN₂ supply set at 24 lb/in². Connect LN₂ exhaust to exhaust hose. Fill bath with alumina
- c With an LN₂ supply of 24 lb/in² check that max LN₂ flow (with fluidisation air set at 0) is approximately 100 l/min.
- d With air supply pressure of 60 lb/in², check that max fluidisation air flow (with N₂ flow set at 100 l/min) is 70 l/min.
- e Select dust extraction switch ON, green indicator should illuminate. If indicator does not illuminate or dust extraction is not enough adjust the air mover until system operates satisfactorily.
- f Set flow meter to maximum flow. Connect unit to suitable power supply and switch ON. Bath will then operate. Check for leaks.
- g Perform an "Autotune" at an appropriate temperature
- h With probe plate fitted, extraction on, and changeover lever horizontal, heat from +20°C to +200°C. Heat up time should be less than 30 minutes.

Record temperature stability.

Short term stability should be within $\pm 0.2^\circ\text{C}$.

Long term stability should be within 0.5°C .i With system set as in (h) cool unit to +50°C using 100 l/min N₂.

- j With perspex probe plate fitted on top of probe plate carrier, extraction off, and changeover lever vertical cool from +50°C to -100°C using 100 l/min N₂. Cool down time should be less than 90 minutes. Record temperature stability changing power setting on Controller to 25%. NOTE: With nitrogen flow of approximately 60 litres/minute and air flow of 70 litres/minute. Short term stability should be within $\pm 0.5^\circ\text{C}$.

5 Completion of Test

- a After completion of test allow the unit to cool down and then drain the media.
- b Thoroughly clean unit.

SPARES LIST

POROUS PLATE	6001557	6001557
SSR	6008457	6008457
FILTER ELEMENT PARTICLE	6009131	6009131
FILTER ELEMENT OIL	6009132	6009132
FUSE	6008181	6008181
THERMOCOUPLE	6005282	600528
HEATER	6007477	6007477
WASHER	6001081	6001081
FILTER EXHAUST	6007558	6007558
TUBE for FLOW CONTROLLER	6009189	6009189
CAPSULE for PRESSURE SWITCH	6000435	600043
CONTROLLER (815S)	6100341	6100341
CONTROLLER(2204E)	6104498	6104498
MAINS SWITCH	6500937	6500937
DRIER ASSEMBLY	6009457	6009457

Accessories

Accessories supplied as standard

- L3948 EXTENSION TUBE
- L7764 PROBE PLATE
- LA244 ACRYLIC PROBE PLATE

The FB-08LT provides a calibration medium for a wide range of sensor shapes and sizes. However, in cases where there is a constant probe size, it is sometimes more convenient to use a probe holder as this provides a metallic thermal shunt so that the basic isothermal properties of the bath are further enhanced.

Accessories available for the FB-08LT are:

- a) Probe holders (made to customers' requirements by Techne)
- b) Air compressor (for use where air line supply is inadequate).