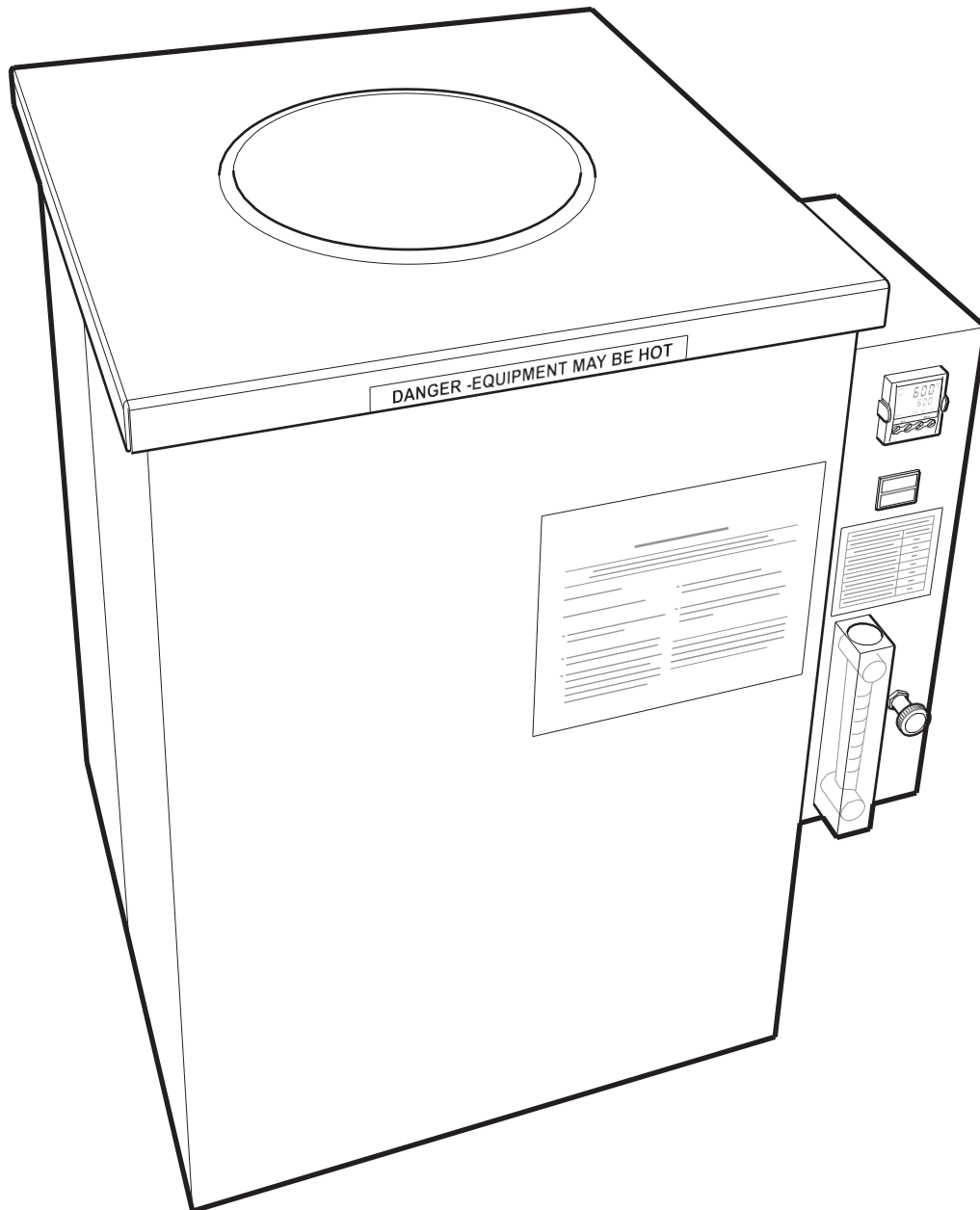


Cole-Parmer®

FSB-200 Series

Industrial Fluidised Sand Bath



Instruction Manual
7002661 Version 6

Cole-Parmer®
essentials

CONTENTS

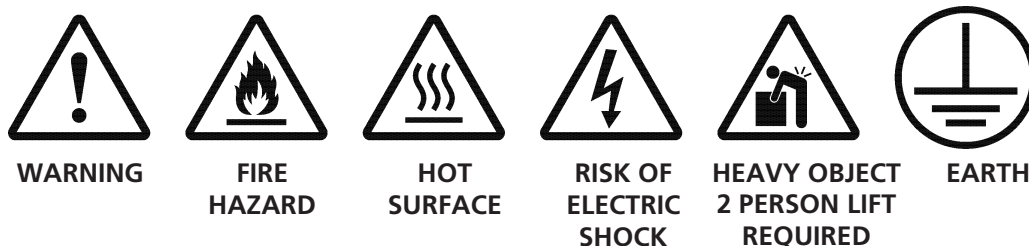
IMPORTANT SUPPLEMENTARY SAFETY INFORMATION	3
GENERAL DESCRIPTION	4
BEFORE USE	5
SAFETY AND INSTALLATION	6
English	6
Français	8
Deutsch	10
Español	12
Italia	14
WARNING	16
PRINCIPLE OF OPERATION AND SAFETY FEATURES	17
DESCRIPTION OF COMPONENTS AND FRONT PANEL CONTROLS	18
INSTALLATION	19
Set-up	19
OPERATION	20
Start-Up	20
Air adjustment	20
Bath temperature	20
Extraction Air setup	20
Shut-Down	21
PID Temperature Controller	21
THE CLEANING PROCESS	22
FUME IGNITION	23
FUME EXTRACTION AND CLEANING	24
OPERATOR MAINTENANCE	25
Special maintenance procedures when burning off PVC or other halogenated polymers	26
FAULT FINDING	27
SERVICE, REPAIR AND TECHNICAL SUPPORT	28
TECHNICAL SPECIFICATION	29
REPLACEMENT PARTS	30
ACCESSORIES	30
DECLARATION OF CONFORMITY	31

IMPORTANT SUPPLEMENTARY SAFETY INFORMATION

Introduction

Cole-Parmer Industrial fluidised Baths (IFB) are safe and effective equipment when installed and operated correctly in accordance with the user manual. However, if used incorrectly they can pose a safety risk. Antylia Scientific Ltd have designed all models of fluidised baths to protect operators from hazards but users should pay attention to the following points.

Symbols Defined



Caution

1. Please read the Instruction Manual before installation and use.
2. Some Cole-Parmer Fluidised Baths can heat up to 700°C. High temperatures are dangerous and can cause serious burns to operators and ignite combustible material.
3. Use care and wear protective gloves to protect hands and protective glasses to protect eyes.
4. Do not put hot objects on or near combustible objects.
5. Do not operate the unit close to inflammable liquids or gases.
6. Do not place any liquid directly in the unit.
7. Always ensure a suitable, adequate ventilation system is used when equipment is in use.
8. Always install fireproof metal ducting with sufficient airflow where applicable.

Maintenance

1. When performing maintenance, always disconnect from power supply and cool below 50°C.
2. Antylia Scientific Ltd recommend regular cleaning of fluidised baths. Externally, wipe with a damp soapy cloth. No abrasive cleaners should be used. Care should be taken to prevent any water entering the unit.
3. Regular internal and external inspection of extraction ducting is recommended to detect any damage and ensure the internals are clean. Any build-up of particles or debris discovered in the extraction ducting requires the ducting to be cleaned or replaced.
4. In fluidised baths used for polymer burn-off, please regularly inspect fluidising medium, remove any foreign debris and replace with clean fluidising medium as required.
5. Never top-up a hot fluidised bath with cold fluidising medium. Always cool below 50°C first.

Please note:

1. Please ensure an adequate risk assessment is performed before use of a fluidised bath.
2. Please ensure the appropriate temperature is used for the application, always stay safely below the combustion temperature of any material or sample in a fluidised bath.
3. Fluidising airflow must be switched on before heating a fluidised bath and left operational until the bath cools to below 50°C.
4. Do not overfill fluidising media. When fluidised, the aluminium oxide level should be approximately 100mm (4") from the top surface of the bath at your maximum operating temperature.
5. In fluidised baths used for polymer burn-off, always remove excess polymer from sample.
6. In applications where materials being treated produce acidic vapours during thermal decomposition, it is recommended a fume scrubber is utilised to ensure fume emission from the plant conforms to local regulations.
7. If you have any questions, please contact cptechsupport@antylia.com.

GENERAL DESCRIPTION

The Cole-Parmer Industrial Fluidised Baths (IFB) FSB-200-51 and FSB-200-121 have been specially designed for removing plastic residue from extruder tools, moulding machine tools and associated parts.

The fluidised bath employs the principle of fluidisation of a mass of finely divided inert particles by means of an upward flow of gas. A state of fluidisation is achieved when the individual particles become microscopically separated from each other by the moving gas. This "fluidised bed" of particles has unusual properties which differ markedly from either those of the gas or of the solid particles. Instead, the fluidised bed behaves remarkably like a liquid, exhibiting characteristics which generally attribute to a liquid state. For example, the fluidised bed can be agitated and bubbled; it always seeks a common level; materials of less density will float while those with densities greater than the equivalent fluidised bed density will sink; and, most important, the heat transfer characteristics between the fluidised bed and a solid interface can have an efficiency approaching that of an agitated liquid.

In addition, the fluidised solid phase has a most unusual physical behaviour, in that its basic characteristics change only slightly over very large temperature ranges; it has no melting point and no boiling point. The lowest temperature available is the liquefaction point of the gas used for fluidisation, while the highest temperature level is the usable temperature of the inert solid. Various metal oxides with allowable temperatures of over 1700°C are readily available. The metal oxide beds commonly used, (e.g. aluminium oxide) are non-flammable, non-explosive and non-toxic.

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. Any other inert gas, such as nitrogen, could be used for special applications e.g. if a non-oxidising atmosphere is required, provided appropriate precautions are taken.

The unique characteristics of gas-fluidised particles is the relatively high rate of heat transfer which yields highly isothermal conditions, as well as excellent heat transfer to solid surfaces. This characteristic is due to the turbulent motion and rapid circulation rate of the solid particles in conjunction with the extremely high solid-gas interface area. Therefore, even though gas-solid interfaces normally yield low heat transfer coefficients and the solids normally have low thermal conductivities, the overall heat transfer characteristics of fluidised particles approach those of a liquid.

The combination of excellent heat transfer characteristics and high heat capacity are ideal for attaining rapid stabilisation at an isothermal condition.

Cole-Parmer Industrial Fluidised Baths use alundum - fused brown aluminium oxide - as the fluidising medium. They have been designed to remove plastic residue from extruder and moulding machine tools, paint build up from paint fixtures and carry out various heat treatment processes. When used for burning plastic residues, the IFB's should be installed with an adequate fume extraction system. An extraction fan and fume extraction collar can be supplied.

BEFORE USE

Thank you for purchasing this Cole-Parmer product. To get the best performance from the equipment, and for your own safety, please read these instructions carefully before use. If there is any doubt relating to the proper use of this equipment, the staff at Antylia Scientific Ltd. or your supplier will be happy to assist you.

UNPACKING

When unpacking the unit please ensure that the following have been removed from the packaging:

Part code	Item description
FSB-200-5I or FSB-200-12I	Industrial Fluidised Bath
7002661	Instruction manual
	Eurotherm controller instructions

Please note that the aluminium oxide fluidising medium must be ordered separately:

Part code	Item description
Brown/ALO	Alundum - brown aluminium oxide, 25kg.

The FSB-200-5I requires 40kg of aluminium oxide and the FSB-200-12I, 73kg of aluminium oxide.

The user is advised to keep the original packaging in case the instrument ever needs to be returned for service or repair. Antylia Scientific Ltd. accepts no responsibility for damage incurred unless the unit is correctly packed and transported in its original packaging.

If the equipment is not used in the manner described in this manual and with accessories other than those recommended by the manufacturer, the protection provided may be impaired.

SAFETY AND INSTALLATION

Please read all the information in this Instruction Manual before using the unit.

WARNING

HIGH TEMPERATURES ARE DANGEROUS: they can cause serious burns to operators and ignite combustible material.

Antylia Scientific Ltd have taken great care in the design of these units to protect operators from hazards, but operators should pay attention to the following points:



- USE CARE AND WEAR PROTECTIVE GLOVES TO PROTECT HANDS AND SAFETY GLASSES TO PROTECT EYES.
- DO NOT use combustible substances near hot objects.
- DO NOT operate the instrument in the vicinity of inflammable liquids or gases.
- DO NOT place any liquid directly into the instrument.
- At all times USE COMMON SENSE.

OPERATOR SAFETY

All operators of Cole-Parmer 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 Antylia the protection provided by the equipment to the operator may be impaired.

All Cole-Parmer units have been designed to conform to international safety requirements and are fitted with an over-temperature cut-out. On some models, the cut-out is adjustable and should be set to suit the application. On all other models the cut-out is pre-set to protect the unit.

If a safety problem should be encountered, switch off at the mains power supply.

INSTALLATION



Before connecting the instrument to the mains electricity supply, check the voltage against the rating plate (located on the back of the unit). **Please note that the unit must be earthed to ensure proper electrical safety.**

Connections 220V-240V

Live	Brown
Neutral	Blue
Earth	Green/yellow

Note: The FSB-200-5I and FSB-200-12I are classified as “Permanently Connected Equipment” and should be connected to the electricity supply by a qualified electrician.

A suitable supply for the FSB-200-5I is rated at 4kW, 220-240V, 50/60Hz~ single phase.

A suitable supply for the FSB-200-12I is rated at 6kW, 220-240V, 50/60Hz~ single phase

The equipment is supplied with 2.5m of flexible, triple core, circular cable to the following specification: 4.0mm², to BS 6500 or equivalent and <HAR> or BASEC approved. Connection to the mains electrical supply should be via a double pole 30mA Residual Current Breaker with Overcurrent protection (RCBO) isolating circuit breaker switch with a continuous current carrying capacity of 30A at 250V and overcurrent of 30A.

Do not switch on until the unit is fully installed.

ENVIRONMENTAL CONDITIONS

This equipment is designed to operate under the following conditions:

- Indoor use
- Use in a well-ventilated area
- Ambient temperature range +5°C to +40°C
- Altitude to 2000 m (6500 ft.)
- Relative humidity 80%
- Mains supply fluctuations not exceeding 10%
- Overvoltage category II IEC60364-4-443
- Pollution degree 2 IEC664

OPERATOR MAINTENANCE

NOTE: THAT THIS EQUIPMENT SHOULD ONLY BE DISMANTLED BY PROPERLY TRAINED PERSONNEL. REMOVING THE SIDE, FRONT OR REAR PANELS EXPOSES POTENTIALLY LETHAL MAINS VOLTAGES. THERE ARE NO OPERATOR 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. Antylia Scientific Ltd accept no responsibility for damage to units which are not properly packed for shipping: if in doubt, contact your supplier.

1.Cleaning

Before cleaning your unit ALWAYS disconnect it from the power supply and allow it 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.Over-temperature cut-out

In the event of no heater power, check the mains plug and lead. Repeated operation of the cut-out indicates a serious fault: you may need to return the unit to your supplier for repair.

3.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.

SÉCURITÉ ET CONSIGNES D'INSTALLATION

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.

Antylia Scientific Ltd 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 :



- UTILISEZ ET PORTEZ DES GANTS DE PROTECTION POUR PROTÉGER VOS MAINS ET DES LUNETTES DE SÉCURITÉ POUR PROTÉGER VOS YEUX.
- 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 Cole-Parmer 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 Cole-Parmer Ltd, la protection pour l'utilisateur ne serait alors plus garantie.

Tous les appareils Cole-Parmer 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-réglé en usine pour assurer la protection de l'appareil.

En cas de problèmes de sécurité, coupez l'alimentation secteur.

INSTALLATION



Avant de raccorder l'appareil à l'alimentation électrique sur secteur, vérifier la tension requise indiquée sur la plaque d'identification (située au dos de l'appareil). **Il est important que l'appareil soit relié à la terre pour assurer la protection électrique requise.**

Connexions 220V-240V

Phase	Marron
Neutre	Bleu
Terre	Vert/jaune

Remarque : les modèles FSB-200-5I et FSB-200-12I sont classés en tant qu'« Équipement branché en permanence » et devraient être raccordés au réseau électrique par un électricien qualifié.

Une alimentation électrique adaptée au modèle FSB-200-5I correspond à 4 kW, 220-240 V, 50/60 Hz[~] monophasé. Une alimentation électrique adaptée au modèle FSB-200-12I correspond à 6 kW, 220-240 V, 50/60 Hz[~] monophasé.

L'équipement est doté d'un câble circulaire flexible à trois conducteurs, de 2,5 m de long, répondant aux spécifications suivantes : 4,0 mm², à BS 6500 ou équivalent et approuvé par <HAR> ou BASEC. La connexion au réseau électrique devrait être faite par le biais d'un disjoncteur à courant continu résiduel bipolaire de 30 mA, doté d'un système de protection de surintensité (RCBO), un disjoncteur isolant avec une capacité de transport de courant de 30 A à 250 V et surintensité de courant de 30 A.

Ne pas allumer avant que l'unité soit complètement installée.

CONDITIONS ENVIRONNEMENTALES

Cet appareil est conçu pour fonctionner dans les conditions suivantes:

- Pour un usage intérieur seulement
- Utilisation dans un lieu correctement ventilé
- Température ambiante +5°C à +40°C
- Altitude inférieure à 2000m
- Humidité relative ne dépassant pas 80%
- Fluctuations de l'alimentation n'excédant pas 10% de la valeur nominale
- Catégorie II IEC 60364-4-443 de surtension
- Degré de pollution 2 IEC664

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. Antylia Scientific Ltd 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.

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. Coupe-circuit d'excès de température

- En l'absence de puissance de chauffe, vérifiez la prise et le câble d'alimentation puis réglez la commande du coupe-circuit (si votre appareil est doté de ce mécanisme).
- Si la sécurité se déclenche trop souvent, il s'agit d'un problème plus sérieux. Nous vous conseillons dans ce cas de prendre contact avec votre fournisseur pour réparation.

3. 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 rendre contact avec votre fournisseur pour réparation.

SICHERHEITS - UND INSTALLATIONSINFORMATIONEN

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.

Antylia Scientific Ltd hat bei der Konstruktion dieses Gerätes sehr darauf geachtet, daß der Bediener vor Gefahren geschützt ist. Dennoch sollten Sie auf die folgenden Punkte achten:



- TRAGEN SIE SCHUTZHANDSCHUHE ZUM SCHUTZ IHRER HÄNDE UND SETZEN SIE EINE AUGENSCHUTZBRILLE AUF.
- KEINE brennbaren Stoffe in der Nähe heißer Gegenstände verwenden.
- Das Gerät NICHT in der Nähe entzündlicher Flüssigkeiten oder Gase betreiben.
- Flüssigkeiten NICHT direkt auf das Gerät auftragen.
- Benutzen Sie immer den normalen Menschenverstand.

SICHERHEIT DES ANWENDERS

Alle Benutzer von Cole-Parmer Geräten müssen Zugang zu der entsprechenden Literatur haben, um ihre Sicherheit zu gewähren.

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 Cole-Parmer 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.

Sollte ein Sicherheitsproblem auftreten, schalten Sie die Hauptstromversorgung aus.

INSTALLATION



Vor dem Anschluss bitte kontrollieren, ob die Stromversorgung den Angaben auf dem Typenschild auf der Geräterückseite) entspricht. **Um die elektrische Sicherheit zu gewährleisten, muss dieses Gerät geerdet werden.**

Anschluss 220V-240V

Phase	Braun
Neutral	Blau
Erde	Grün/Gelb

Hinweis: FSB-200-5I und FSB-200-12I sind als „Permanent angeschlossene Geräte“ eingestuft und sollten von einem qualifizierten Elektriker an den Stromanschluss angeschlossen werden.

Die geeignete Stromversorgung für das Gerät FSB-200-5I beträgt 4kW, 220-240V, 50/60Hz~, einphasig. Die geeignete Stromversorgung für das Gerät FSB-200-12I beträgt 6kW, 220-240V, 50/60Hz~, einphasig.

Das Gerät wird mit einem 2,5 m langen flexiblen, dreiadrigen Rundkabel mit folgenden Spezifikationen betrieben: 4,0 mm², BS 6500 oder gleichwertig und <HAR>- oder BASEC-zertifiziert. Der Anschluss an das Stromnetz sollte über einen doppelpoligen 30 mA Fehlerstrom-Schutzschalter mit Überstromauslöser (RCBO) und einen Trennschalter mit einer kontinuierlichen Strombelastbarkeit von 30 A bei 250 V und Überstrom von 30 A erfolgen.

Schalten Sie das Gerät erst ein, wenn das Gerät vollständig installiert ist.

UMWELTBEDINGUNGEN

Dieses Gerät ist für den Betrieb unter folgenden Bedingungen ausgelegt:

- Nur für den Betrieb in Innenräumen
- Betrieb in gut belüfteten Räumen
- Umgebungstemperaturbereich: +5°C bis +40°C
- Höhenlagen bis 2000 m
- Relative Luftfeuchtigkeit maximal 80 %
- Schwankungen in der Stromversorgung maximal 10 %
- Überspannungskategorie II IEC60364-4-443
- Verschmutzungsgrad 2 IEC664

WARTUNG DURCH DEN BEDIENER

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

DURCH ENTFERNEN DES GERÄUSES ODER GEHÄUSETEILEN SIND BAUTEILE MIT LEBENGEFÄHRLICHEN SPANNUNGEN FREI ZUGÄNLICH.

IM INNERN 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 Antylia Scientific Ltd und thermo-DUX keine Haftung bei Transportschäden aufgrund unzureichender Verpackung übernehmen. Setzen Sie sich im Zweifelsfall mit Ihrem Lieferanten in Verbindung.

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.Übertemperaturabschalter

- Der Übertemperaturschutz ist ein empfindliches mechanisches Teil. Schon eine Erschütterung kann diesenauslösen.
- Falls die Heizung nicht funktioniert, überprüfen Sie zuerst Netzstecker und Kabel. Setzen Sie dann denÜbertemperaturabschalter (an der Rückseite des Gerätes) wieder zurück, indem Sie den roten Knopf einmalbis zum Anschlag drücken.
- Wenn der Übertemperaturabschalter wiederholt auslöst, liegt ein größerer Defekt vor. Das Gerät mußzur Reparatur an Ihren Lieferanten eingeschandt werden.

3.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 eingeschandt werden.

INFORMACIÓN DE SEGURIDAD E INSTALACIÓN

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.

Antylia Scientific Ltd 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:



- UTILIZAR CON PRECAUCIÓN Y CON GUANTES PROTECTORES PARA PROTEGER LAS MANOS Y GAFAS DE SEGURIDAD PARA PROTEGER LOS OJOS.
- 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 Cole-Parmer 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 Cole-Parmer 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.

Si encuentra un problema de seguridad, desconecte el dispositivo de la red eléctrica.

INSTALACIÓN



Antes de conectar el instrumento al suministro eléctrico, compruebe que el voltaje coincida con el indicado en la placa de régimen (situada en la parte trasera de la unidad). **El instrumento debe disponer de una toma de tierra para garantizar la seguridad eléctrica adecuada.**

Conexión	220V-240V
Con corriente	Marrón
Neutro	Azul
Toma de tierra	Verde/amarillo

Nota: El FSB-200-5I y el FSB-200-12I tienen la clasificación de "Equipo Permanentemente Conectado" y deben ser conectados a la red eléctrica por un electricista cualificado.

Un suministro apto para el FSB-200-5I tiene una calificación de 4 kW, 220-240 V, 50/60 Hz~ monofase. Un suministro apto para el FSB-200-12I tiene una calificación de 6 kW, 220-240 V, 50/60 Hz~ monofase.

El equipo cuenta con un cable circular flexible de triple núcleo de 2,5 m con la siguiente especificación: 4,0 mm², conforme a BS 6500 o equivalente y <HAR> o aprobado por el BASEC. La conexión a la red eléctrica debe ser a través de un disyuntor por corriente diferencial con protección de sobrevoltaje (RCBO) doble polo de 30 mA con una capacidad de conducción de corriente continua de 30 A a 250 V y sobrevoltaje de 30 A.

No conectar hasta que la unidad esté totalmente instalada.

CONDICIONES AMBIENTALES

Este equipo se ha diseñado para funcionar en las condiciones siguientes:

- Sólo para uso en interior
- Se debe utilizar en un área bien ventilada
- Rango de temperatura ambiente: de +5°C a +40°C
- Altitud: hasta 2000 m
- Humedad relativa: inferior al 80%
- Fluctuación de la alimentación eléctrica: inferior al 10%
- Categoría de sobretensión II: según IEC 60364-4-443
- Grado de contaminación: 2 IEC664

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. Antylia Scientific Ltd 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.

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.Desconexión en caso de sobretemperaturas

El sistema de desconexión en caso de sobretemperaturas es un dispositivo mecánico sensible (una sacudida mecánica podría desconectarlo).

- Si el calefactor no recibiera alimentación, compruebe el enchufe y el cable de la toma de corriente; a continuación vuelva a ajustar el control del dispositivo (si su equipo lo lleva montado).
- Una desconexión repetida indicaría una avería grave; puede que tenga que devolverle el aparato a su proveedor para su reparación.

3.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.

INFORMAZIONI SULLA SICUREZZA E L'INSTALLAZIONE

Prima di utilizzare l'apparecchio, leggere tutte le informazioni contenute in questo manuale.

ATTENZIONE

Le alte temperature sono pericolose: possono causare ustioni gravi all'utilizzatore e possono causare la combustione di materiale infiammabile. La Antylia Scientific Ltd ha posto particolare cura nel progettare questo strumento, al fine di proteggere gli operatori da eventuali pericoli, ma gli utilizzatori devono prestare attenzione ai seguenti punti::



- USARE CON PRUDENZA E INDOSSARE GUANTI PROTETTIVI PER PROTEGGERE LE MANI E OCCHIALI DI SICUREZZA PER PROTEGGERE GLI OCCHI.
- NON usare sostanze combustibili vicino ad oggetti caldi
- NON mettere in funzione lo strumento nei pressi di liquidi o gas infiammabili
- NON collocare alcun tipo di liquido direttamente nello strumento.
- In ogni caso Usare Buon Senso.

SICUREZZA PER L'UTILIZZATORE

Il personale che utilizza l'apparecchiatura Cole-Parmer deve avere a disposizione la documentazione necessaria al fine di assicurare la loro incolumità.

È importante che solo personale adeguatamente addestrato utilizzi questo apparecchio, in conformità alle istruzioni contenute in questo manuale e nel rispetto delle normative e procedure generali di sicurezza. Se l'apparecchio è utilizzato in modo non specificato da Antylia Scientific Ltd, la protezione fornita dall'apparecchiatura all'utilizzatore potrebbe essere a rischio.

Tutte le unità Cole-Parmer sono state progettate in conformità ai requisiti internazionali di sicurezza e sono equipaggiate con un interruttore anti surriscaldamento. Su alcuni modelli, l'interruttore è regolabile e dovrebbe essere impostato secondo l'utilizzo. In tutti gli altri modelli l'interruttore è prerogolato per proteggere l'unità.

Se si dovesse verificare un problema di sicurezza, spegnere l'alimentazione generale.

INSTALLAZIONE



Prima di collegare lo strumento all'alimentazione elettrica di rete, controllare la tensione confrontandola con la targhetta riportante i valori nominali (si trova sul retro dell'unità). **Notare che al fine di garantire la corretta sicurezza elettrica, occorre che l'unità sia messa a terra.**

Connessione 220V-240V

Sotto tensione	Marrone
Neutro	Blu
Terra	Verde/giallo

Attenzione: FSB-200-5I e FSB-200-12I sono classificati come "Apparecchiature Collegate Permanentemente" e dovrebbero essere collegati all'impianto elettrico da un elettricista qualificato.

L'alimentazione adeguata per l'IFB-51 è indicata come monofase a 4kW, 220-240V, 50/60Hz~.

L'alimentazione adeguata per l'IFB-52 è indicata come monofase a 6kW, 220-240V, 50/60Hz~.

L'attrezzatura viene fornita con 2,5 m di cavo flessibile, tripolare e a sezione circolare, secondo le seguenti specifiche: 4,0mm², conforme a BS 6500 o equivalenti e approvato da <HAR> o BASEC. Il collegamento all'alimentazione generale dovrebbe essere effettuato tramite un interruttore differenziale bipolare da 30mA con sganciatore di sovracorrente isolante (RCBO) con capacità di trasporto di corrente continua di 30A a 250V e sovracorrente di 30A.

Non accendere fino a quando l'unità non sia stata completamente installata.

ENVIRONMENTAL CONDITIONS

Condizioni di esercizio previste:

- Solo per uso in ambienti chiusi
- Usare in ambienti ben ventilati
- Temperatura ambiente da +5°C a +40°C
- Altitudine fino a 2000 m
- Umidità relativa non superiore all'80%
- Oscillazione dell'alimentazione elettrica non superiore al 10%
- Categoria di sovratensione II IEC60364-4-443
- Grado di inquinamento 2 IEC664

MANUTENZIONE

QUESTO APPARECCHIO DOVRÀ ESSERE APERTO ESCLUSIVAMENTE DA PERSONALE ADEGUATAMENTE ADDESTRATO.

LA RIMOZIONE DEI PANNELLI LATERALI, FRONTALI O POSTERIORI PUÒ ESPORRE POTENZIALMENTE A VOLTAGGI DI CORRENTE LETALI.

ALL'INTERNO DELL'APPARECCHIO NON CI SONO PARTI MANUTENIBILI DA PARTE DELL'UTILIZZATORE.

Nell'eventualità che si riscontri un problema con l'apparecchio che non può essere facilmente risolto, si dovrà contattare il proprio fornitore e restituire, se necessario, l'apparecchio. Si prega di specificare nel dettaglio i difetti riscontrati e di ricordare di restituire l'apparecchio nel suo involucro originale. La Antylia Scientific Ltd non si fa carico di alcuna responsabilità per danni subiti dall'apparecchio che non sia stato propriamente imballato per il trasporto; in caso di dubbio, rivolgersi al fornitore.

1.Pulizia

Prima di pulire il vostro apparecchio, disconnettere sempre la presa di alimentazione e lasciare raffreddare sotto i 50°C. Questo apparecchio può essere pulito passando un panno inumidito con sapone. Si deve prestare attenzione onde prevenire l'ingresso dell'acqua all'interno dell'apparecchio. Non utilizzare per la pulizia sostanze abrasive.

2.Disconnessione in caso di surriscaldamento

In caso di non funzionamento dell'apparecchio, controllare la spina elettrica e il relativo cavo collegati alla rete. Ripetute interruzioni del funzionamento dell'apparecchio indicano un serio malfunzionamento: in questo caso restituire l'apparecchio al fornitore per la riparazione.

3.Fusibili

L'apparecchio è protetto da uno o due fusibili. Questi dovrebbero essere sostituiti solo da personale qualificato. Se i fusibili si bruciano frequentemente ciò indica un malfunzionamento serio e in questo caso si consiglia di contattare il fornitore per le riparazioni.

WARNING



Poor fluidisation causes hot spots, heater failure and damage to other parts. Follow this Instruction Manual carefully. For correct fluidisation, pay attention to the following:

INSTALLATION

- Ensure the bath is level and air supply is adequate.

OPERATION

- Adjust air valve for even fluidisation.
- Do not insert objects larger than recommended.
- Ensure objects do not lie in contact with container wall or porous plate. Sample buckets are available.

MAINTENANCE

- Regularly inspect and maintain the air filter to eliminate oil vapour in the air supply.

ALUMINIUM OXIDE

- Before handling the aluminium oxide, consult the MSDS for safe handling. Contact cptechsupport@antylia.com if you require a copy.
- Aluminium oxide is non-hazardous but dust may irritate the eyes and the respiratory system and cause skin irritation.
- Provide appropriate exhaust ventilation at places where dust is formed.
- For storage: protect from moisture. Avoid dust formation. Keep container tightly closed. Store in a well-ventilated place. Guard against dust accumulation of this material.
- Wear correct PPE whilst handling the aluminium oxide material. Wear safety glasses with side shields, appropriate chemical resistant gloves and suitable protective clothing.
- Should the fluidised bath be stored for a long period under damp or humid conditions, moisture may be absorbed by the aluminium oxide which is hygroscopic. To avoid violent fluidisation which occurs when damp aluminium oxide is heated above 100°C, operate the bath for a period of approximately 8 hours at 90°C prior to operation at elevated temperatures.
- NEVER ADD COLD OR DAMP ALUMINIUM OXIDE TO A HOT BATH AS THIS WILL ALSO CAUSE VIOLENT FLUIDISATION WHICH CAN BE DANGEROUS. Allow the bath to cool then add the fresh aluminium oxide. If this fresh aluminium oxide is a large portion of the charge, then dry the whole charge as above.

FUME EXTRACTION

- When used for processing items which may emit toxic or inflammable fumes, it is essential that an adequate fume extraction system be installed. The extraction system must be correctly sized to ensure that any toxic fumes are removed from the working environment.
- To eliminate the risk of spontaneous ignition, the concentration of inflammable fumes above the bath and within the exhaust duct work must be kept below the lower explosive limit. See section INSTALLATION.

PRINCIPLE OF OPERATION AND SAFETY FEATURES

The equipment, as described in this Instruction Manual, has been designed for use by properly trained personnel.

It is important that all relevant information relating to the equipment be distributed to employees who may handle or encounter it. We would stress the importance of standard, common sense rules and adherence to normal, safety standards and procedures. (For example, any covers or enclosures should only be removed by trained personnel.) Please ensure that all those involved in the operation of this equipment are knowledgeable of the design criteria and that it is used in accordance with the instructions and recommendations contained in this manual. If there is any doubt whatsoever relating to the proper use of this equipment, please contact your supplier.

The industrial fluidised baths detailed in this manual are designed specifically for "burning off" residue from plastic machinery tools. However, the IFB baths are also a good choice for many heat treatment, reactive chemistry and exothermic reaction type of applications. The systems are effective on the full range of plastics, including polyethylene, polypropylene, PVC, nylon, polyester, polycarbonates, acrylic, polystyrene and acetyl. In addition, they are effective with rubber, EPR, epoxy resins and acrylic paints. They provide a safe, dry and fast means of removing all plastic residue with a minimum amount of effort and physical contact with the tools. The "burning off" operation is controlled at a uniform temperature so that distortion is avoided. Furthermore, as the fluidised bath is non-abrasive, physical damage to parts is minimal. Each of these factors extends tool life.

The fluidised bed is housed in a circular container manufactured from 0.075" (14 gauge) stainless steel. This container is surrounded by electrical heating elements and housed in a square insulated case. The temperature of the fluidised bed is set and maintained by digital PID temperature controller, which is governed by the electrical signal from a type "K" (chrome/alumel) thermocouple placed along the fluidised bath container inner wall. Current to the heating elements is switched on and off by means of solid state relay actuated by the temperature controller. The controller has a resolution of 1° and can be switched between °C and °F.

The FSB-200-5I and FSB-200-12I are supplied with an internal contactor that disables power to the heaters if one of the following conditions occur: thermocouple failure, loss of power to or controller fault and/or exceeding the factory set high temperature limit of 620°C (1148°F). The controller will flash a message when one of these conditions has occurred and can be reset for operation once the situation is corrected. See section OPERATION for more details on the PID temperature controller.

The air supply to the bed must be clean and dry. An air filter and pressure regulator can be supplied as optional equipment (part number F5915).

DESCRIPTION OF COMPONENTS AND FRONT PANEL CONTROLS

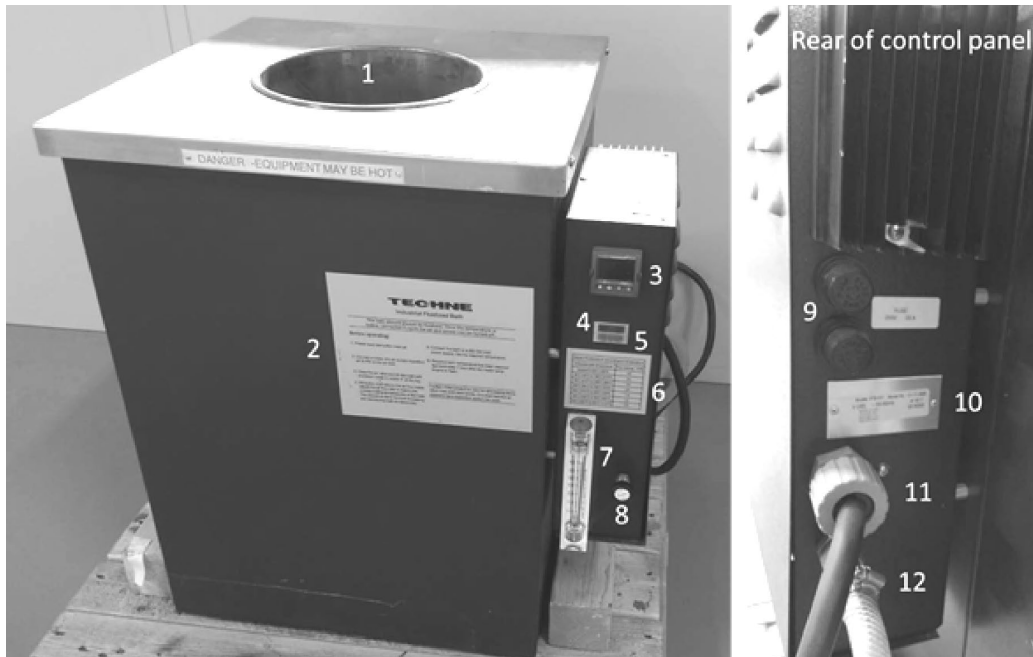


Figure 1: Components and controls – FSB-200-5I shown

Item	Description	Function
1	Fluidised bath chamber	Heated chamber containing the fluidised aluminium oxide.
2	Operating instructions	Quick operating guide.
3	Eurotherm 3216 temperature controller	Used to set the required bath set point temperature. The control parameters have been factory pre-set.
4	Power indicator (green)	Lights green when there is mains power to the unit.
5	Heater indicator (amber)	Lights amber when the heaters are on. Will flash on and off when the bath is at set temperature.
6	Air flow table	Indicates approximate air flow according to temperature.
7	Flow meter	A float indicates the fluidisation air pressure set by the control valve. The flow rate indicated by the float in the tube is on a scale of 0.5 to 4.0 CFM (cubic feet per minute).
8	Air flow valve	Controls the amount of air for fluidising the bed.
9	Fuses	The unit is fitted with 2 x 25A (FSB-200-5I) or 2 x 30A
10	Rating plate	(FSB-200-12I) fuses Details the model number, serial number and power rating. Connect to mains power supply.
11	Mains power cord	
12	Compressed air inlet	The air supply should be connected via suitable flexible hose.

INSTALLATION

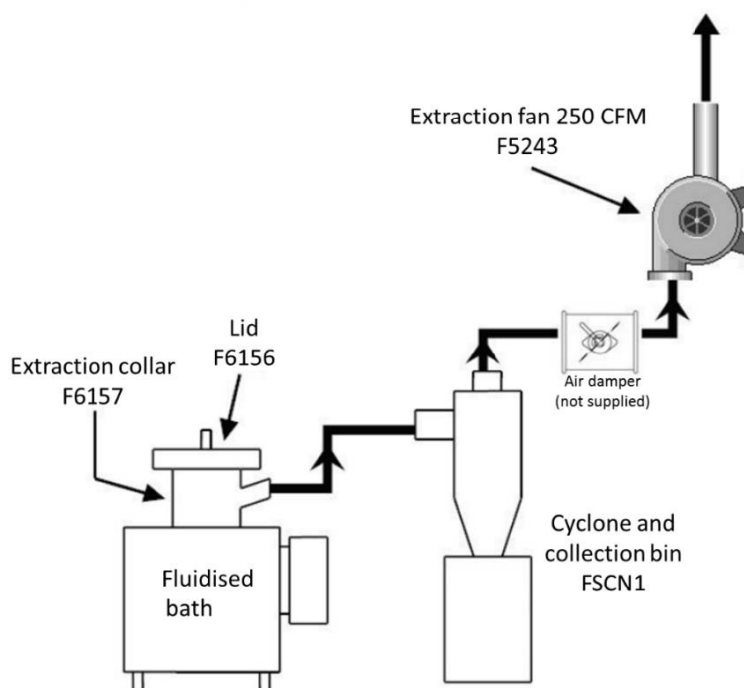


Figure 2: Schematic of fluidised bath set up with cyclone and basic exhaust extraction system.

SET-UP

The extraction collar, cyclone and extraction fan should be interconnected using appropriate 100mm (4") ducting. The purpose of the cyclone is to recover any aluminium oxide pulled out of the bath which can be sieved and reused. An air damper should be positioned in the ducting between the cyclone and extraction fan to control fume extraction and pull fumes away from the bath into the exhaust system. If the damper is open too much it would create a negative pressure in the bath working area resulting in significant heat and sand loss. A dilution tee (not shown) may also be included in the ductwork between the fluidised bath and cyclone to dilute effluent gasses.

POWER

The FSB-200-5I and FSB-200-12I require a power supply of 230V, 50/60Hz, single phase. A 208V supply is insufficient and should be boosted to 230V with a suitable boost transformer.

AIR

The compressed air supply to the bath must be clean, dry and free from oil. The pressure delivered to the bath should be 30 psi (207 kPa) and capable of delivering 5 cubic feet/minute (CFM) (142 litres/min).

MECHANICAL

The unit should be mounted on a firm level surface. It is important to ensure that the bath is level, otherwise it will fluidise incorrectly. This will lead to the formation of large temperature gradients across the bath which results in premature heater failure and possible damage to the porous plate and inner container assemblies.

1. Mount the fluidised bath in the position where it is to be used on a dry, level surface.
2. Connect a 30 psi air supply to the compressed air inlet on the rear of the control panel. The tubing and any fittings should not be less than 13mm (1/2") ID at any one point or bath performance may be reduced.
3. Wire up the bath to a 220 to 240V single phase power supply. See section ELECTRICAL INSTALLATION.
4. Fill the bath with aluminium oxide to within 80 to 100mm (3 or 4 inches) of the top.

5. Place the extraction collar (if used) into the bath.
6. Install and connect any associated fume treatment equipment with appropriate ducting and connect to the fluidised bath extraction collar. See figure 2 above and section FUME CLEANING.

OPERATION

START-UP

1. Check that the unit has been set up as described in the previous section and that required services are available.
2. Check that aluminium oxide level is correct and adjust if necessary. Never add new, cold aluminium oxide (which may contain moisture) to a hot bath. Should the fluidised bath be stored for long periods of time under damp or humid conditions, moisture may be absorbed by the aluminium oxide which is hygroscopic. To avoid violent fluidisation which occurs when damp aluminium oxide is heated above 100°C, operate the bath for a period of approximately 8 hours at 90°C prior to operation at elevated temperatures.
3. Turn on power and air to the unit. Following the instructions displayed on the label on the unit, set the air flow to 4 CFM when at ambient temperature. When fluidised and bubbling make sure the aluminium oxide level is still within 80-100mm of the top.
4. Place the extraction collar (if purchased) into the bath and place the lid on.

AIR ADJUSTMENT

5. **Important:** as the bath heats up you will need to adjust the airflow settings based on the front label chart or the heat up time will greatly increase. See Table 1 below. The reverse needs to happen when cooling down.

Indicated bath temperature		Flow rate (CFM)
Temperature (°C)	Temperature (°F)	
Ambient to 50	Ambient to 122	4.0
50 to 100	122 to 212	3.5
100 to 200	212 to 392	3.0
200 to 300	392 to 572	2.2
300 to 400	572 to 752	1.9
400 to 500	752 to 932	1.7
500 to 600	932 to 1112	1.4

Table 1: Air flow rate settings at indicated bath temperatures.

BATH TEMPERATURE

6. Set the controller to the required operating temperature. Once the controller has reached the set point, allow 1 hour for the bath to fully stabilize before attempting to use it.

An initial temperature drop or quenching of the bath can occur after inserting a workpiece to be cleaned. This temperature drop depends on the size of the immersed object, but is generally in the order of 25°C (77°F). Carbon is burned to carbon dioxide quickly above 400°C (752°F). It may be found desirable to pre-heat the bath to as high as 550°C (1020°F) to obtain quick results, but caution should be exercised not to damage tools by overheating.

EXTRACTION AIR SETUP

If you use an exhaust hood for ventilation, please ignore this section.

7. Make sure the exhaust system is plumbed according to our recommendation (see Figure 2 and section FUME CLEANING).
8. With the exhaust fan on, close the damper so there is no extraction to the bath.
9. Place parts to be cleaned in the basket and lower into the bath. Place the lid on the bath.
10. When smoke and fumes start to come up and around the lid, slowly open the damper just to the point where they are pulled back into the bath and no longer entering the room, then stop adjusting. This setting will give good results with minimal heat and sand loss.
11. With your first tool cleaning, start with a smaller number of tools and at a lower temperature. Adjust the bath set temperature and the number of tools cleaned based on your results and the amount of time required. It is always a good idea to clean at the lowest possible temperature.
12. After repeated tool cleanings heavier clumps and larger particles should be sieved from the aluminium oxide.
13. In time, the aluminium oxide may become dense and fluidise poorly at which point it should be replaced.

SHUT-DOWN

14. The bath air supply and power can be turned off after the temperature has cooled to 200°C/400°F.
15. Alternatively, if used daily, reduce the overnight temperature to 300°C for quicker start up.

PID TEMPERATURE CONTROLLER

The control parameters in the PID temperature controller have been optimized by the factory during manufacture to give the best results for most applications. Per the image below use the “scroll” button to navigate to the menu option UNITS for changing display from °C to °F and vice versa.

Two set points can be entered for future recall, press the “scroll” button to access SP1 and SP2. Set a different set point in each of these. Then “Scroll” to SP.SEL to select either set point SP1 or SP2. The up/down buttons are used to set the bath set point temperature. If an alarm indicates an overtemperature condition or thermocouple failure the two buttons labelled as ACK need to be depressed together after the alarm condition is corrected. If the alarm cannot be cleared please contact Antylia Scientific for support.

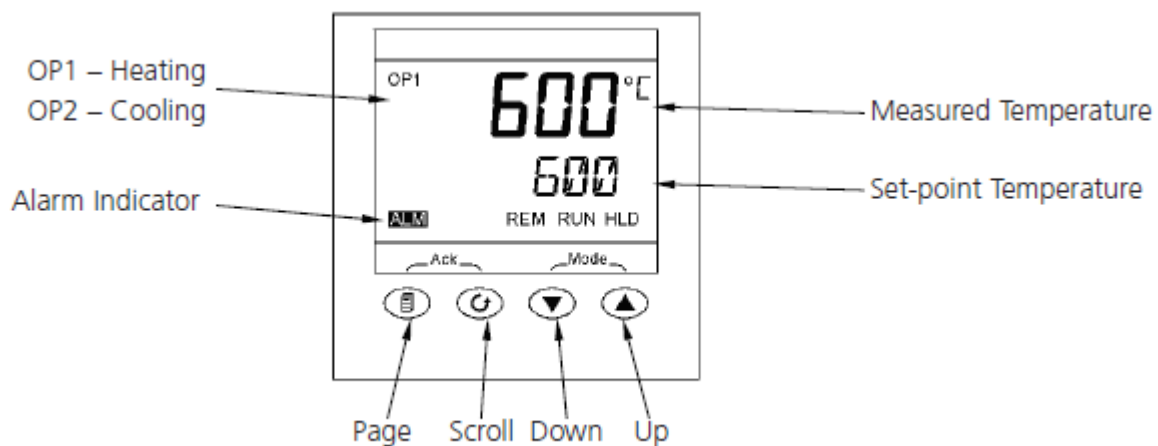


Figure 3: Eurotherm 3216 temperature controller.

THE CLEANING PROCESS

The cleaning process relies on heat being transferred from the fluidised bed to the immersed tools, the heat then degrades the plastic residue. Objects to be cleaned should be supported in a basket or suitable holder for ease of handling and lowered into the fluidised bed. To avoid physical damage and local overheating, it is important to ensure that any items placed in the bed are supported and not allowed to rest either on the porous plate at the bottom of the bed or against the wall of the inner container.

The bath should be operated generally in the temperature range of 450°C to 500°C, depending on the polymer to be removed. The process time depends upon the thermal mass of the object, the amount and type of polymer to be removed. During the first two thirds of the process time the polymer is reduced to a tar mix, in this phase all the initially combustible products of the polymer are emitted from the fluidised bath in the form of fumes that must be extracted and treated by suitable fume handling equipment. During the last third of the process time, the polymer is reduced to carbon which either burns away or remains loosely bound to the object being cleaned.

Any carbon or incombustible filler that remains on the processed item can be removed by a secondary cleaning operation, either by brushing or some form of water wash.

It is important to ensure that the items being processed do not exceed the maximum loading capacity (see section TECHNICAL SPECIFICATION) and that they are loaded into the fluidised bath in such a way that the fluidisation is not impeded.

THE PROCESS RELIES UPON GOOD FLUIDISATION TO ENSURE GOOD HEAT TRANSFER; OVERLOADING OR INCORRECT LOADING OF THE BATH WILL RESULT IN EXTENDED CYCLE TIMES GIVING INFERIOR RESULTS. LOCAL OVERHEATING MAY ALSO OCCUR, GIVING RISE TO PREMATURE HEATER FAILURE AND POSSIBLE DISTORTION OF THE INNER CONTAINER.

The aluminium oxide fluidising medium does not degrade but will need to be replenished due to loss from spillage or entrainment in the exhaust (from where it may be recovered by the cyclone trap).

All articles should be completely cleaned and removed from the bed before shutdown. Corrosion of processed parts could be seriously increased if they are left immersed overnight. Furthermore, residual polymer, instead of being burned off in a fluidised state, could percolate down through a static bed and settle on the porous plate to cause a blockage and result in poor fluidisation. In the case of PVC, chlorinated hydrocarbons remain in the fluidised bath after burn-off which dictates special maintenance procedures. See section SPECIAL MAINTENANCE PROCEDURES WHEN BURNING OFF PVC AND OTHER HALOGENATED POLYMERS.

When parts are removed from the bed they should be allowed to cool in air and, whilst still warm, treated to prevent rusting.

It should be noted that some plastics and, in particular, paints contain fillers. These fillers are usually inorganic materials and will not therefore burn when put into a fluidised bath, with the result that the material falls away from the article being cleaned and is retained in the bath, either on the surface or at the base of the bath, depending upon the density of the material involved. If this happens it is recommended that the bath be checked and cleaned at least once a week or more frequently if the bath is used continuously.

Table 2 details recommended operating temperatures for particular polymers. The temperatures quoted should be used as an initial guide. The ideal operating temperature will vary depending on the size of the components being cleaned and the amount of material being removed. In general temperatures below 400°C should be avoided to obviate the danger of the polymer melting and sinking to the bottom of the bath where it may block the porous plate. With some large objects, it may be desirable to preheat the bath to well above the operating temperature so that the polymer temperature rapidly moves through the melting phase to the burning condition.

Excessive operating temperatures should be avoided as they increase the fume concentration above the bath and may result in the formation of condensed fumes within the extraction system.

Material	Burn-off temperature (°C)
Nylon	450
Paint	475-575
Polythene	450-500
Polypropylene	425-500
PTFE	500
PVC	450-500
Silicone rubber	550
Ethylene methacrylic	450-480
Polyurethane	440-450
Rubber de-bonding	350 (de-bonding)
Polycarbonate	400-425
Polystyrene	450
Organic matter oil/grease	450-500
High density polythene	450
Polyesters	450
Fluoropolymers	500
Styrene	450

Table 2: Recommended operating temperatures for various polymers.

CAUTION

Care should be taken when handling hot parts which have been removed from a fluidised bath. We recommend that protective clothing (safety glasses, etc.) be worn when working with fluidised baths and that the installation and maintenance procedures outlined in this booklet be followed explicitly.

FUME IGNITION

Spontaneous ignition may occur above the surface of the fluidised bath or within the exhaust ductwork if the fume concentration exceeds the lower explosive limit.

The fume concentration is dependent upon the rate of fume production in the fluidised bath and the level of dilution achieved by entraining air from above the bath or through the dilution tee.

The rate of fume production is dependent upon the type and amount of material being treated and the temperature of the bath.

To ensure that the concentration of inflammable fumes is below the lower explosive limit, ensure that the amount of combustible material immersed in the bath at any one time is within the design capacity of the extraction system.

Ensure that the temperature of the bath is at minimum level to which satisfactory results can be achieved. Increased working temperatures result in increased fume concentration. By way of example, an extraction

rate of 2m³/min is required to ensure that the fume concentration is below 25% of the lower explosive limit when thermally decomposing 1kg/hr of polythene at 450°C.

To safeguard the fluidised bath from damage, two safety features are included in the control console: an adjustable over temperature cut-out which guards against controller failure, and an air pressure switch which inhibits operation if the compressed air supply to the fluidised bath fails. Both devices isolate the electrical supply to the heater elements and illuminate the cut-out indicator in a fault condition. The over temperature cut-out is factory pre-set at 630°C. Under no circumstances should this setting be increased, but lower limits may be set to safeguard particular processes in the fluidised bath.

FUME EXTRACTION AND CLEANING

When used for processing items which may emit toxic or inflammable fumes, it is essential that an adequate fume extraction system be installed. A typical schematic diagram of a full fume extraction system is shown in Figure 4. The system consists of the following components: -

Ductwork to connect the fluidised bath extract duct via the various fume treatment equipment to the input of the fume extraction fan. The ductwork should include an air dilution tee, positioned as close as possible to the fluidised bath. The dilution tee enables the fumes within the system to be diluted with air. The ductwork should also include a damper valve which is normally positioned adjacent to the extraction fan. This valve allows the extraction velocity to be reduced. In general, the ductwork may be manufactured out of galvanised mild steel; however, in installations where PVC or other halogenated polymers are being processed, it is recommended that stainless steel ducting is used. The ductwork should be as short as possible and contain the minimum number of bends and horizontal runs to reduce the possibility of a blockage.

A cyclone separator should be mounted directly after the dilution tee. The cyclone removes any fluidised medium that may be present in the extracted fumes. The fluidised medium is collected in the cyclone collection bin from where it may be returned to the fluidised bath. In applications where the components being cleaned are contaminated by polymers which contain inorganic pigments or fillers such as titanium oxide, of a particle size less than 0.005mm diameter which will not be retained by the cyclone, it is recommended that a filtration system be fitted after the cyclone.

In applications where the materials being treated produce acidic vapours during thermal decomposition, it is recommended that a fume scrubber be utilised to ensure that the final fume emission from the plant conforms with local regulations. A caustic dosing system may also be required to ensure that the scrubbing liquid is maintained at an acceptable pH level.

An extraction fan is required in all applications to provide the motive force for the exhaust.

In applications where it is not permissible to emit visible smoke from the plant or where local regulations specify the maximum fume concentrations that may be emitted from an exhaust stack, an afterburner may be required. The afterburner heats the fumes to a point where thermal incineration eliminates the visible content of the fumes while reducing the fume concentration.

Finally, an exhaust stack is required to direct the treated fumes away from the working environment. The exhaust stack will generally be manufactured out of the same materials as the ductwork system. However, in installations where an afterburner is fitted, the exhaust stack should be manufactured out of insulated stainless steel.

The exact combination of fume treatment components required depends upon the application and local conditions.

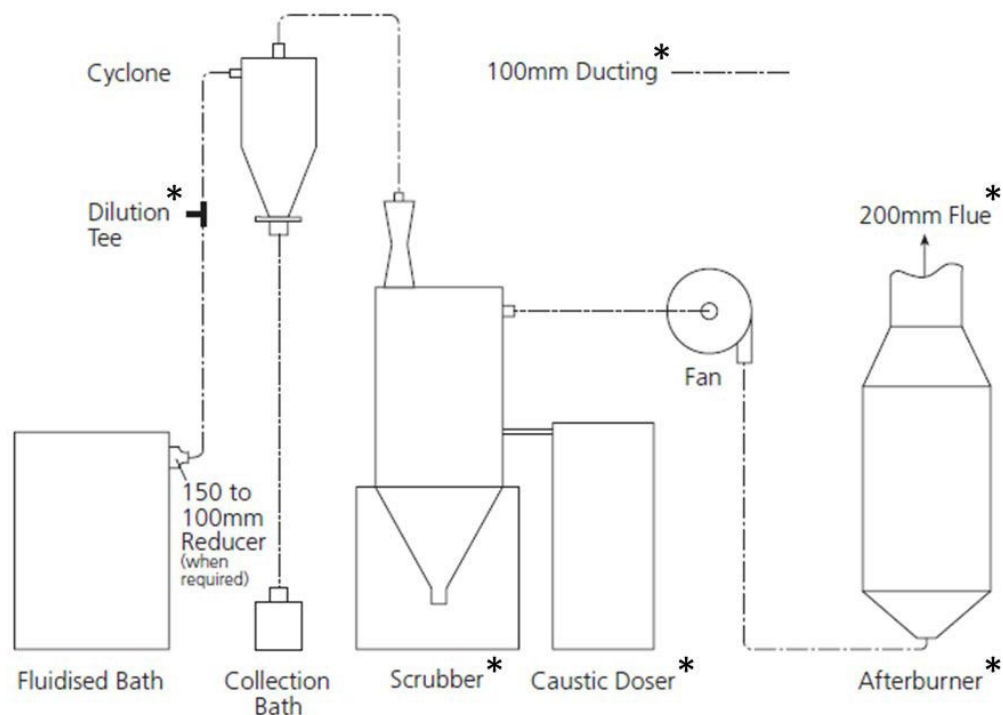


Figure 4: Full extraction system required for burn-off of toxic fumes and PVC. *Items not supplied by Antylia Scientific Ltd.

OPERATOR MAINTENANCE

The aluminium oxide fluidising medium, not being degradable, will only require replacement when losses occur due to attrition, spillage or contamination with inert pigments, filler or acidic by-products from the burn-off process. Note that the aluminium oxide pulled out of the bath through the exhaust duct can be captured for reuse by the cyclone trap.

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

On at least daily intervals, the bed should be cleaned of floating residues by means of a wire mesh hand scoop. This procedure removes carbon char which impairs fluidization and acts as an absorbent. More importantly, it can also remove uncharred plastic and so reduce the quantity of fumes produced and the time of processing.

The optional air-line filter into the bed is self-draining. However, it should be kept in good condition by inspection at two-week intervals and by cleaning the bowl and washing or replacing the filter element as necessary. With exceptionally dirty or wet air supplies, this frequency may have to be increased. Free water or water vapour in the air supply acts as a solvent to produce hydrochloric acid in the bed when PVC is burned off. In addition, oil vapours in the air supply which reach the fluidising plate are carbonized within the pores of the plate, quickly causing blockage and consequent poor fluidization, local overheating, premature heater failure and possible distortion of the inner container.

All articles should be completely cleaned and removed from the bed before shutdown. Corrosion of processed parts could be seriously increased if they are left immersed overnight. Furthermore, residual plastic, instead of being burned off in a fluidised state, could percolate down through a static bed and settle on the porous plate causing blockage and poor fluidization.

When parts are removed from the bed, they should be allowed to cool in the air and, while still warm, wiped with an oily cloth to prevent rusting. If the bath is left unused for long periods of time, empty the aluminium oxide and store it in a separate container. Keep the inside of the bath clean and dry.

The fume extraction system (if used) should be regularly maintained. The cyclone trap collection bin should be emptied at the end of each day's use; the collected fluidising medium being returned to the fluidised bath. It is important to ensure that the airtight seal between the cyclone and collector bin is re-made.

SPECIAL MAINTENANCE PROCEDURES WHEN BURNING OFF PVC OR OTHER HALOGENATED POLYMERS

Burning off PVC (polyvinyl chloride) in a fluidised bath offers one of the most severe conditions of operation. Hydrogen chloride (HCl) liberated on the breakdown of PVC is absorbed by the bed medium creating an acidic environment within the bed. This happens especially when the bed also absorbs water from the atmosphere or when the fluidising air is cold. HCl is extremely corrosive, especially when it is aerated and wet. In addition, in water it produces chloride ions which, even in neutral or alkaline solutions, promote corrosion and rusting in steel.

Consequently, fluidising beds used for burning off PVC require strict supervision to minimize corrosion of the bed itself and of parts cleaned in it, especially if these are of un-coated steel. The purpose of most of the recommended maintenance procedures is aimed at keeping the bed medium clean, free-flowing, free of gums, acids, agglomerates, partly decomposed plastic, char and larger particles. These cleaning processes have the additional benefit of ensuring good fluidization and thus good heat transfer throughout the bed and through immersed parts. This, in turn, reduces burn-off time, uneven heating of parts and thus distortion, increases heater life by eliminating localized hotspots and makes cleaning easier on a regular basis.

The following instructions apply generally to halogenated polymers and specifically to PVC. They are aimed at minimising corrosion of the bath and of immersed metals.

DAILY INTERVALS - at the end of each working day

1. Maintain the working temperature (about 400°C) for half an hour after the last processed batch, to assist removal of corrosive acids from the bath.
2. If possible, maintain the temperature of the bath at about 100°C overnight and over weekends and holidays to reduce absorption of water vapour into the batch. Overnight, the residual heat in the bath will usually ensure this.
3. Scoop out charred plastic residues, clods of media and articles being processed.

WEEKLY INTERVALS - at the end of each working week and before prolonged shut-downs

1. Ensure compliance with daily instructions above.
2. Add about 50g (2oz) of powdered mild alkali to the bath and mix in well by maintaining fluidisation for 5 minutes. Suitable alkalis are limestone, dolomite, hydrated or slaked lime, sodium bicarbonate, sodium carbonate, magnesia. The addition of corrosive alkalis such as caustic soda (sodium hydroxide) and quick lime (calcium oxide) should be avoided.

MONTHLY INTERVALS

1. Empty the bath and inspect it for signs of corrosion, especially pitted surfaces and flaking scale. The inside should be wiped out with a rag wetted with 5% washing soda (sodium carbonate) solution.

2. Screen the medium through a 50 to 70 mesh sieve before returning it to the cleaned bath. This removes scale, agglomerated medium, char, undegraded polymer and lost parts and helps maintain a good quality of fluidisation.

HALF-YEARLY INTERVALS

1. The bath should be emptied, cleaned, inspected and the medium replaced by a fresh charge.
2. Alternatively, if the facilities are available, the medium may be thoroughly washed in several changes of clean water, washed through a 70-mesh sieve, drained, dried and returned to the bath where drying is completed by fluidisation and heating at 150°C, until the medium fluidises in the normal manner. The washing procedure removes acidic residues and accumulated soluble salts and residues.

Symptoms of neglect should be dealt with immediately. These include: pitting of metallic surfaces, formation of lumps of agglomerated medium, accumulation of polymer or polymer filler material, indications of bad or uneven fluidisation, blockage of the fluidising plate and wetness or stickiness of the medium.

FAULT FINDING

Any service or repair work should only be carried out by a trained electronic or electromechanical technician. Untrained personnel should not attempt to dismantle this equipment.

If the heater indicator fails to go off, the unit fails to reach its operating temperature or heat up rate decreases, check:

1. Fluidization – remove aluminium oxide from bath leaving approximately 50mm (2”) in the bottom. If an area of one quarter or more is not bubbling, then most likely the porous plate is blocked and should be replaced. Check that the porous plate is not blocked with plastic residue or other material.
2. Heater - Empty medium from the bed and disconnect the main supply. Turn the unit upside down and check the resistance of the heater. If one or more heater windings are faulty, replace the heater. Reassemble in the reverse order.
3. Thermocouple – check with an instrument that can measure and simulate thermocouple signals to verify its operation.
4. Controller and/or SSR – the controller will output a DC signal to the SSR when heat is called for. If the SSR is receiving a DC control signal but not passing power to the heaters, then it should be replaced. Alternatively, a problem may exist with the controller. If the fluidization deteriorates, check the air filter assembly for clogging of the filter element; if necessary, replace the element.

If the fault remains, run your bath at 600°C (1100°F) for a period of one hour to allow any accumulated residue in the bath to burn off. If the fault persists, empty the medium from the bed, check the stainless-steel porous plate for damage due to clogging by plastic residue, distortion of the plate or corrosion.

Factory PID Parameters (For FSB-200-5I S/N: 451 and higher, IFB52 S/N: 214 and higher)

Parameter	FSB-200-5I	FSB-200-12I
Pb	15	12
Ti	450	480
Tg	75	80
1PLS	5.0	5.0
CBHI	20	20
CBLO	20	20

SAFETY, REPAIR AND TECHNICAL SUPPORT

NOTE THAT THIS EQUIPMENT SHOULD ONLY BE DISMANTLED BY PROPERLY TRAINED PERSONNEL.

REMOVING THE CASE EXPOSES POTENTIALLY LETHAL MAINS VOLTAGE.

THERE ARE NO OPERATOR MAINTAINABLE PARTS WITHIN THE EQUIPMENT.

In the unlikely event that you experience any problems with your fluidised bath which cannot easily be remedied, it may be necessary for your equipment to be sent back to our service department for repair. In this case please contact the service department for all the required returns paperwork, including the decontamination certificate, which must be included when you return the equipment. Please also ensure you include a clear description of the fault. The decontamination certificate must be completed to certify that the returned item is not contaminated with any harmful substance. Failure to complete this will prevent the repair of your equipment.

Please return the unit in its original packing. Antylia Scientific Ltd accept no responsibility for damage to units which are not properly packed for shipping: if in doubt, contact your supplier. Clearly mark the package for the attention of the Service Department and post to the following address:

Antylia Scientific Ltd
Beacon Road
Stone
Staffordshire
ST15 0SA
United Kingdom

Only spare parts supplied by the manufacturer or its agent should be used. Fitting of non-approved parts may affect the performance of the safety features of the equipment. If in doubt, please contact Antylia Scientific Ltd. If you require further technical or application assistance, please contact Antylia Scientific Ltd at:

E-mail: cptechsupport@antylia.com

Phone: +44 (0)1785 810433

TECHNICAL SPECIFICATION

Specifications	FSB-200-5L	FSB-200-12L
Temperature range	50°C to 600°C (122°F to 1112°F)	50°C to 600°C (122°F to 1112°F)
Stability at 450°C	±1.0°C (20cm/8" immersion depth with lid after 2 hours at set point)	±1.0°C (46cm/18" immersion depth with lid after 2 hours at set point)
Display accuracy	±10.0°C (20cm/8" immersion depth with lid after 2 hours at set point)	±10.0°C (46cm/18" immersion depth with lid after 2 hours at set point)
Temperature display	°C or °F	°C or °F
Type of control	3 term PID	3 term PID
Sensor type	K type thermocouple	K type thermocouple
Internal diameter	255mm (10.1")	255mm (10.1")
Working diameter when using sample basket	213mm (8.4")	213mm (8.4")
Depth	405mm (16")	762mm (30")
Working depth when using sample basket	305mm (12")	660mm (26")
Load Capacity (1/3 of volume)	5 litres	12 litres
Air pressure	207 to 1034 kPa (30 to 150 psi) clean, dry and oil-free	207 to 1034 kPa (30 to 150 psi) clean, dry and oil-free
Air Consumption at Ambient (max)	115 litres/min	115 litres/min
Air Consumption at	48 litres/min	48 litres/min
Fluidised medium	40kg (88lb) aluminium oxide (Alundum), 120 mesh, part code Brown/ALO	73kg (160lb) aluminium oxide (Alundum), 120 mesh, part code Brown/ALO
Heat up time 20°C to 450°C	105 minutes	210 minutes
Heat up time 20°C to 600°C	150 minutes	300 minutes
Nominal heater power	4kW	6kW
Electrical supply	230V, 50/60Hz, single-phase	230V, 50/60Hz, single-phase
Exhaust fan requirements	7125 litres/min (250 CFM)	7125 litres/min (250 CFM)
Net weight	60kg (132lb)	84kg (185lb)
Gross weight incl. aluminium oxide	100kg (220lb)	156kg (344lb)
Overall size W x D x H	521 x 521 x 686	609 x 533 x 1041

REPLACEMENT PARTS

The following parts may be purchased if replacements are required:

Part number	Item description
7001560	25A fuse for FSB-200-5I
7001665	30A fuse for FSB-200-12I
Brown/ALO	25kg alundum, brown aluminium oxide

ACCESSORIES

The following accessories are available for use with the FSB-200-5I and FSB-200-12I.

Sample basket

The steel mesh sample basket safely holds samples away from the heating elements of the fluidised bath and assists retrieval of items from the bath.

Product code	Item description
FA624	Basket for FSB-200-5I (standard basket)
FA625	Basket for FSB-200-5I (deep basket, used with extraction collar)
7031658	Basket for FSB-200-12I (standard basket)
7031659	Basket for FSB-200-12I (deep basket, used with extraction collar)

Extraction collar

The extraction collar is used with the deep baskets and allows ducting to be connected for fume extraction away from the bath.

Product code	Item description
F6157	Extraction collar for FSB-200-5I and FSB-200-12I

Lid

Lids are a vital part of the fluidisation process to contain the aluminium oxide and retain heat. They are designed to allow airflow into the top of the bath and allow clean air to be drawn into the bath and through the exhaust duct when connected to an extraction system. The FSB-200-5I and FSB-200-12I have an insulated lid.

Product code	Item description
F6156	Lid for FSB-200-5I and FSB-200-12I

Air pressure regulator and filter

Antylia Scientific Ltd can supply a filter/regulator assembly for compressed air which is not moisture or oil-free.

Product code	Item Description
F5915	Filter Pressure regulator for FSB-200-5I and FSB-200-12I

CN-100 Cyclone and Collection bin

An efficient wall mounted unit which can extract all the aluminium oxide carried over into the Fluidised Sand Bath exhaust system when the extraction fan is in operation. The cyclone collection bin allows escaped aluminium oxide to be collected and re-used. An extraction fan and cyclone are recommended unless a suitable extraction hood or fume extraction system is already in place.

Product code	Item description
FSCN1	CN-100 Cyclone and collection bin for FSB-200-5I and FSB-200-12I

Extraction Fan

Powerful 380/415V, 3 phase fan delivering an extraction rate of 250CFM (425m³/hr).

Product code	Item description
F5243	Fan 250CFM, 380 / 415V, 3 Phase, 50Hz
F5243-60Hz	Fan 250CFM, 380 / 415V, 3 Phase, 60Hz



This product meets the applicable CE Directives and UKCA Legislation for radio frequency interference and may be expected not to interfere with, or be affected by, other equipment with similar qualifications. We cannot be sure that other equipment used in its vicinity will meet these standards and so we cannot guarantee

that interference will not occur in practise. Where there is a possibility that injury, damage or loss might occur if equipment malfunctions due to radio frequency interference, or for general advise before use, contact the manufacturer.

Declaration of Conformity is available to view online at www.coleparmer.com

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Ordering Information

Order No.	Series	Model	Legacy SKU
01184-10	FSB-200	FSB-200-5I	FIFB51D
01184-20	FSB-200	FSB-200-12I	FIFB52D

Warranty Registration



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