Tempcal®

Dry Block

TEMPERATURE CALIBRATORS

Features

- Choose from three models covering temperatures from -40°C to 650°C.
- Two versions - the basic 'S' and microprocessor based 'H' version.
- High accuracy and stability.
- Large interchangable multiple-drilled insert.
- Unique temperature zone - with improved uniformity and control stability.
- Rapid heat-up and cool-down times.
- Calsoft calibration software supplied as standard with the 'H' versions and as an optional extra with the 'S' versions.
- RS232 interface for data and programme transfer, or real-time control.
- Fast settling time for rapid testing.

'H' versions only

- Software supplied as standard.
- 4 line 20 character LCD, 8 button keypad for entering programmes and viewing data.
- Ability to create/use/store programmes and test results internally.
- Programming of set temperature, ramp rate, hold time, 'pause on switch changeover' operation and hold until pause pressed.
- Switch test input for monitoring temperature thermostats.
- Calibration using the User Probe Interface which allows storage of the block temperature and the reading of the test sensor

Tempcal® Junior

Features

- Low cost option
- Hand-held
- Large block in 6 formats
- Maximum temperature 350°C
- Independent over temperature cut-out
- Temperature sensor burnout protection
- Separate heater on/off switch for fast cool down without changing set temperature
- Indicators for over temperature cut-out and heater power
- Switchable °C/°F

Haven Automation Limited

Tempcal®

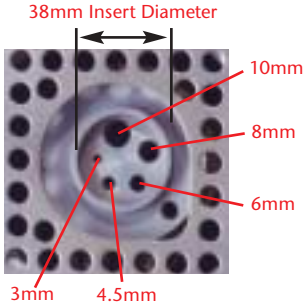
Designed to provide a stable and accurate environment for the calibration of temperature sensors including liquid-in-glass and dial thermometers, thermocouples, RTD's, thermal switches, transmitters and fluid filled bulbs, the Tempcal® range of Block Calibrators comes in two different formats and three temperature ranges.

Model	Min Temp°C	Max Temp°C	°C/°F Display	Programme Storage	Switch Test Input	Software
Tempcal® 140S	amb-45	140	▼	-	-	Optional
Tempcal® 140H	amb-45	140	▼	▼	▼	▼
Tempcal® 425S	amb+20	425	▼	-	-	Optional
Tempcal® 425H	amb+20	425	▼	▼	▼	▼
Tempcal® 650S	amb+25	650	▼	-	-	Optional
Tempcal® 650H	amb+25	650	▼	▼	▼	▼

N.B: Tempcal 140 - using an external 4°chilled water supply connected to the integral cooling coil an actual temperature of - 40°C can be achieved.

One Insert for Multiple Probes

The insert blocks on the Tempcal® units have the advantage of a 38mm diameter to enable multiple probes of varying sizes to be tested at one time, making the units both economical and extremely flexible.
The example shown is insert AB102M with five drilled holes from 3mm to 10mm diameter. Please contact our Sales Office if your requirement is outside our standard range.



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Tempcal Software 'Calsoft'

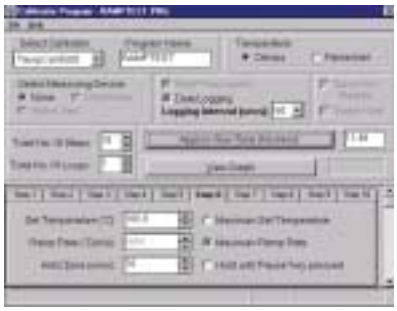
FOR BOTH H AND S MODELS, CALSOFT ENABLES YOU TO:

- Create, open, save and print programmes
- Log data from the calibrator while connected to the computer
- Open, save, view and print logged data
- Run a programme in real time mode

N.B: The 'S' range of Tempcal calibrators must be connected to the computer at all times in order to run the programmes set up by CalSoft.

FOR H MODELS ONLY, CALSOFT ENABLES YOU TO:

- Select 3 possible options to carry out a calibration
- Perform a calibration where you input the temperature of the probe manually
- Perform a calibration using the User Probe Interface - see optional accessories
- Perform a calibration requiring a switch test
- Send programmes to the calibrator
- Retrieve programmes from the calibrator
- Retrieve test results from the calibrator
- Erase test results



Shows step 6 of a 10 step programme for a Tempcal® 650S. Step 6 has a set temperature of 100°C, a maximum ramp rate and a hold time of 10 minutes.

Shows above programme running in real time mode. Programme is currently running step 1 of the 10 step programme, with data being logged and graphed at 60 second intervals.

Shows a visual representation of a 10 step programme for a Tempcal® 650S.

Specifications

	TEMPCAL® 140S/H	TEMPCAL® 425S/H	TEMPCAL® 650S/H	TEMPCAL® JUNIOR
Temperature Range °C	amb-45 to 140*	amb+20 to 425	amb+25 to 650	amb+20 TO 350
Working Ambient °C	10 to 30	10 to 30	10 to 30	10 TO 30
Measuring Zone (M.Z.)	0-50mm from base of well	0-50mm from base of well	0-50mm from base of well	-
Typical Accuracy °C	±0.3 in M.Z.	±0.3 in M.Z.	±0.4 in M.Z.	±1.0 (100-300°C)
Uniformity °C (in M.Z.)	±0.2 at 100	±0.2 at 300	±1 at 400	-
Immersion Depth	114.3mm	114.3mm	152.4mm	-
Stability	±0.05°C after 10 mins	±0.05°C after 10 mins	±0.09°C after 10 mins	±0.10°C @ 100°C ±0.15°C @ 200°C
Display Resolution °C or °F	0.1	0.1	0.1	0.1
Heating Rate	20°C to 100°C - 5 mins	20°C to 400°C - 15 mins	20°C to 600°C - 35 mins	20°C to 300°C - 5.2 mins (230V only)
Cooling Rate	100°C to 0°C - 9 mins	400°C to 100°C - 25mins	600°C to 200°C - 30 mins	300°C to 100°C - 10.8 mins
Fan Cooling	N/A	Automatic	Automatic	Automatic
Programmable Ramp Rate °C/Min	0.1 to 10 on H Version	0.1 to 10 on H Version	0.1 to 10 on H Version	-
Switch Test	on H Version	on H Version	on H Version	-
Weight, Kg	14.0kg (S) 14.4kg (H)	9.2kg (S) 9.6kg (H)	11.8kg (S) 12.2kg (H)	1.5kg
Dimensions H x W x D	285 x 190 x 426mm	285 x 190 x 426mm	285 x 190 x 426mm	72 x 128 x 178mm (excluding handle)
Voltage	230V or 120V	230V or 120V	230V or 120V	230V or 120V
Hz	50/60	50/60	50/60	50/60
Watts	400	700	1100	460

* The minimum temperature achievable can be reduced when used in conjunction with the CH-5 Chiller Unit - see optional accessories

Tempcal® Interchangeable Insert Blocks

Description	Order Code Tempcal 140 and 425 (aluminium)	Order Code Tempcal 650 (aluminium bronze)
5 x 6mm	AB101M	BB101M
1 x 10, 8, 6, 4.5, 3mm	AB102M	BB102M
2 x 6mm and 2 x 10mm	AB103M	BB103M
2 x 6mm and 2 x 12mm	AB104M	BB104M
1 x 6mm	AB105M	BB105M
5 x 1/4"	AB1061	BB1061
3/8", 5/16", 1/4", 3/16", 1/8"	AB1071	BB1071
2 x 3/8" and 2 x 1/4"	AB1081	BB1081
2 x 1/2" and 2 x 1/4"	AB1091	BB1091
1 x 1/4"	AB1101	BB1101
Blank	AB111	BB111
1 x 9/16"	AB1121	BB1121
1 x 5/8"	AB1131	BB1131
1 x 11/16"	AB1141	BB1141
1 x 3/4"	AB1151	BB1151
20mm	AB116M	BB116M
1 x 4, 5, 9, 11mm	AB117M	
1 x 6mm (immersion depth 40mm)	AB118M	
1 x 6mm and 1 x 9mm	AB119M	
9 x 3.18mm	AB120M	
1 x 19.5mm		BB121M
1 x 10, 8, 6, 4, 3mm		BB122M
1 x 12mm		BB123M
1 x 15mm		BB124M

Supplied with a soft carry case with adjustable shoulder strap, removable mains lead, user manual and insert extractor tool.* In addition 'H' units are supplied with Calsoft Software and 1.5 metre RS232 lead.

*Please state when ordering whether you require a 120V or 230V model.

Tempcal Junior

Unit Block Options

Block Type	Description
A	4 x 6mm
B	1 x 10, 8, 6, 4.5, 3mm
C	2 x 6mm, 2 x 10mm
D	4 x 1/4"
E	1 x 3/8", 5/16", 3/16", 1/8"
F	2 x 1/4", 2 x 3/8"

N.B: The block on the Tempcal® Junior is fixed and cannot be removed.

Supplied with removeable mains lead and user manual.*

Optional Accessories

CH-5 Chiller Unit

The CH-5 Chiller Unit is designed for use in conjunction with the Tempcal 140 calibrators to achieve calibration temperature down to -40°C. The minimum temperature achievable on the Tempcal 140 models is 45°C below ambient, but by artificially cooling the heatsink of the units with water from the Chiller an actual temperature of-40°C can be achieved. The unit is designed to run on distilled or deionised water.

Working Temperature Range	4-15°C
Cooling Capacity	400 watts
Temperature Control	Thermostat on/off
Electrical Control	Manual
Dimensions LxWxH (inc. pump)	430 x 235 x 524mm
Bath Capacity	5 litres
Pump Capacity	20 litres/min

Cooling Probe

A cooling probe is available for use with the Tempcal 425 and 650. It can be used to rapidly cool the block and to operate the unit around ambient temperature. The cooling probe must be inserted into a 10mm diameter or larger hole in the insert block.

User Probe Interface

- Enables fully automated and unattended calibration of temperature sensors
- For use on 'H' versions only

The User Probe Interface accepts K, J, N, T and E thermocouple types and 100 and 1000 ohm 3 and 4 wire RTD's. The UPI can also be connected in series with a 0-20 mA loop and the current reading of the transmitter displayed.

Simply install your sensor into the insert block and connect the wiring to the appropriate front panel terminals, switch the UPI on and select your sensor type. Create or run a programme either using the Calsoft Software or the Tempcal Calibrator memory and the Calibrator will save all the data throughout the run.

When finished, data can be output as text, as a graph or a calibration certificate can be created for the sensor under test.

The UPI is powered by a standard 9V battery. Sensor wires are connected to standard 4mm banana jacks.

Probe Type	Resolution	Accuracy	Range
K t/c	0.1°C	0.3°C ±0.15% ±0.2%	-50 to 300°C 301 to 530°C 531 to 650°C
J t/c	0.1°C	0.3°C ±0.15% ±0.2%	-50 to 300°C 301 to 530°C 531 to 650°C
N t/c	0.1°C	0.3°C ±0.15% ±0.2%	-50 to 300°C 301 to 530°C 531 to 650°C
T t/c	0.1°C	0.3°C ±0.15%	-50 to 300°C 301 to 400°C
E t/c	0.1°C	0.3°C ±0.15% ±0.2%	-40 to 300°C 301 to 530°C 531 to 650°C
100Ω RTD	0.1°C	0.2°C ±0.1%	-50 to 200°C 201 to 650°C
1000Ω RTD	0.1°C	0.2°C ±0.1%	-50 to 200°C 201 to 650°C
mA	0.1µA	±0.002mA ±0.2%	0 to10mA 10.1 to 20.0mA

Ordering information

Optional Accessory	For Instrument Type	Order Code
Chiller Unit	Tempcal 140S/H	CH-5
Cooling Probe	Tempcal 425S/H, 650S/H	FG-134
User Probe Interface	Tempcal 140H, 425H, 650H	FG-136
Calsoft Software only	Tempcal 140S, 425S, 650S	FG-132
Calsoft Software and RS232 Cable	Tempcal 140S, 425S, 650S	FG-133
Hard Carry Case	Tempcal 140S/H, 425S/H, 650S/H	FG-137
Soft Carry Case	Tempcal Junior	FG-154
UKAS Calibration Certificate	All Models	On request

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Authorised Representative:

GB92/1160

Calibrate with confidence using the *NEW* Tempcal "Field" Range of Dri-Block Calibrators

Following on from many years of experience with the high quality ***Tempcal S*** **and** ***H*** models the new ***F*** models have been introduced to offer a compact and lightweight, high performance range of Dri-Block temperature calibrators.

Tempcal 140F

Low temperature Portable Field Temperature Calibrator

Minimum temperature	45°C below ambient (typically -20°C in ambient of 25°C)
Maximum temperature	140°C
Temperature accuracy	±0.3°C
Temperature uniformity	±0.2°C
Temperature stability	±0.05°C (after 10 mins)
Display resolution	0.01°C or 0.1°F
Set point resolution	0.1°C or 0.1°F
Heating rate, 20°C to 100°C	5 minutes
Cooling rate, 100°C to 0°C	9 minutes
Large well	Ø38mm x 114 mm inserts
Fan cooling	Automatic
Dimensions HxWxDmm	273x207x289
Weight	11kg

Options

- Inserts from standard list FINSAL-
- RS-232 interface plus software and cable
- Carry case soft
- Carry case hard
- UKAS calibration certificate

Tempcal 425F

Medium temperature Portable Field Temperature Calibrator

Minimum temperature	20°C above ambient
Maximum temperature	425°C
Temperature accuracy	±0.3°C
Temperature uniformity	±0.2°C
Temperature stability	±0.03°C at 200°C (after 10 mins)
Temperature stability	±0.05°C at 425°C (after 10 mins)
Display resolution	0.01°C or 0.1°F
Set point resolution	0.1°C or 0.1°F
Heating rate, 20°C to 400°C	12 minutes
Cooling rate, 400°C to 100°C	21 minutes
Large well	Ø38mm x 114mm inserts.
Fan cooling	Automatic
Dimensions HxWxDmm	270x170x255
Weight	6.3kg

Options

- Inserts from standard list FINSAL-
- RS-232 interface plus software and cable
- Cooling probe for rapid cooling of block
- Carry case soft
- Carry case hard
- UKAS calibration certificate

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Tempcal 650F

High temperature Portable Field Temperature Calibrator

Minimum temperature	**25°C above ambient**
Maximum temperature	**650°C**
Temperature accuracy	**±0.4°C**
Temperature uniformity	**±1°C**
Temperature stability	**±0.09°C** (after 10 mins)
Display resolution	**0.01°C or 0.1°F**
Set point resolution	**0.1°C or 0.1°F**
Heating rate, 20°C to 600°C	**35 minutes**
Cooling rate, 600°C to 200°C	**30 minutes**
Large well	**Ø38mm x 152mm inserts.**
Fan cooling	**Automatic**
Dimensions HxWxDmm	**278x170x300**
Weight	**11 kg**

Options

- **Inserts from standard list FINSAB-**
- **RS-232 interface plus software and cable**
- **Cooling probe for rapid cooling of block**
- **Carry case soft**
- **Carry case hard**
- **UKAS calibration certificate**

Ordering information

Tempcal 140F

FDB140FD	Tecal 140F 230v
FDB140FP	Tecal 140F 120v
FDB140FY	Tecal 140F 100v
FDB140FR	Tecal 140F 230v with RS-232
FDB140FS	Tecal 140F 120v with RS-232
FDB140FT	Tecal 140F 100v with RS-232

Tempcal 425F

FDB425FD	Tecal 425F 230v
FDB425FP	Tecal 425F 120v
FDB425FY	Tecal 425F 100v
FDB425FR	Tecal 425F 230v with RS-232
FDB425FS	Tecal 425F 120v with RS-232
FDB425FT	Tecal 425F 100v with RS-232

Tempcal 650F

FDB650FD	Tecal 650F 230v
FDB650FP	Tecal 650F 120v
FDB650FY	Tecal 650F 100v
FDB650FR	Tecal 650F 230v with RS-232
FDB650FS	Tecal 650F 120v with RS-232
FDB650FT	Tecal 650F 100v with RS-232

INSERTS FOR THE TEMPCAL 140 AND TEMPCAL 425 UNITS

Part No	Description	Net weight kg
FINSALA	Insert 5 x 6mm probes aluminium	0.5
FINSALB	Insert 10 + 8 + 6 + 4.5 + 3mm probes aluminium	0.5
FINSALC	Insert 2 x 6mm + 2 x 10mm probes aluminium	0.5
FINSALD	Insert 2 x 6mm + 2 x 12mm probes aluminium	0.5
FINSALE	Insert 1 x 6mm probe aluminium	0.5
FINSALF	Insert 5 x 1/4" probes aluminium	0.5
FINSALG	Insert 3/8" + 5/16" + 1/4" + 3/16" + 1/8" probe aluminium	0.5
FINSALH	Insert 2 x 3/8" + 2 x 1/4" probes aluminium	0.5
FINSALI	Insert 2 x 1/2" + 2 x 1/4" probes aluminium	0.5
FINSALJ	Insert 1 x 1/4" probe aluminium	0.5
FINSALK	Insert blank aluminium	0.5
FINSALL	Insert 9/16" probe aluminium	0.5
FINSALM	Insert 5/8" probe aluminium	0.5
FINSALN	Insert 11/16" probe aluminium	0.5
FINSALO	Insert 3/4" probe aluminium	0.5
FINSALP	Insert 11 + 9 + 5 + 4 mm probes aluminium	0.5
FINSALQ	Insert 6mm probe aluminium (immersion depth 40mm)	0.5
FINSALR	Insert 6mm + 9mm probes aluminium	0.5
FINSALT	Insert 9 x 3.18mm probes aluminium	0.5
FINSALZ	Insert 20mm probe aluminium	0.5

INSERTS FOR THE TEMPCAL 650

FINSABA	Insert 5 x 6mm probes aluminium bronze	1.1
FINSABB	Insert 10 + 8 + 6 + 4.5 + 3mm probes aluminium bronze	1.1
FINSABC	Insert 2 x 6mm + 2 x 10mm probes aluminium bronze	1.1
FINSABD	Insert 2 x 6mm + 2 x 12mm probes aluminium bronze	1.1
FINSABE	Insert 1 x 6mm probe aluminium bronze	1.1
FINSABF	Insert 5 x 1/4" probes aluminium bronze	1.1
FINSABG	Insert 3/8" + 5/16" + 1/4" + 3/16" + 1/8" probes aluminium bronze	1.1
FINSABH	Insert 2 x 3/8" + 2 x 1/4" probes aluminium bronze	1.1
FINSABI	Insert 2 x 1/2" + 2 x 1/4" probes aluminium bronze	1.1
FINSABJ	Insert 1 x 1/4" probe aluminium bronze	1.1
FINSABK	Insert blank aluminium bronze	1.5
FINSABL	Insert 9/16" probe aluminium bronze	1.1
FINSABM	Insert 5/8" probe aluminium bronze	1.1
FINSABN	Insert 11/16" probe aluminium bronze	1.1
FINSABO	Insert 3/4" probe aluminium bronze	1.1
FINSABP	Insert 19.5mm probe aluminium bronze	1.1
FINSABQ	Insert 10/8/6/4/3mm probe aluminium bronze	1.1
FINSABR	Insert 12mm probe aluminium bronze	1.1
FINSABS	Insert 15mm probe aluminium bronze	1.1
FINSABZ	Insert 20mm probe aluminium bronze	1.1

Visit www.haven.co.uk for further information

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Calibration Solutions for Industry

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OTB-8 Series Digital Oil / Water Baths

Haven OTB-8 Oil/Water Baths are a compact and reliable solution for the calibration of thermal sensors. Available in 2 models depending on range and application required.

All baths are supplied complete with bath cover, drain tap, carry handles and hole to hold a certified sensor. The bath is fully insulated on the sides and the base and has a cooling coil fitted for connection to a cold water supply for use around ambient.

- Temperature stability as good as ±0.005°C
- Ranges covering -35°C* to 250°C
- 7 Litre or optional 12 litre capacity bath.

* A Flow cooler is required to operate the OTB-8S model at below ambient temperatures. A Dip Cooler is required to operate the OTB-8HT model at below ambient temperatures

TempWorks has been designed for use with OTB-8 Oil/Water Baths and the TU-20D controller on the refrigerated baths. It is a Windows® based programme that connects via an RS232 connection to your computer. Programmes can be created, saved and recalled at any time as well as running in real time mode. Time, temperature and ramp rates can all be set up. Temperature can be set to two decimal places. Temperatures within the range of -35°C to 250°C can be programmed.

	OTB-8S	OTB-8HT
Temperature Range °C	Ambient +10 to 200	Ambient +10 to 250
Temperature Selection	Digital	Digital
Temperature Stability °C (using water @ 40°C)	±0.005%	±0.005%
Pump Capacity litres/minute	10	N/A Internal Circulation only
Pump Capacity (mbar)	145	N/A
Method of Control	PID	PID
Temperature Sensor	PRT	PRT
Adjustable over-temperature cut-out	YES	YES Plus audible alarm
Low liquid level cut-out	YES	YES
PC Interface	YES RS232	YES RS232
TempWorks Software	Supplied As Standard	Supplied As Standard
Bath Capacity	7 Litre	7 Litre
Bath Opening (mm)	140 x 140	140 x 140
Below Ambient Temperatures	Use Flow Cooler -20°C Model FC-200 -35°C Model FC-500	Use Dip Cooler -20°C Model RU-200 -35°C Model RU-500
Dimensions: (mm) Bath L x W x H Head L x W x H	351 x 260 x 183 237 x 124 x 260	

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Flow Coolers

The Flow Cooler enables the OTB-8S Oil/Water Bath to reach below ambient temperatures down to -35°C**.

They work in conjunction with the thermoregulator (head) to continually extract heat from the bath fluid by means of a heat exchanger which is built into the unit.

	FC-200	FC-500
Minimum Achievable Temperature* (°C)	-20	-35
Cooling Capacity: 20°C (watts)	140	210
Cooling Capacity: 0°C (watts)	140	210
Cooling Capacity: -10°C (watts)	110	200
Internal Capacity (ml)	200	200
Dimensions (Excluding handles) mm Width Length Height	 235 420 300	 370 430 325
Weight (kg)	19	39

* In a well insulated 7 litre bath system at an ambient of 20°C.
** At ambient of 20°C, using a mixture of 40% water, 40% antifreeze, 20% alcohol to achieve -35°C.

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DIP COOLERS

The Dip Cooler enables the OTB-8HT Oil/Water Bath to reach below ambient temperatures down to -35°C.

The cooling head of the Dip Coolers fit neatly and unobtrusively into the corner of the standard circulating bath and can be secured with a specially designed mounting bracket. Even if cooling can be achieved by cold tap water, a dip cooler is recommended as it conserves water and is easier and more convenient to use.

	RU-200	RU-500
Minimum Achievable Temperature* (°C)	-20	-35**
Cooling Capacity @ 0°C (watts)	145	240
Cooling Capacity @ 20°C (watts)	145	240
Cooling Capacity @ -10°C (watts)	110	230
Nominal Dimensions (Excluding handles etc) mm		
Width	235	370
Length	420	430
Height	300	325
Coil Dimensions (mm)		
Length	85	85
Diameter	75	75
Weight (kg)	19	39

* In a well insulated 7 litre bath system, at an ambient of 20°C.
** At ambient of 20°C, using a mixture of 40% water, 40% antifreeze, 20% alcohol to achieve -35°C.

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CH-5 Chiller Unit

The CH-5 Chiller Unit is designed for use in conjunction with the Tempcal 140 calibrators and the OTB-8-H-T Digital Oil / Water Bath to achieve calibration temperature down to -40°C.

The minimum temperature achievable on the Tempcal 140 models is 45°C below ambient, but by artificially cooling the heatsink of the units with water from the Chiller an actual temperature of -40°C can be achieved. The unit is designed to run on distilled or deionised water.

Working temperature range	4 - 15°C
Cooling capacity	400 watts
Temperature control	Thermostat on/off
Electrical control	Manual
Dimensions L x W x H (inc pump)	430 x 235 x 524 mm
Bath capacity	5 litres
Pump capacity	20 litres/min

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Fluidised Baths - SBL Series

- Working temperature span 50°C to 600°C (0-800°C with TC-8D)
- Control stability ±1°C (±0.3° with TC8-D)
- Three models to choose from
- Simple to operate

The SBL range offers a working environment that is dry, easily accessible and totally free from the dangers associated with high temperature oil or salt baths.

The units are designed to be bench standing and only require an electrical and air supply for operation. Air passes through the mass of the (AL203) particles via a porous plate in the base of the unit separating the individual particles and suspending them in free air, giving the properties of a liquid bath. Heaters are placed in the bath which allow temperatures of up to 600°C to be maintained. All the SBL range units have a stainless steel inner container insulated from the outer wall and a safety air pressure switch in the event of loss of air.

All SBL Series fluidised baths are supplied as standard with an overspill flange and an initial charge of fluidising medium.

Other available accessories include air compressor for when a convenient airline is not available, air pressure regulator/filter and stainless steel baskets to keep workpieces from touching the heater elements and to make retrieval easier.

TC-8D
Designed to improve the temperature stability and temperature setting obtainable with the energy regulator supplied as standard with the SBL Series of fluidised baths.

The TC-8D is a self contained unit and is supplied complete with a chromel/alumel Type K thermocouple which fits into the sheath supplied with the SBL baths. The unit has digital set point and readout of bath temperature on an LED display and incorporates PID control.

		SBL-1	SBL-2	SBL-2D	TC-8D
Temperature Range °C		50 to 350	50 to 600	50 to 600	0 to 800
Temperature Stability °C, @ 50°C		±1	±1	±1	±0.3
Heat up Time, minutes 20°C to maximum		60	105	105	N/A
Cooling Time, minutes from maximum to 200°C		150	300	330	N/A
Air Pressure, kPa (psi)		21 (3)	21 (3)	21 (3)	N/A
Air flow, max litres/min		57	57	57	N/A
Weight of Medium (Kg) supplied with unit		13	16	32	N/A
Overall size (mm)	Diameter (excl. tap)	315	385	385	Width 165 Depth 240 Height 140
	Height	470	470	695	
Working volume (mm)	Diameter	228	228	228	N/A
	Height	120	140	350	

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Refrigerated Baths

- Temperature Range -35°C to 100°C
- 7 or 12 litre capacity
- Temperature stability up to ±0.005°C

These baths are a complete refrigerated circulating system for closed circuit applications for temperature ranges from -35 to 100°C.

Two bath capacities are available, 7 litres (RB-5A) or 12 litres (RB-12A). Temperature control is by the thermoregulator giving four different combinations.

COOLING (AT 20°C AMBIENT)	**RB-5A**	**RB-12A**
Minimum Achievable Temperature (°C) *	-20	-35
Maximum Achievable Temperature (°C)	100	100
Cooling Capacity at 20°C (watts)	145	235
Cooling Capacity at 0°C (watts)	145	371
Cooling Capacity at -10°C (watts)	110	154

Dimensions (L x W x H mm)		
Overall Size (with controller)	430 x 250 x 566	430 x 370 x 610
Liquid surface to top of the bath	65	65
Internal Dimensions	192 x 151 x 200	208 x 300 x 150
Working length to thermoregulator	224	224
Working depth – Max/Min (mm)	180 / 135	130 / 85
Working Capacity – Max/Min (litres)	7.0 / 5.5	11.6 / 9.6

THERMOREGULATOR	**TE-10D**	**TU-20D**
Temperature Selection	Digital	Digital
Temperature Stability @ 40°C (°C)	±0.01	±0.005
Nominal Heater Power at 120V (watts)	1000	1500
Nominal Heater Power at 230V (watts)	1000	1800
Pump Capacity (litres/min)	10	10
Pump Capacity (mbar)	145	145
Method of Control	PID	PID
Temperature Sensor	PRT	PRT
PC Interface	NO	YES Via RS-232
Software	NO	OTBSoft ** (Optional Accessory)

* Using a mixture of 40% water, 40% antifreeze, and 20% alcohol to achieve -35°C

**OTBSOFT SOFTWARE
OTBSoft has been designed for use with OTB-8 Oil / Water Baths and the TU-20D controller on the refrigerated baths. It is a Windows® based programme that connects via an RS-232 connection to your computer. Programmes can be created, saved and recalled at any time as well as running in real time mode.

Time, temperature and ramp rates can all be set up. Temperature can be set to two decimal places. Temperatures within the range of -35°C to 250°C can be programmed. Refrigeration units are available for connection to the system and can be controlled via the software.

A Refrigeration Control Pack is needed to turn the refrigeration unit "on/off" when used with the software.

0295

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FB08 Series Fluidised Baths

- Temperature range -100°C to 700°C
- Control stability ±0.2°C to ±0.5°C
- Three models to choose from
- Digital temperature indication/setpoint
- PID temperature control

FB-08 Fluidised Baths are available in three models, the standard FB-08 covering temperatures of 50 to 700°C, the FB-08LT for low temperature operation, -100 to 200°C and the FB-08C designed for minimum supervision, works in conjunction with a supervisory computer via an RS232 (or optional IEEE488) interface.

All FB-08's are attractively finished free standing bench units with controls mounted on a recessed panel on the front of the unit. The inner container is well insulated and the outer case is vented so that it remains safe to touch even when the bath is operating at its maximum temperature.

The inner container is filled from the top with alumina. When fluidised this medium is heated by four immersion heaters close to the container wall; the control thermocouple is close to the heaters. The heater elements are protected (by a pressure switch operated by the fluidising air) from excessive surface temperatures if fluidisation is lost.

Clean dry air from an external source passes through two filters and two regulators, to reduce the pressure for the cyclone extraction system and for fluidisation. The fluidising air passes through a flowmeter and then to a plenum chamber from which it is distributed evenly around the inner container.

The FB-08LT has provision for connection to a liquid nitrogen (LN2) supply and is fitted with an air drying system to avoid condensation of water when the fluidising air at ambient temperature is introduced into the cold fluidised bed. The LN2 supply is regulated by a flow meter on the front of the unit.

Dust extraction is by means of ambient air drawn down past the probe plate and through a peripheral slot round the top of the inner container, then through a cyclone to the exhaust filter. Entrained medium, removed by the cyclone and discharged into a special jar accessible from the front of the unit, can be emptied back into the bath at regular intervals.

Operating temperature is set by depressing and releasing the up/down buttons on the front panel of the control unit. Control of set temperature, incremental temperature steps, dwell times and control of dead bed state on the FB-08C can be programmed by the operator.

All FB-08 precision fluidised baths are supplied with the temperature controller and a probe plate to help keep items being processed away from the heating elements of the bath and to assist in the retrieval of items from the bath. A probe carrier is also available, which holds up to eight probes of varying sizes (customer specified). It is specially designed to allow free flow of the fluidising media assuring constant uniformity, reducing short term temperature fluctuations and improving calibration accuracy.

	FB-08	FB-08LT	FB-08C
Temperature Range °C	50 to 700	-100 to 200	50 to 700
Temperature Stability °C	Short Term @ 50°C ±0.2 Short Term @ 600°C ±0.3 Long Term @ 50°C ±0.5 Long Term @ 600°C ±0.5	@ 200°C ±0.2 @ -100°C ±0.5	Dead bed ±0.01 Short Term @ 50°C ±0.2 Short Term @ 600°C ±0.3 Long Term @ 50°C ±0.5 Long Term @ 600°C ±0.5
Display Resolution °C	1	1	1
Type of Control	3 term (PID)	3 term (PID)	3 term (PID)
Sensor Type	K Chromel/alumel thermocouple	Pt100	K Chromel/alumel thermocouple
Heat up Time, minutes	20 to 700°C, 105	20 to 200°C, 30	20 to 700°C, 105
Cooling Time, minutes	700 to 200°C, 165	200 to -100°C, 90	700 to 200°C, 165
Air Pressure, kPa (psi)	420 (60)	420 (60)	420 (60)
Maximum Flow, litres/minute	127	170	127
Weight of Medium, kg	16	16	16
Overall Size L x W x H, mm	770 x 515 x 600	770 x 615 x 600	870 x 515 x 600
Working Volume : Diameter x Depth, mm	165 x 385	165 x 385	165 x 385
RS232 Interface	NO	NO	YES
Automatic Air Supply	NO	NO	YES
Programmable	NO	NO	YES

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Fluidised Baths - BFS High Temperature Bath

- Temperature range 200°C to 1100°C
- Control stability ±0.5°C to ±3.5°C

Designed for applications requiring a constant high temperature source for calibration. The BFS is supplied with a TC-5 temperature controller, a separate air supply control unit which incorporates two flowmeters for monitoring the air supply, a charge of fluidising medium (aluminium oxide) and air diffuser (zirconium oxide).

The BFS has a hinged lid and a cylindrical bath. Substantial firebrick insulation is incorporated within the outer container and the lid. The inner container holds a layer of zirconium oxide, which acts as a heat insulator and a layer of aluminium oxide, the fluidising medium. The inner container is divided into inner and outer fluidised sections. Each area has a separate air supply which must be oil, water and dust free.

The air supply is adjustable to obtain uniform fluidisation in both sections of the bath. Heaters are mounted in the firebrick insulation between the inner and outer container; heat is radiated inwards to the fluidised bath.

An air extraction tube enables dust created by the bath's operation to be removed if connected to an extraction duct or fan. The dust can also be trapped in a small tank of water.

The TC-5 is used for setting, controlling and indicating the bath temperature. The TC-5 uses a chromel/alumel thermocouple, which mounts onto the back of the BFS and fits into the pocket of the inner container and is also fitted to the air flow control unit.

BFS with TC-5 Temperature Controller	
Temperature Range °C	200 to 1100
Temperature Stability °C (short term)	±0.5 to 3.5
Display Resolution °C	1
Type of Control	3 term (PID) digital set/readout
Sensor Type	K Chromel/alumel thermocouple
Air Pressure, kPa (psi)	47 (7)
Maximum Flow, litres/min	85
For immersed object: Maximum load size Maximum surface area	 2.2 litres 1080mm²
Weight of Medium, kg	16kg (aluminium oxide) 16.8kg (zirconium oxide)
Overall Size L x W x H, mm	686 x 686 x 876 (airflow controller adds 305mm to the width)
Working Volume, Diameter x Depth, mm	203 x 203 Top lid has a central opening 82.5mm square
Overall Size L x W x H, mm (TC-5)	430 x 305 x 140