



Electrothermal

STEM Integrity 10 Reaction Station

Sample capacity choice

Various diameter vessels

Energy efficient

Cost effective to run

Suitable for many disciplines

Increases lab throughput

Environmentally conscious

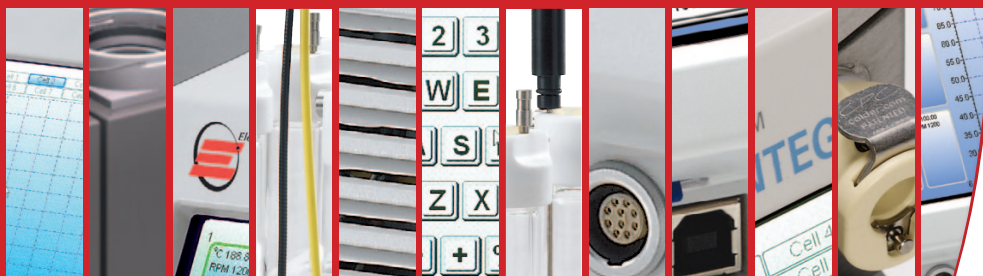
Compact and slimline

Highly accurate and controllable

Safe to run unattended

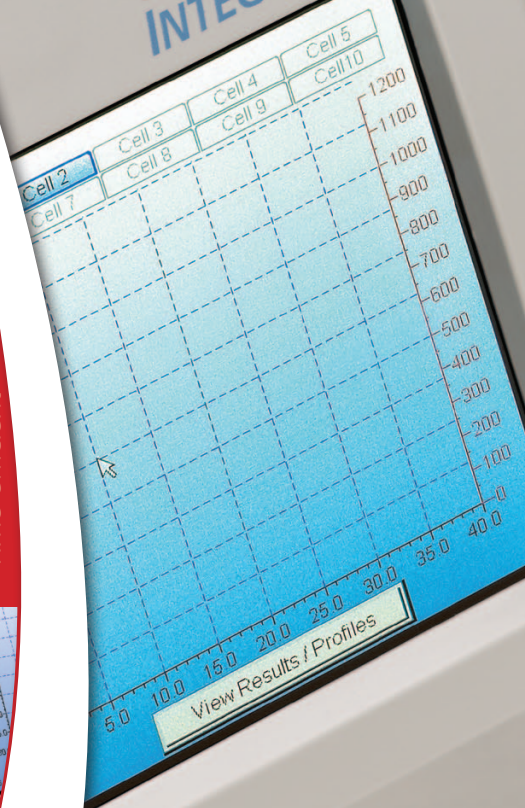
Wide range of accessories

Time-efficient



 **Cole-Parmer®**
scientific experts

STEM
INTEGRITY 10



Introducing the Integrity 10

STEM Integrity 10 Reaction Station

The STEM Integrity 10 Reaction Station's evolutionary design provides the advanced laboratory with a means for allowing the users to perform multiple reactions at individually set temperatures both in negative and positive temperature ranges simultaneously. Each cell position can be heated/cooled and stirred independently of the cell next to or adjacent to it.

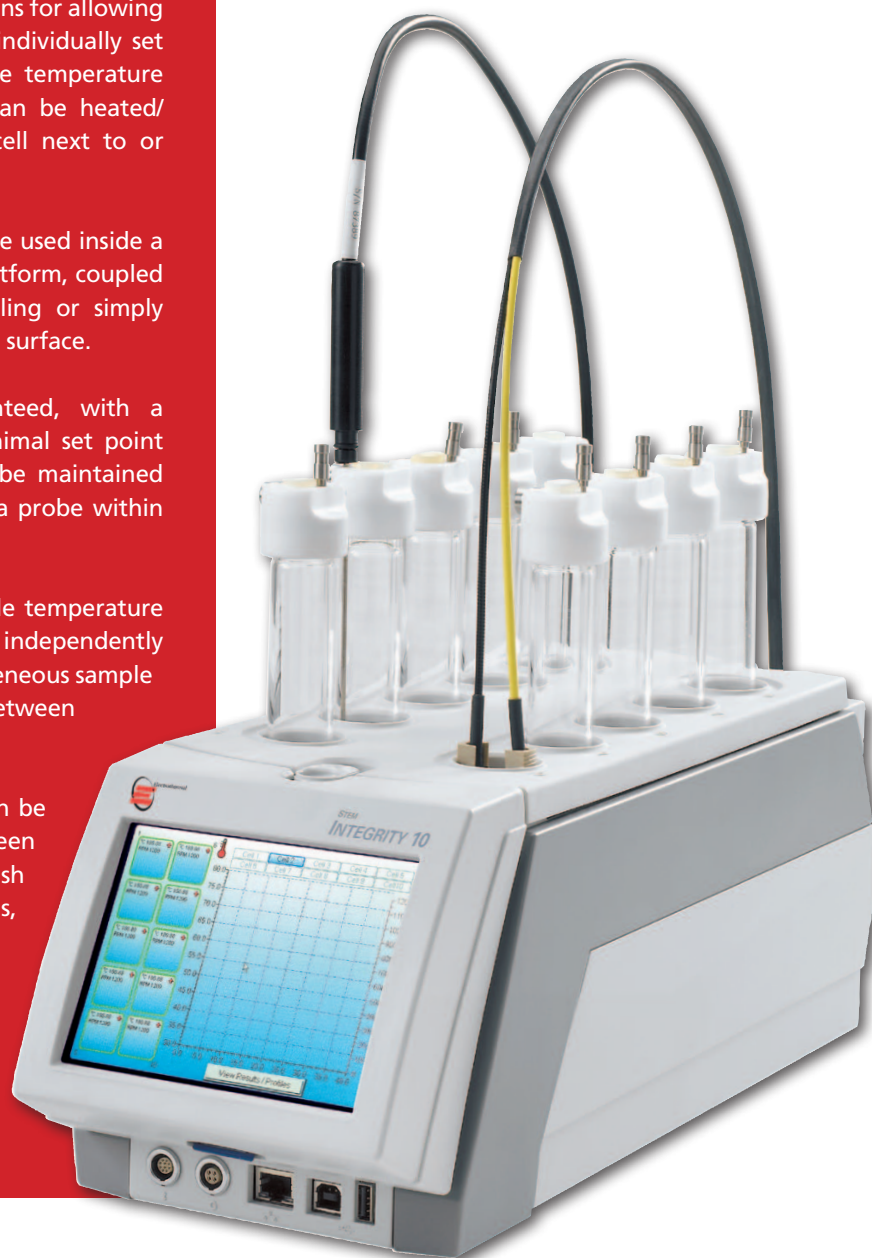
The versatility of the product means it can be used inside a fume cupboard, mounted onto a robotic platform, coupled together as multiple units for mass sampling or simply operated free standing on a laboratory work surface.

Extreme temperature accuracy is guaranteed, with a temperature stability of $\pm 0.5^{\circ}\text{C}$ and a minimal set point overshoot of 0.5°C . The temperature may be maintained either through the block itself or by using a probe within each cell's solution.

This accuracy can be maintained over a wide temperature range of -30°C to 150°C , with precise, independently controlled temperature profiles, and homogeneous sample mixing may be assured with stirring rates of between 350rpm to 1200rpm using magnetic stirrers.

If desired, fast heating and cooling rates can be selected, with temperature ramps of between $0.1^{\circ}\text{C}/\text{min}$ to $5^{\circ}\text{C}/\text{min}$. There is also a crash function for even faster temperature changes, which is ideal for kinetic determinations.

With working volumes of between 1ml to 25ml, the STEM Integrity 10 is an excellent screening tool for most laboratories and can also be used to establish ideal process conditions.



Key features: Integrity 10

- 10 individual cells in one unit.
- Individual control of temperature and stirring rate for each cell.
- Temperature range of -30°C to 150°C .
- Stirring rate of 350 rpm to 1200 rpm.
- Cell working volume of 1ml to 25ml.
- Optional attachments for refluxing, and working under vacuum or inert gas conditions.
- Optional infrared probes for solubility/crystallisation studies.
- Automatic microprocessor control through a touchscreen.
- Small footprint.

Intuitive operation

- 5.7" (145 mm) touchscreen offers convenient operation.
- Intuitive, clear touchscreen menus.
- Simple icons reduce the potential for costly errors.
- Manual programming of 'setpoints' and ramps for individual process demands or pre-programmed profiles for routine measurements.



Integrated microprocessor control

with exclusive user-friendly and intuitive touchscreen

The integrated microprocessor control with exclusive touchscreen simplifies operation and enables rapid access to important information for each critical parameter in the reaction block. It provides trend analysis for convenient evaluation of your station's performance without connecting a laptop.

Key features

1. Simple and intuitive touch screen interface allows quick and easy navigation.
2. Profile template enables the quick set up and execution of temperature and stirring profiles.
3. Graphical display ensures easy viewing of results with the extensive data evaluation and viewing function.



Total control

Complete information at your fingertips!

- Front mounted 5.7" (145mm) screen for easy accessibility and viewing.
- Easy-to-use menu, prompts to guide you and simple icons reduce the potential for costly errors.
- Visibility of each cell, showing the complete profile: on-screen logs and usage recording.
- Graph performance trends over established time frames and run event history logs protected with user pass codes and control lockouts.
- Data extractable via USB or SD card.

Full data logging

Solubility and crystallization software

This software provides full data logging of all key parameters, such as temperature and stirrer speed, using PC control. Experimental records and data are clearly displayed for convenient, at-a-glance monitoring of in-cell conditions. With real-time editing of ramp rates, run times and setpoints, the system is extremely user-friendly and all data is easily exported for further analysis. Additionally, data banks can be produced for simple storage and retrieval of frequently used protocols.

Choice of formats

The STEM Integrity 10 is most commonly utilised in two formats depending upon your needs:

- Option 1: STEM Integrity 10 Reaction Station as a standalone unit.
- Option 2: Clarity System, which consists of the STEM Integrity Reaction Station, with additional solubility and crystallisation evaluation apparatus and software.



Option 1

The STEM Integrity 10 unit

Option 1, the STEM Integrity 10 unit by itself, is generally useful for a wide range of reactions or processes in which temperature plays a major role, regardless of the industry. Within a temperature band of -30°C to 150°C , it is applicable whether these processes are derived from the petrochemical, chemical, pharmaceutical or food processing industries.

Different attachments may be added to these reaction cells, such as reflux heads to minimise evaporation and loss of liquid, or PTFE caps for maintaining an inert gas environment, to expand the range of uses for the STEM Integrity 10 Reaction Station. The Electrothermal Integrity 10 is a lean "lab-in-a-box".



Option 2

The Clarity System

One attachment that has been specifically designed for the STEM Integrity is the optional infrared (IR) probe, which is available in intrusive or non-intrusive formats. This is available for Option 2, the full Clarity System, which is finding increasing use in the pharmaceutical, petrochemical, cosmetic and food industries for specialist applications. Developed in collaboration with partners at Pfizer and the Illinois Institute of Technology, the Integrity 10 STEM reaction station with software is a powerful tool, for determining solubility and crystallisation profiles. Precise heating and data collection of up to 10 reactor cells in parallel provides rapid measurement of solubility under a range of conditions, whilst individual infrared transmission detectors allow turbidity/solubility measurements to be performed to a standardised endpoint (threshold).

The full Clarity System is a great aid in determining the solubility of drugs, the biodegradability of oils, and the crystallisation characteristics of cocoa butter to name just a few potential applications.

Macro Process Control

with User-friendly Touchscreen and Integrated Microprocessor

The Integrity 10 captivates by its simple operation and the clear representation of all process-relevant parameters and results. Each reaction cell is individually controlled and evaluated. The Integrity 10 is easy to set-up using the touch screen. With an intuitive menu system, operation is both quick and simple allowing the user to set-up and operate a simple profile or operate with full manual control.



Simplicity itself:

Five Step touchscreen operation

1. Cell/positionselection

Just select one of the 10 cell buttons to the left of the screen and this will take you to the screen where you can make your choice of manual control or run/start to build a profile.

2. Choose your profile

The options on the touchscreen offer you the choice of running a manual or automatic profile.

3. Inclusion of heating/cooling ramps

The touchscreen allows you to set up cooling and heating ramps and establish a temperature profile for each cell. You can also set up cycle runs by choosing how many times you would like this profile to repeat.

4. Automatic warnings

In the event of any problems, you are automatically alerted through warnings on the touchscreen. This ensures that you remain in control of the process, and that the profile you have programmed is running as planned.

5. Monitor results visually

Monitor the results of your experiments as they happen, displayed on the monitor.

A highly efficient screening tool...

Using the STEM Integrity 10 Reaction Station is a very time-efficient way of conducting chemical experiments, speeding up investigative work several-fold. Chemical reactions, involving either synthetic chemicals or naturally occurring substances, are universally impacted by heat and Integrity units allow you to assess the impact of both temperature and stirring rate upon reactions.

The beauty of the STEM Integrity 10 is that it combines flexibility with accuracy: It allows you to run up to 10 experimental variants simultaneously within the same unit, whose temperature and stir rate you can precisely and individually control. You can design temperature profiles for each individual experiment and record everything electronically; all results are captured and stored automatically, so you can be working (or relaxing) elsewhere whilst your STEM Integrity unit has everything under control.

You can add further refinements to increase the usefulness of this apparatus, for example, by adding reflux condensers to maintain sample volumes. As an accessory, PTFE gas inlet/outlet heads permit working under vacuum conditions or inert gas conditions with a nitrogen or argon blanket. The Clarity System utilises the STEM Integrity 10 to conduct solubility and crystallisation studies.

...and for establishing ideal process conditions

Whilst there is obvious potential for screening reactions in investigative chemistry or drug discovery laboratories, let's not forget about process monitoring laboratories. The STEM Integrity 10 can be very useful for establishing the ideal reaction conditions of many industrial chemical processes and can more than earn its keep as a great trouble-shooter, pinpointing the cause of process malfunctions due to temperature.

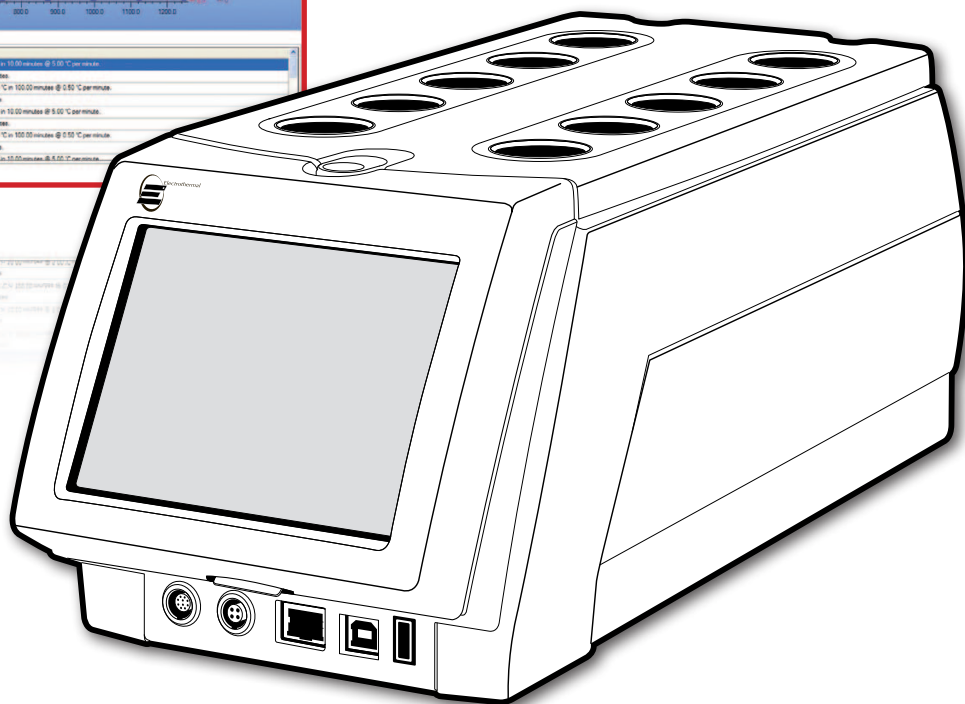
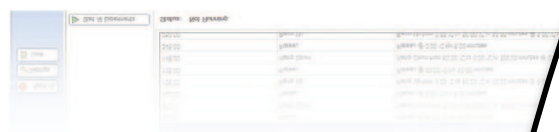
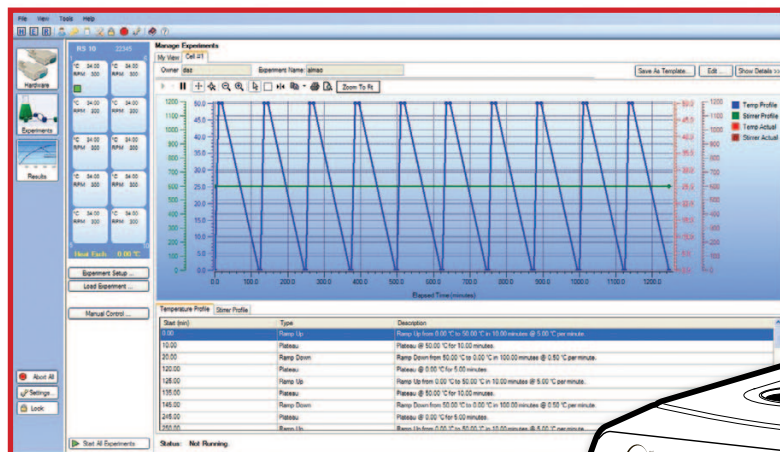
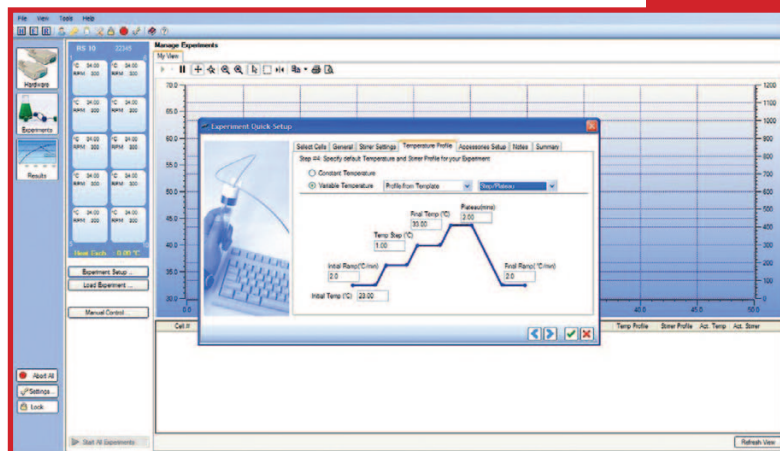
Saving time, bench space and electricity, Integrity units are easy to clean, and since the working volume of each reaction cell is between 1 to 25ml, they are very economical on reagents as well.



Solubility Crystalization Software

The accessory PC-software has all functions of the on-board software of the Integrity 10 and beyond that it enables an even more global handling of the data.

The process data of the conditions in the individual cells e.g. temperature and stir speed, are clearly displayed. The extremely user friendly software enables the real-time editing of ramps, process times and set values. In addition the software allows easy control of the optional IR probes. The software enables graphical on-screen monitoring of solubility/crystallisation and automatically plots the results when exported to excel.



Key features

- Choice of temperature profile and stirring parameters.
- Prompts to guide you in your selections.
- Intuitive icons to reduce the potential for costly errors.
- Real-time editing of ramp rates, run times and set points.
- Tailored temperature profiles.
 - Curves can be programmed into the temperature profiles.
 - Integrated database options for frequently used profiles.
- Flexibility as all parameters can be changed during the process.
- Visibility of each cell on the microprocessor screen to provide immediate and on-going access to the progress of the reactions within each cell.
- At-a-glance display of the results graphically.
- Automatic functions for:
 - Recording of the reaction profile for each cell for all important parameters.
 - Scaling of data.
 - Self-diagnostic warning system to flag any errors immediately.
- Historical records:
 - All data is captured and can be viewed historically.
 - Extensive storage capability.
 - Protection of run event history logs through user pass codes and control lockouts.
- Data is extractable to a PC via a USB port or SD card for more in-depth analysis and evaluation of the results.

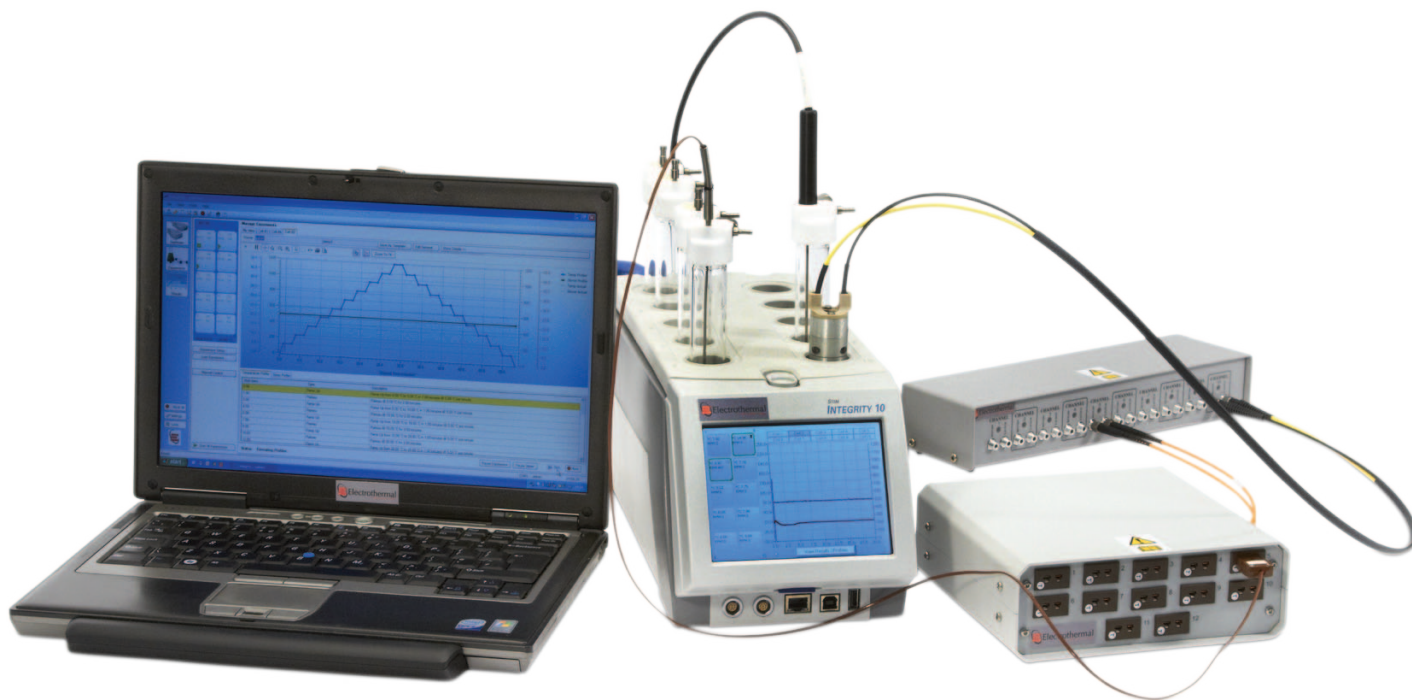
The Clarity System

For the Solubility/Crystallisation Studies

Crystallisation processes are used in the manufacture of speciality chemicals, fine chemicals and pharmaceuticals. The first step in the crystallisation process is determining the solubility compound in a selection of aqueous, organic solvents and/or solvent mixtures. Solubility determines methods for supersaturation and the yield in the crystallisation process. Unfortunately, determining the solubility of a compound can be labour intensive and consume large quantities of material/chemical solution. The Clarity Solubility Station provides a quick and inexpensive way of determining the solubility of a compound by monitoring the turbidity of the mixture. The Clarity system for solubility includes all of the following:

- Integrity 10 (PS20000)
- Multi-IR box (ATS10232E)
- IR Probes (Choice of ATS10230 / ATS10360/1 / ATS10394/1)
- Chiller unit or cool water supply
- Customer supplied personal computer
- Integrity Software (ATS11005)
- Glass Tube Kit - Reaction vial, stirrer bar and cap

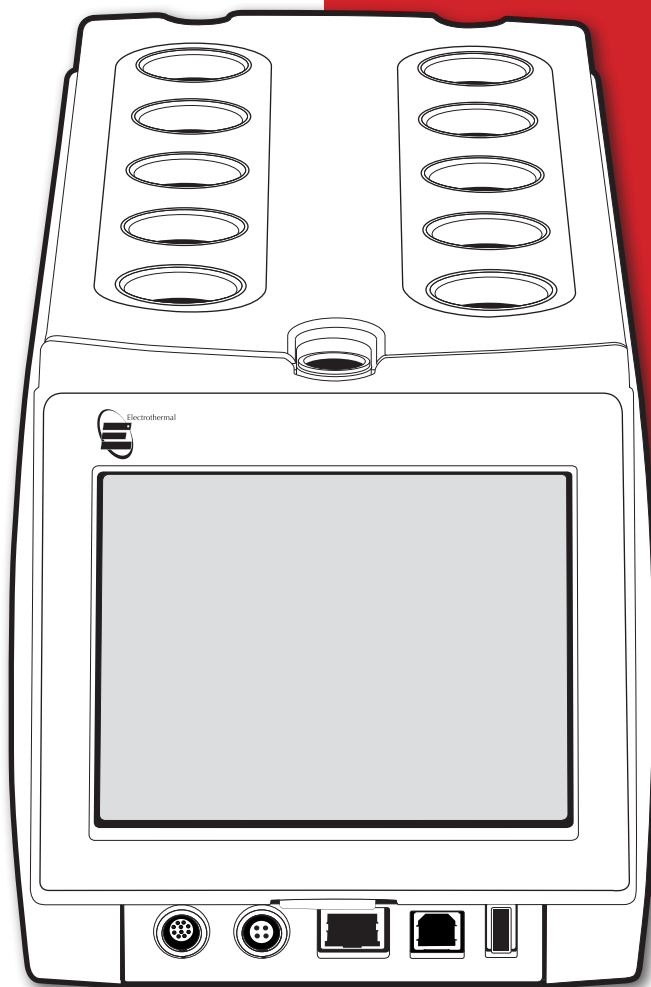
The solubility data of developed pharmaceutical compounds in a range of solvents must be determined to correctly identify the best drug delivery methods. Choosing the correct solvent is equally important because of its impact on reaction yield, product quality and manufacturing process. The Clarity system provides a high through-put system for accurately determining solubility with only small sample volumes.



Integrity 10 Software

The Integrity Software (ATS11005) provides the user with many technological features such as the 'Solubility Curve Generator' and import/export functions. As part of the Clarity System the software will help advance your laboratory processes for many years. The platform has been laid down to support and integrate future

accessories as they evolve ensuring your processes benefit from all the latest technological advances as they happen. Experimental data features include the facility to show boiling points, calculations and a solvent list, while a scheduler allows for batch control parameter settings.



Super energy-efficient alternatives to hotplate stirrers

Supporting modern ways of working

Although Integrity 10 Reaction Stations can perform highly accurate specialised work, their value-added credentials make them a credible alternative to hotplate stirrers. The first hotplate was patented in 1859 by George Simpson, and despite improvements such as the incorporation of magnetic stirring, the design of hotplate stirrers still wastes a lot of energy in heating the surrounding air, equating to wasted money and unnecessary CO₂ emissions.

In contrast, almost all the energy generated by Integrity's in-built heater cartridges goes directly into the reaction vessels. If your lab already has a lot of hotplate stirrers, it would be worth considering an upgrade to an Integrity 10 Reaction Station as they support modern ways of working.

Green Lab

- The Integrity 10 Reaction Station is very environmentally conscious as it uses an exact energy input, with each cell being pre-programmed to switch off automatically.
- Using 90% less energy reduces CO₂ emissions accordingly, so they are perfect for Green Lab working.

Lean Lab

- Different experiments may be run simultaneously, increasing throughput by up to 10-fold at any one time.
- Since they can be left to run 24/7 with minimal supervision for years, they can give you a better work-life balance.
- Data is automatically captured and plotted, so experiments may be left to run unattended day and night. They could be set up last thing in the evening and results collected first thing in the morning, already plotted out for you.
- Ten scientists can use one Integrity.
- The Integrity 10 is about the size of a shoebox. Their compact footprint means that they can be used in the fume hood, on a lab bench, or easily moved between labs on a lab trolley.
- With sample working volumes of between 1 to 25ml, they are very economical on reagents.
- The Integrity's individual reaction cells are fully encapsulated, protecting them from any moisture ingress. This in turn means that there is minimal maintenance and repairs typically take just a couple of minutes and require only a screwdriver.

"Lab-in-a-box"

- Reaction stations offer a succinct heating/cooling/stirring solution to over-crowded laboratories, and coupled with the right accessories, may be regarded as a "lab-in-a-box".
- Hence, a whole raft of accessories are available to make the Integrity even more useful to laboratory scientists of all disciplines.

Robotic platform

- The Integrity 10 may be used on a robotic platform as it has dual control, operating either as a standalone unit via the user-friendly touchscreen to the integral microprocessor, or remotely via an external computer. This makes them ideal for use on any robotic platform.
- Separate Integrity units can also be coupled together if desired for mass sampling.

Safety conscious

- Integrity has a cool-to-touch outer casing, a very important safety feature for multiple users.
- Automatic shut down of cells prevents thermal runaway.

Integrity 10



Number of cell positions	10
Cell cavity diameter	25.5mm
Glass vessel fill level	1 to 25ml
Temperature range	-30°C to 150°C
Temperature difference between any two positions	180°C
Temperature overshoot (maximum)	0.1°C
Maximum heating/cooling rate	5°C/min
Temperature ramp rate	0.1°C/min to 5°C/min in 0.1°C/min steps
Stir speed range	350 to 1200 rpm
Maximum viscosity capacity	Glycerine at 25°C
Recommended stir bars	12/4.5mm (cylindrical) or 10/6mm (oval)
Temperature Range	-30°C to 150°C
Temperature Resolution	0.01°C
Temperature Accuracy	±0.5°C
Stirrer Speed range	350 to 1200 rpm
Stirrer Resolution	1 rpm
Stirrer Accuracy	±10 rpm

- Minimum temperature is linearly dependent upon the temperature of the cooling fluid. Specified range assumes a cooling fluid temperature supply of max 5°C at a flow rate of ≥ 5L/min and a cooling capacity of 1100W between -5°C to 5°C.
- Stir performance only guaranteed using recommended stir bars.
- For more information on how to optimise the performance of your system, refer to the Integrity cooling guide available online.

Running costs comparison

Reaction station series	Integrity	Hotplate stirrers	
Model	Integrity 10	Lower power consumption, 550W	Higher power consumption, 950W
No. of positions	10	1	1
Max. temperature	150°C	300- 450°C	300- 450°C
Min. temp	-30°C	Ambient	Ambient
Sample volumes at each position	1 - 25ml	Variable	Variable
Power consumption	1100W	550W	950W

Maximum running costs @ 14.5p per kW/h

Per hour, £	£0.16	£0.08	£0.14
Per week, £ (8 hours x 5 days)	£6.40	£3.20	£5.60
Per year, £ (50 weeks)	£320	£160	£280
No. of hotplates	N/A	10	10
1 year's running costs, 8 hours x 5 days/week	£320	£1,600	£2,800
10 years' running costs, 8 hours x 5 days/week	£3,200	£16,000	£28,000
1 year's running costs, 24 hours x 5 days/week	£960	£4,800	£8,400
2 years' running costs, 24 hours x 5 days/week	£1,920	£9,600	£16,800
3 years' running costs, 24 hours x 5 days/week	£2,880	£14,400	£25,200
4 years' running costs, 24 hours x 5 days/week	£3,840	£19,200	£33,600

Notes:

- The average cost of UK electricity was quoted as being 14.5p per kW/h on the UK Government's www.directgov.uk website in Jan 2012.
- Although costs of electricity will vary across countries, the general trends will remain the same, being based upon energy consumption figures.
- Water usage has not been factored into these calculations. To minimise water usage, it is recommended that water is recycled wherever possible.
- Power consumption of accessories has not been factored into these calculations. To minimise power consumption, it is recommended that accessories are turned off when not required.

Ordering information

Integrity Reaction Stations

Part Code	Description
PS20000	Integrity 10 with 10 individually controlled cells, UK , US & EU power leads
ATS20100	Integrity 10 reflux/inerting unit
ATS20002	SVL 22 thread inerting caps for use with ATS20100
ATS10075	Glass tubes 24 / 150mm, SVL 22 thread pack of 10
ATS20003	Kimble thread inerting caps for use with ATS20100
ATS20004	Kimble thread 24 / 150mm glass tubes compatible with ATS20003
ATS10055	Small volume test tubes 24 - 16mm taper (3ml) x10
ATS10056	Reducing sleeves for ATS10055 x10
ATS10209	Small volume test tubes 24 - 11mm taper (1ml) x10
ATS10101	Reducing sleeves for ATS10209
AZS4206	Stirrer bars 10 / 6mm, pack of 10
AZS4235	Stirrer bars 12 / 4.5mm, pack of 10
ATS10001	Multi-Temp 10 plug-in box
ATS10027	Temperature probe, pack of 6
ATS10027 / 10	Temperature probe, pack of 10
ATS11005	Integrity software
ATS10232E	Multi IR Plug-in box
ATS10360 / 1	Non Intrusive IR sensor, pack of 1
ATS10230	Small Intrusive IR probe in stainless steel PID-NIR5-BNSD, pack of 1
ATS10394 /	1 Large Intrusive IR and NIR probe pack of 1



Intrusive IR Probes for Integrity 10

Part Code	ATS10394/1	ATS10230 (stainless steel- pack 1)
Description	Intrusive IR/NIR probe 661.6004-NIR, 10mm	Intrusive IR probe DIP-NIR5-BNSD
Key features	Ultra-mini Immersion probe Large window at probe tip Ideal for large crystals and highly viscous solutions	World's smallest fibre optic dipping probe Ideal for multi-channel applications
Optical light path	10 mm \pm 0.02 mm	5mm
Materials in contact with sample	Sapphire Kalrez 6375 (perfluoroelastomer) Hastelloy C-22, PEEK (polyether ether ketone)	Choice of stainless steel or Hastelloy (nickel-based alloy with high corrosion resistance)
Probe housing	Designed to fit Integrity 10	Designed to fit Integrity 10
Dimensions:		
Outer tip diameter	6 mm	1.5 mm (17-gauge needle size)
Min. immersion depth	20 mm	7mm (tip to upper edge of sample window)
Total length	215 mm	180mm (including handle)
Max. temperature at the probe shaft	150°C	
Pressure range sample	1 bar up to 6 bar	
Fibre optic fibres	Quartz built-in cables with low OH content (NIR)	Quartz built-in cables
Core diameter optic fibres	600 μ m	2 x 400 μ m
Total length	2 x 1.4 m	1.5m (from connector to tip)
Cable connectors	FSMA type 905	SMA
Chemical resistance	Very good chemical resistance	Can be used in almost any organic and inorganic solvents except HF and strong acids. HF will dissolve the quartz fibre and strong acids will corrode the stainless steel
Recommended cleaning solutions		Distilled water, detergent, alcohol, acetone



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



UK Office

Keison Products,

P.O. Box 2124, Chelmsford, Essex, CM1 3UP, England.

Tel: +44 (0)330 088 0560

Fax: +44 (0)1245 808399

Email: sales@keison.co.uk

Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.