



The Next Generation in Titration

Clever, Compact, Capacitive Technology

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GR Scientific are recognised experts in the titration market with particular focus on the petrochemical sector. Although the technique lends itself to generic titration, GR Scientific believe in focusing on a given sector, which ensures they are recognised as specialists and are regarded as the preferred supplier of instrumentation within petrochemical industry.

Amongst other products, we manufacture the Aquamax KF Coulometric System, with new products being continually developed. The concept behind all our products stem from our customers within this industry. We strive to meet their high demands and needs, and follow this up with customer service and support to make their job as hassle free as possible. The idea behind the PAT940 (Petrochem Analysis Titrator) was to introduce a more user friendly and robust potentiometer combined with the latest touch screen technology for the petrochemical industry. In essence, moving away from long installation procedures should allow the new user to open the box, set up and go.

The Importance of Titration Analysis in the Oil and Petrochem Industry

Monitoring the performance of new and used oils, such as crudes, transformer, lubricants and diesel fuels, is a requirement by industries. Titration is only one of the many analytical techniques used which allows the quantitative determination of a specific substance dissolved in a sample. Potentiometric titration is a very fast, accurate and precise technique which can be used by low-skilled and low-trained operators with no need for highly specialised chemical knowledge.

The PAT940 Smart Titrator offers new features that increase the ease of use and sampling productivity as well as the titration process itself, especially when running more complex testing procedures.

The Thinking Behind PAT940

More user friendly— User friendly is a common phrase bounced around in many different industries. It's easy to say but not always true! Our ethos with our customers has always been based around usability which encompasses user satisfaction and user experience. Where possible, processes in the work place should be made as easy as they can be to improve productivity. PAT940 utilises the latest capacitive touch screen technology, equivalent to current smart phones on the market. Personalised menus and prompts with quick access to favourite methods allow optimisation of routine tasks. Swipe the screen even when wearing gloves to navigate around the firmware with ease. The home screen icon is present on every screen so regardless of which submenu you are in you can always get back to your homepage.

More Robust – The compact design has been engineered and manufactured from environmentally safe and chemically resistant surface treated materials including anodised aluminium side panels to repel even the most aggressive solvents such as ketones.

Pre-programmed ASTM Methods - PAT940 supports monotonic (MET), dynamic (DET) and predefined endpoint (SET) titration modes to perform titrations according to ASTM standards including Acid/Base Number, Mercaptan Sulphur, Saponification Number, H₂S in Crude and Bromine number. A full list of ASTM methods associated with PAT940 are available on request.

What is So 'Smart' about PAT940

Automatic Electrode Identification - We understand that the electrode is the most important part of any titration system and traceability plays an important role in any working laboratory or industrial environment. Each electrode is colour coded - plug in your electrode, turn the unit on and a coloured electrode icon will materialise. A list of pre-programmed methods will then appear that are associated with the connected electrode. The user also has the option to edit or create new methods



as they so wish in addition to the pre-programmed methods. They can then add and save them under that particular colour coded electrode for future use. Each method is assigned automatically with its own unique ID code in sequential order. Pre-programmed ASTM methods with optimised parameters are stored in the memory ready for the operator to use and the good news is that there is unlimited capacity to store methods.

Capacitive Touch Screen Technology - If we can relate our titrator to something that everyone uses day to day, then it's a simple concept. Most people now have a smart phone, which is essentially a PC in your hand. We know there are plenty of touch screen titrators on the market but most use what's called a resistive touch screen.

What are the Differences Between a Capacitive and Resistive Touch Screen

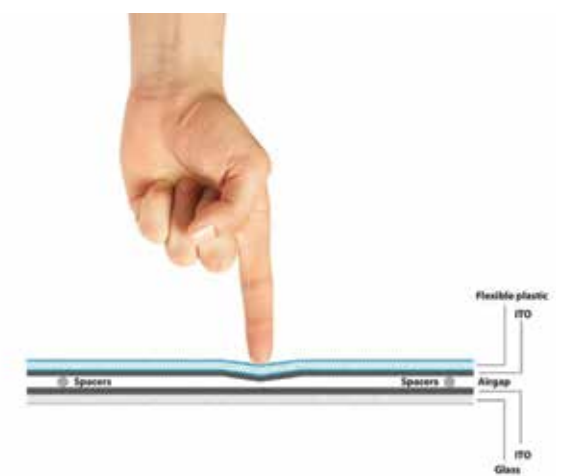
Capacitive screens consist of a sandwich of two spaced layers of insulating glass coated with ITO (indium tin oxide) on the inside.

Capacitive touch screens use the microvolt energies provided in the human finger to cause a response. The microvolts of the human finger are enough to register with this technology which negates the necessity of a stylus which had long been staples of devices like the Palm touch pads and Tablets.

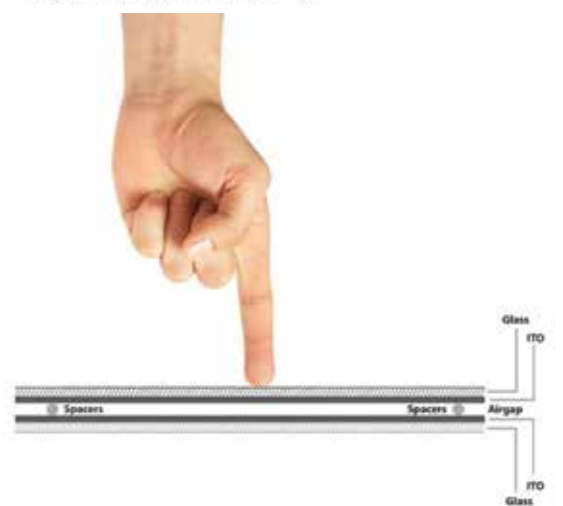
Resistive screens have a front surface of flexible plastic with a thin film of conductive material again ITO printed onto its underside.

Beneath it is a second layer, usually made of glass but sometimes of hard plastic. This has a coating of ITO. When the screen is touched the plastic deforms so that the two ITO films meet, and by measuring the resistance of both layers at their point of contact it's possible to get an accurate measurement of the touch position. This, of course relies on an even coating of ITO on the layers, plus accurate calibration: with some early touchscreen mobiles, the calibration could drift as the battery became depleted.

Nowadays Capacitive screens have become almost the norm and allow for easy care free manipulation and control of



Resistive touchscreen



Capacitive touchscreen

most modern tablets. As capacitive screens don't need much contact at all, you can swipe across them very lightly and get just as good a response as you would with a slow, full-fingered drag. By comparison, the vast majority of resistive touchscreen phones won't normally react at all to a very light swipe.

Benefits of PAT940 Capacitive Touch Screen

Much better clarity and resolution than a resistive screen because it offers a higher transmission of light from the display beneath the sensor — over 90 percent compared to resistive technology's 80 percent — which is particularly important for devices like smartphones that boast bright, high-resolution screens.



Robustness is paramount in this particular industry. The glass screen is 1.2mm thick and is more resistant to casual scratches and blemishes than flexible plastic on resistive screens.

Operational even with gloves on!

High touch resolution means even the slightest contact of your electron-rich finger with the screen's glass is enough to activate the capacitive sensing system below therefore no pressure required. By altering and adjusting capacitive screen technology-touches can be sensed and responded to, even while the user is wearing gloves. The inoperability of capacitive-touch tablets with gloves has been a complication for many businesses in industries and workplaces that require employees to wear protective equipment - including gloves. This has been accomplished by elevating the touch screen's sensitivity, so the capacitive screen can detect electrical impulses- even if the impulse is insulated by a glove.

Hygienic - Wipe clean in an instant.

Full finger touch is needed on the screen but the use of glass as the main material means that the screen is also very quick and easy to clean. The very nature of resistive screens means that their top layer is soft, soft enough to press down leaving an indent. This makes such a screen vulnerable to scratches and other minor damage. A resistive screen also gradually wears out and requires more frequent calibration

The Hardware – Perfect PODularity

PAT940 consists of PODS; a Dispense POD, Titrate POD and a Control POD as standard. Add in up to fifteen multiple Dispense PODs and two Titrate PODs thanks to the versatile design and engineering of the complete system. Why would you want to do this? Whilst running a sample you may wish to set up another burette with a different titrant or use it for dispensing of indicators/solvents and cleaning of electrodes.

Select either a vortex mixer for more viscous samples or magnetic stirrer depending on your type of sample. Create a functional workstation by organising your PODS, rinsing and calibration solutions in an ergonomically designed drip tray.



For some methods a larger titration vessel is required. The Titrate POD has the flexibility to house larger vessels up to 400ml without changing the overall size of the POD.

Accurate dispensing at speed - The Dispense POD delivers a 48000 stepper motor driven piston syringe giving the highest injection resolution in the industry. Available currently with syringe volumes of 5 and 12.5ml, it has outstanding precision and speed control. The motor is directly attached to a linear actuator to drive the piston in precise increments to as low as 0.01µl.

PAT940 Automated - AutoPOD

An increasing number of samples, time-consuming sample preparation and unattended overnight operation quickly justifies the use of automating procedures. The PAT940 AutoPOD is an XYZ autosampler designed to maximise throughput in minimal space. It is important that our customers increase productivity without sacrificing laboratory bench space. We have three sampler size options depending on your requirements that can analyse samples in half the time a standard XYZ sampler can do using two of our Titrate PODS simultaneously.

Traditionally the robotic arm has a fixed electrode platform where the probe, dispensing tube and vortex mixer would rest. The AutoPOD has a robotic extended claw which picks up the vessel to be analysed and takes it to a fixed electrode platform for analysis. As the electrode platform is not moving from sample to sample with the potential of drips to fall, there can be no contamination from previous samples.

Between every sample, the electrodes, dispensing tube and stirrer are rinsed using an active pump system. The SMART RINSE system utilises a high powered blasting sequence with the appropriate solvent to ensure no carry over.

A series of wash stations are also positioned to optimise the cleaning procedure that indicate the probes are clean and free of contamination, based on the method you are running of course.



PAT940 Customised

Choosing the right instrumentation for your applications can be daunting especially in such a demanding industry. Whatever your primary focus is discover what the PAT940 can offer you. Tailoring processes to meet your demands is our speciality combined with customised after sales service and support.

After reading this article a product demonstration is on the tip of your tongue. Don't hesitate, contact us today for more information.

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