Smart Titrator®

GRScientific

PAT940

Dedicated for Petroleum Analysis

*The **next generation** in titration*

Smart, Simple, Swipe Technology

Improving productivity - the ethos behind PAT940

Introducing a more user friendly and robust titrator combined with the latest touch screen/swipe technology.

User friendly is a common phrase bounced around in many different industries. It is easy to say but not always true! Processes in the work place should be made as easy as they can to improve productivity and operational efficiency.

- Light 'finger touch' screen with swipe reduce and enlargement functionality with graphs
- Touch enabled QWERTY keypad that pops up for all data entry
- Store up to 1000 methods and 1000 results
- 50 shortcuts can be saved to the Homepage to quick start favourite methods

There are many complex methods within all industry types in the titration world, therefore introducing a more user friendly and robust potentiometer combined with the latest touch screen technology, is the perfect combination. PAT940 utilises the latest capacitive touch screen technology, what does that mean? This is the technology that your smart phone uses.

Making life easier in a demanding industry

Focusing on the challenges faced within the petrochemical world

Monitoring the performance of new and used oils, such as crudes, transformer, lubricants and diesel fuels, is an important requirement. Titration is only one of many analytical techniques used which allows the quantitative determination of a specific substance dissolved in a sample.

Crude Oil Components

Crude oil is a liquid found within the earth comprised of hydrocarbons, trace metals and organic compounds. It is formed over millions of years through the process of heating and compression of organic materials, where the remains, commonly zooplankton and prehistoric algae, have settled on the bed of an ocean or lake. Physical compaction of these sediments due to pressure increase on burial is called diagenesis, thus forming sedimentary rock.

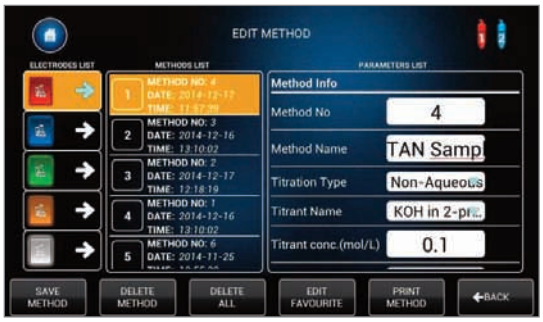
Why are hydrocarbons so important

- Hydrocarbons contain a large amount of energy. Gasoline, diesel fuel and paraffin wax are derived from crude oil and take advantage of this energy
- Hydrocarbons can take on many different forms, such as the smallest form which is methane (CH_4). Longer chains with five or more carbons are liquid and any longer can be tar or wax. By chemically cross linking these hydrocarbon chains, substances such as synthetic rubber, nylon and plastic can be produced

Screen Navigation Made Easy

Uncomplicated Programming

Ease of operation is key to optimizing routine tasks. Ploughing through screens with numerous sub options is tedious and time consuming. PAT940 is able to load and run a method in less than a minute from the homepage.

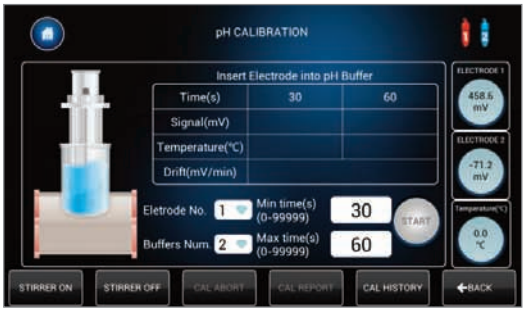


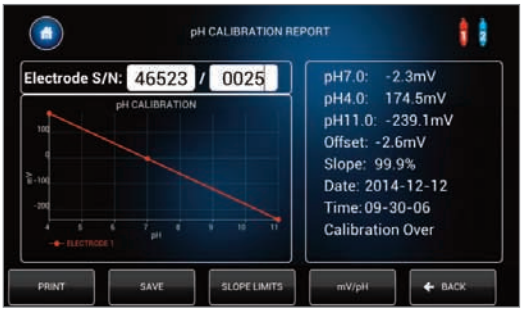
Updating favourites for a quick start

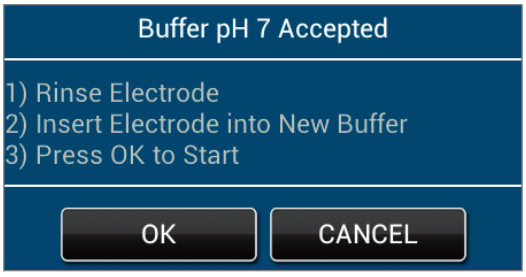
- Run a favourite method with one touch
- When loading the method table simply tick which ones you wish to add to favourites
- Regardless of which screen you are in, an icon appears on every screen to take you back to your homepage

Stress free editing or creating methods

- Setting up methods is no longer a tedious task of clicking through lots of screens
- Simply scroll through parameters and use drop down boxes all on the same screen to edit or create your method
- Press a field and enter information using the automatic pop up keypad or choose an option from a predefined list







- Select up to 5 buffers when performing a calibration
- Select your own minimum and maximum waiting times for measure value acceptance
- Temperature can be entered manually or continually monitored with a temperature probe
- Automatic buffer recognition after each measurement

PAT940 – Smart Titrator®

PAT940 has a compact PODULAR design with anodised aluminium side panels to repel aggressive solvents. The instrument supports, dynamic, incremental and manual titration modes with pre-programmed methods conforming to ASTM standards..

Conforms to Recognised Standards

Total Acid Number	ASTM D664
Total Base Number	ASTM D2896 ASTM D4739
Mercaptan Sulphur	ASTM D3227
H2S, Mercaptan Sulphur	UOP 163
Saponification Number	ASTM D94
Organic Chlorides in Crude	ASTM D4929
Iodine Value of Biodiesel	EN 14111

Please contact us with any application enquiries relating to crude oil, biofuels, petroleum products and other recognised standards.

Titration with capacitive touch screen technology

Benefits of a capacitive touch screen

Seamless finish

Projected capacitive screens consist of a sandwich of two spaced layers of insulating glass coated with ITO (Indium tin oxide) on the inside. The glass is 1.2mm thick with a flush front and is more resistant to casual scratches and blemishes and won't deform over time or shrink with heat.

Operational with gloves on

The inoperability of touch screens whist wearing gloves has been a complication for many companies that require employees to wear protective equipment. PAT940 has elevated sensitivity so the capacity screen can detect electrical impulses-even if the impulse is insulated by a glove.

Superior image quality

High quality manufacturing processes are critical to projected capacitive touch screens producing near 100% optical clarity, resolution, luminance and sharpness.

Perfect Podularity

Integrate, Interface and Organise your Workspace

Versatile POD linking

The modern design platform allows provides you with all the interfaces you need to plan your workload and perform analyses to the standards you set.

- A complete system consists of a Dispense POD®, Titrate POD® and Control POD®
- Link up multiple Dispense and Titrate PODs® and tailor the system to your requirements
- Devices such as printers, balances, memory sticks and LAN connections can be connected to the back of the Control POD®

AutoPOD® – automation for increased sample throughput

Increased efficiency

Create sample sequences for your methods and store on the homepage as a favourite then begin with a single touch

- Choose from two X,YZ samplers, 48 and 96 place
- Each AutoPOD has an extended claw which picks up the vessel to be analysed and takes it to a fixed reaction station for analysis
- No cross contamination – electrode platform does not move from sample to sample therefore no potential of carryover

Smart Rinse

Reduced carry over. 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.

Technical Specifications

Display	Capacitance touch screen Width 152mm Height 89mm Resolution:
Dispense POD®	
Multiple linking PODs:	Up to 16 Dispense PODs® can be linked simultaneously
Syringe volumes:	12.5 ml and 5 ml
Drive Design:	Maintenance-free, direct drive stepper motor
Stroke Speed:	4.2 seconds to 800 minutes per stroke (3200 minutes in microstep mode)
Step Resolution:	24,000 steps
Imprecision (full stroke):	≤0.1% CV @ 50µl to 100 µl ≤0.05% CV @ 250µl to 5ml
Inaccuracy (full stroke):	≤1% syringe volume
Measurement Modes:	Dynamic equivalence point titration Incremental equivalence point titration Manual titration Calibration with automatic buffer recognition
Potentiometry	
mV Range:	-3200 - +3200 mV
Accuracy:	± 0.1 mV (± 0.0016 pH).
Resolution:	0.1mV
Amplifier Input Impendence:	> 10 12Ω
Storage	
Methods	Up to 1000
Results	Up to 1000
Favourite Methods	Up to 50
Temperature	
Measuring Range Pt100:	0.0 - 100°C
Resolution Pt100:	0.1°C
Measuring accuracy Pt100:	± 0.3°C (with linear calibration)
Interfaces	
USB ports:	2 USB (Type A sockets) for connection of printers, USB sticks
Wireless Communication:	Bluetooth Printing
Titrate POD®:	2X Titrate POD® 9 PIN D-type (female) RS232
Balance:	1x 9 PIN D-type (female) RS232
Autosampler:	1x 9 PIN D-type (female) RS232
Network Connection:	LAN RJ-45 connector, ethernet
Electrodes:	2x 6 pin LEMO (male)
Dispense POD:	BUS RS485 Kycon 4 pin for series connections
Ambient Temperature	
Operating Temp Range:	-10 to +45°C
Operating humidity:	8-90% RH non-condensing
Storage Temp Range:	-20 to +70°C
Storage Humidity:	5-95% RH no-condensing
External Power Supply	
Supply Voltage	110V/220V
Frequency	50-60Hz
Power Consumption	160W
Electrode Recognition:	Colour coded E-Chem® electrodes with auto recognition technology
Dialog Languages:	English, German, French, Spanish, Chinese, Russian, Polish
Weight:	approx 7.5kg
Dimensions:	Control POD® 25x13x22cm, Titrate POD® 40x25x9cm, Dispense POD® 14x14x5cm

Ordering Information

594000	**PAT940 Smart Titrator®,Standalone System 1** **Comprises of:**
594005	Control POD®, with 24VDC 7A PSU Power Pack and RS485 Cable (2 pin) 500mm
594006	Titrate POD®, with RS232 Cable 500mm and Cable Kycon 500mm
594007	Dispense POD® with Cable Kycon 500mm, RS485 to RS485 Cable (2pin) 500mm and syringe assembly kit
594033	RED Combined Electrode (non-aqueous titrations)
594010	Bottle Cap with drying Tube, dessicant filled
301802	170ml Standard Titration Vessel
503028	PTFE Stirrer 6x20mm (Pack of 5)
594001	**PAT940 Smart Titrator®,Standalone System 2** **Comprises of:**
594005	Control POD® with 24VDC 7A PSU Power Pack and RS485 Cable (2 pin) 500mm
594004	2x Titrate POD®, with RS232 Cable 500mm and Cable Kycon 500mm
594055	Dispense POD® with Cable Kycon 500mm, RS485 to RS485 Cable (2pin) 500mm and syringe assembly kit
594033	RED Combined Electrode (non-aqueous titrations)
594010	2x Bottle Cap with drying Tube, dessicant filled
301802	2x 170ml Standard Titration Vessel
503028	PTFE Stirrer 6x20mm (Pack of 5)
594002	**PAT940 System 1 with AutoPOD®,48- 4 Racks of 12 x 210ml** **Comprises of:**
594053	AutoPOD®,48 with RS485 to RS485 Cable (2 pin) 1000mm
594000	PAT940 Smart Titrator®,Standalone System 1
594007	Dispense POD® with Cable Kycon 500mm, RS485 to RS485 Cable (2pin) 500mm and syringe assembly kit
594038	Cable Kycon to Kycon 500mm
594043	48x 210ml AutoPOD®,Titration Vessels
594010	2x Bottle Cap with drying Tube, dessicant filled
594015	2x Bottle /Syringe tubing (700mm)
594003	**PAT940 System 1 with AutoPOD®,96- 8 Racks of 12 x 210ml** **Comprises of:**
594054	AutoPOD®,96 with RS485 to RS485 Cable (2 pin) 1000mm
594000	PAT940 Smart Titrator®,Standalone System 1
594007	Dispense POD® with Cable Kycon 500mm, RS485 to RS485 Cable (2pin) 500mm and syringe assembly kit'
594038	Cable Kycon to Kycon 500mm
594043	96x 210ml AutoPOD®,Titration Vessels
594010	2x Bottle Cap with drying Tube, dessicant filled
594015	2x Bottle /Syringe tubing (700mm)

Accessories

594012	PTFE Vortex Stirrer Paddle
594029	Organiser Drip Tray for Standalone System 1
594030	Organiser Drip Tray add ons for additional PODs
594031	Homogeniser
594033	E-Chem® RED Combined Electrode (non-aqueous titrations)

594034	E-Chem® BLUE Combined Electrode (aqueous titrations)
594035	E-Chem® GREEN Combined Electrode (redox titrations)
594036	E-Chem® YELLOW Combined Electrode (precipitation titrations)
594044	Drip Tray for AutoPOD®
594045	Electrode Rack - fits onto drip tray
594046	AutoPOD®, Vessel Rack - 12 place

Certificates

All PAT940 Smart Titrators®, are supplied with a calibration certificate traceable to national standards.

For additional technical information, specifications, MSDS data, user manuals, and exhibition news, visit our website at: www.grscientific.com

About G.R. Scientific

Key personnel at G.R. Scientific are recognised experts in titration technology and electrochemistry. We have been designing and manufacturing titrators for twenty years and are widely regarded as one of the leading specialists in this technology

Intellectual Property Rights

GR Scientific

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