VapourPressure (R1)

Powered by icon

icon

intelligent scientific analysis

icon scientific limited

t +44 (0) 1225 667050
e info@iconscientific.com
w www.iconscientific.com

What does it do?

The icon scientific Vapour Pressure Analyser measures the pressure exerted by vapour in equilibrium above a liquid at a specified temperature and vapour-liquid ratio. Vapour pressure is a measurement of volatility. Vapour pressure measurement finds use in gasoline, LNG condensate, crude oil and liquefied petroleum gas production.

The Vapour Pressure Analyser uses the piston expansion principle to measure vapour pressure in line with the latest vapour pressure test methods. It can perform single or multiple expansions, and while it normally operates at 37.8°C (100°F) and a 4:1 liquid vapour ratio, its measuring temperature and liquid-vapour ratios can be varied up to 60°C and 20:1. The liquid and vapour volumes are tracked by laser for unparalleled accuracy.

How does it work?

The sample flows into a piston based measuring cell via low dead-volume solenoid valves, and is either flushed or isolated for measurement. Within the measuring cell, a resistance thermometer enables the cell temperature to be accurately controlled at the required measurement temperature. A small defined volume of the sample is held in place by the piston, which is moved to achieve the desired vapour-liquid ratio. Once equilibrium is established, the absolute pressure inside the cell is converted into actual vapour pressure as required by the test method being emulated.

Why choose the icon scientific Vapour Pressure Analyser?

Vapour pressure measured according to modern test methods: results can still be correlated back to Reid Vapour Pressure by the use of published and accepted correlation factors.

Precise temperature control: using a Peltier cooler and cartridge heater, the cell temperature is accurately controlled and measured for better repeatability.

Laser precise liquid-vapour ratio measurement: provides superior repeatability.

Test method adaptability: variable piston expansion enables vapour pressure to be tested in accordance with various standard test methods.

Applicable Test Methods

The directly applicable test methods are:-

ASTM D5191: Standard Test Method for Vapour Pressure of Petroleum Products (Mini Method).

ASTM D6378: Determination of Vapour Pressure (VPX) of Petroleum products, Hydrocarbons, and Hydrocarbon-Oxygenate Mixtures (Triple Expansion Method).

ASTM D6897: Vapour Pressure of Liquefied Petroleum Gases (LPG) (Expansion Method).

ASTM D6377 Standard Test Method for Determination of Vapor Pressure of Crude Oil:VPCRx (Expansion Method).

Now approved by the EPA for environmental considerations and being adopted for all crude oil applications ultimately replacing ASTM D323 (RVP).

The analyser can also perform "True Vapour Pressure" analysis by conversion of correlated RVP data by back extrapolation of multiple expansion curve to a user defined Vapour liquid ratio as described in ASTM D6377.

TVP may be calculated/measured at temperatures up to up to 100°C.

The analyser can also estimate Gas Oil Ratio (GOR).

The correlated test methods are:-

ASTM D323: Standard Test Method for Vapour Pressure of Petroleum Products (Reid Method).

ASTM D4953: Standard Test Method for Vapour Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method).

ASTM D5190: Standard Test Method for Vapour Pressure of Petroleum products (Automatic method).

ASTM D5188: Standard Test Method for Vapour-Liquid Ratio Temperature Determination of Fuels (Evacuated Chamber Method).

ASTM D5482: Standard Test Method for Vapour Pressure of Petroleum Products (Mini Method-Atmospheric).

Specification

Measuring range	Adjustable between 0-300kPa as standard (0-1500kPa for LPG)
Repeatability	Application dependent but typically better than +/- 0.7 kPa.
Reproducibility	Equal to or better than the reproducibility criteria of the relevant test
Cycle Time	5-15 minutes dependent on method and sample type.
Vapour/Liquid Ratio	Normally 4:1 but adjustable as required by the analysis method.

Sample Requirements

Filtration	Sample should be free from non-dissolved water and filtered to 10 microns
Sample Pressure at Inlet	Maximum 7 barg (LPG 16 barg)
Sample Pressure at Outlet	Atmospheric drain (standard). Sample can be returned to pressure provided a minimum of 2 Barg differential is maintained.
Sample Temperature at Inlet	Between 5-60 Deg.C
Sample Consumption	Dependent upon sample pressure, typically 5-10l/hour.

Utility Requirements

Instrument Air	Not Required
Nitrogen	Not Required
Cooling Water	Not Required
Power	Nominal 115 or 240V, 50/60Hz, Max 500VA

Installation Requirements

Location	Unit to be located out of direct wind sun and rain
Ambient Temperature	+5 to +40 Deg.C
Ambient Humidity	0-95% RH, non-condensing.

Control System

Control System	Based on fan-less industrial PC with solid state hard drive.
Graphical User Interface(GUI)	17” armoured glass touch-screen. The GUI is used to program the unit and display current and historical analyser results and alarm status.
Language	User selectable multi-language.

Inputs/Outputs

Analog Output	3 x 4-20ma isolated output is provided as standard (VP result, GOR and TVP calc (6377 only)).
Modbus Output	Wired Modbus RTU (RS485) and Modbus RTU over Ethernet (TC/IP) available as standard. Optionally these wired connections can be converted to fibre optic. OPC (wired) is also available.
Analog Inputs (optional)	The analyser can read in up to 4 customer provided 0-10V or 4-20mA signals. These inputs may be displayed and the values can have alarm levels associated with them.
Digital (contacts) Inputs (optional)	The analyser can monitor up to four volt free external contacts. The contacts may be included in the alarm table.
Alarms	Any available alarm condition within the analyser may be allocated as active or inactive. Active alarms are notified on screen and stored in the alarm history table. Active alarms can be set by the user to activate a warning alarm contact or a fatal alarm contact. A warning alarm is for notification only while a fatal alarm causes the analyser to suspend its operation.
Digital (contacts) Outputs	In addition to the above Alarm contacts, the analyser also provides the following contact outputs; New Result: a 10 second contact to notify that a new analyser result is available. Data Valid: this contact will operate if the analyser is operating but the data is not valid because calibration or validation is in progress or the analyser is being run in manual mode or in standby. Spill Alarm: This contact will operate in the case of a leak being detected in the analyser enclosure. All contact ratings are 24VDC 0.5A, 230VAC, 1A

Certification

Hazardous Area Certification	The icon vapour pressure analyser is ATEX, IECEx, GOST and TIIS (Japan) certified Exd to the latest standards, for zone 1 or zone 2 use in gas groups IIA, IIB or IIB+H2 with a variable T-rating depending upon application. It is also ETL listed for Canada and the USA Class1, Div1, groups B,C,D.
IP Ratings	Tested and certified to IP66 (dust tight and protected from powerful water jets) and to IP67 (dust tight and protected from temporary total immersion in water). Classification broadly equivalent to NEMA 6

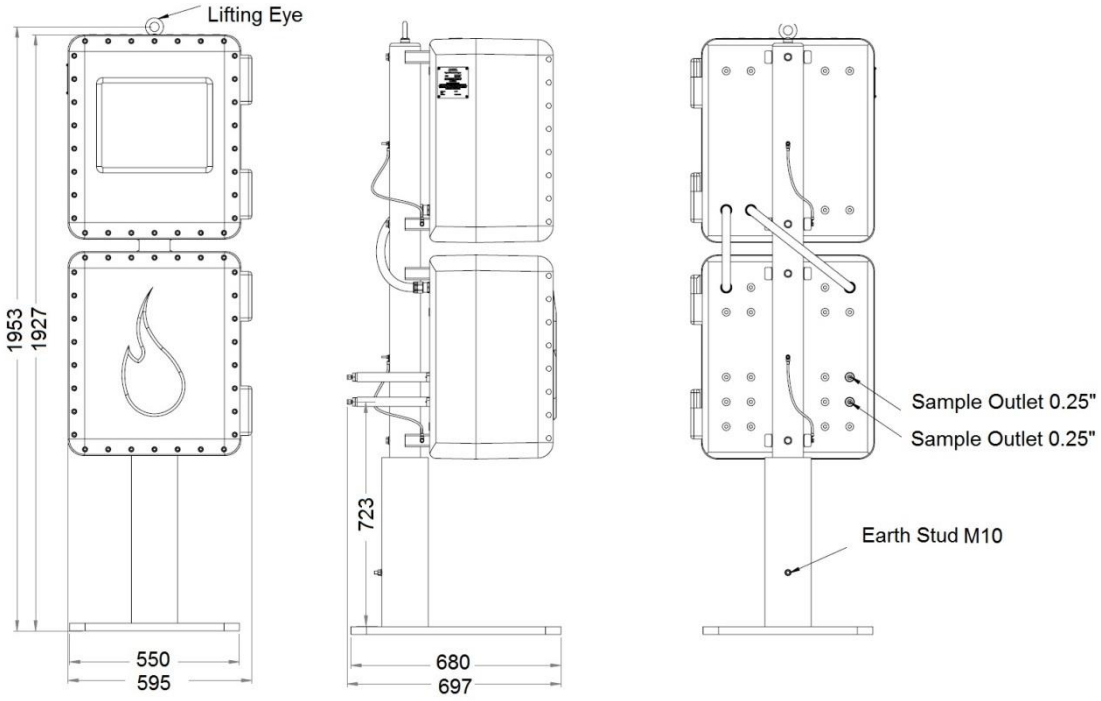
Dimensions & Weights

Notes:

All dimensions in mm

Unpacked weight approx. 420kg

Packed weight approx. 516kg



Note: *icon scientific products are subject to a program of continuous development and improvement and specifications are liable to change without notice. Please check that you have the latest information available before relying on any specification.*