VERSATILE AND ACCURATE
MINIVAP VP is a versatile and easy to use instrument for the determination of vapor pressure of liquids. Three different measuring procedures for the various international standards are included. Applying the patented double injection procedure, the partial pressure of the dissolved air is determined. The absolute vapor pressure is determined with high accuracy over a wide temperature range. The manual sample introduction allows the user to change the test conditions.

APPLICATIONS
Applications include vapor pressure tests of gasoline and gasoline-oxygenated blends according to standard procedures. Vapor pressures of crude oils are measured quickly and easily. The high temperature range is ideal for studies of vapor locks in automotive fuel systems. Utilizing the complete vapor pressure curve to optimize production plants. To measure very low vapor pressures for safety data sheets in the chemical industry a
modified MINIVAP VP is available. The outgassing is performed on the frozen specimen cooled with liquid nitrogen. In this method the standard procedure of a chemical lab is made automatically and provides excellent data.

**TECHNICAL DATA**

Temperature range:  
-20 to 150°C  
-4 to 300°F  
Pressure range:  
0 to 10,000 hPa  
0 to 1000 kPa  
0 to 145 psi  
0 to 10 atm  
Power requirements:  
100/120/230/240 V AC  
50/60 Hz, 130 W  
W x H x D:  
320 x 250 x 275 mm  
12.6" x 9.8" x 10.8"  
Weight:  
10 kp (20 pounds)

**Accessories:** Vacuum pump required and printer recommended
MINIVAP VPS
Industry Standard of Vapor Pressure Testers

- ASTM D 5191 (DVPE)
- ASTM D 323, D 4953 (Correlation Formulas)
- ASTM D 6378 - Vapor Pressure of Gasoline (VP4)
- ASTM D 6377 - Vapor Pressure of Crude Oil
- EN 13016 -1 (ASVP)
- 10 mL Sample
- 5 Minutes Testing Time
- RS 232 Interface and MINIWIN Software
- EPA Approved

PISTON BASED TECHNIQUE
The unique measuring principle with the integrated piston for automatic sample introduction and expansion offers high accuracy and easy operation and eliminates the use of a vacuum pump.

DVPE OF GASOLINE
ASTM D 5191, the standard "Mini-Method" with only 1 mL of sample, measured against vacuum and a correlation formula for the calculation of the DVP.
Sample preparation, including cooling of the sample to 0°C and a triple air saturation prior to the measurement is required.

VAPOR PRESSURE OF GASOLINE
ASTM D 6378 is the "Triple Expansion Method" with determination of the dissolved air in the sample.
It was developed by GRABNER INSTRUMENTS and replaces ASTM D 5191.
Cooling and air saturation is NOT required!

YOU CERTAINLY HAVE BETTER THINGS TO DO THAN COOLING AND AIR SATURATION!
The new ASTM standards D 6377 and D 6378 constitute real milestones in the history of vapor pressure determination.
Due to the outstanding measuring principle of MINIVAP the sample preparation prior to the measurement is not necessary.
You save expensive labor time at even significantly better precision, as a possible operator bias is eliminated.

VAPOR PRESSURE OF CRUDE OIL
ASTM D 6377, the new "Single-Expansion Method" for vapor pressure of Crude Oil, developed by GRABNER INSTRUMENTS. The pressurized sample is transferred into the measuring chamber and expanded to the final volume by the built-in piston. The precision of this method is significantly better than the classical ASTM method of D 323 (ASTM correlation formula is available).
Due to the outstanding measuring principle of MINIVAP the sample preparation prior to the measurement is not necessary.
You save expensive labor time at even significantly better precision, as a possible operator bias is eliminated.

APPLICATIONS
MINIVAP testers are utilized in most major oil and pipeline companies as well as independent test laboratories worldwide. The US-EPA declared the "Grabner" instrument as the reference in the USA.

LABORATORY
Applications include the compliance control for vapor pressure of gasoline and crude oil in the laboratory and the production plant in addition to testing directly on-site (battery option). MINIVAP VPSH further allows volatility studies at elevated temperatures and the vapor pressure determination of crude oil at very low vapor liquid ratios.

ON-LINE
MINIVAP ON-LINE is installed for vapor pressure compliance control of gasoline, crude oil and LPG.

APPLICATIONS
Applications include the routine vapor pressure testing of gasoline, gasoline-oxygenate blends and crude oil, the rapid determination of vapor pressure in laboratories and production control facilities, as well as screening and testing directly in the field.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Temperature range</th>
<th>Pressure range</th>
<th>Vapor/Liquid-Ratio</th>
<th>Power requirements</th>
<th>Field application</th>
<th>W x H x D:</th>
<th>Weight:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINIVAP</td>
<td>20 to 60°C</td>
<td>0 to 300 kPa</td>
<td>4:1</td>
<td>100/120/230/240 V AC</td>
<td>12 V/4A DC (vehicle battery)</td>
<td>196 x 315 x 175 mm</td>
<td>8 kp (18 pounds)</td>
</tr>
<tr>
<td>VPS</td>
<td>68 to 140°F</td>
<td>0 to 500 kPa</td>
<td>4:1</td>
<td>50/60 Hz, 65 W</td>
<td></td>
<td>7.7&quot; x 12.4&quot; x 6.9&quot;</td>
<td></td>
</tr>
<tr>
<td>VPSH</td>
<td>32 to 212°C</td>
<td>0 to 500 kPa</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
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Accessories: Printer, PC, MINIWIN, and 6-position sampler recommended
MINIVAP VPSH
The ultimate Vapor Pressure Tester

- ASTM D 5191 (DVPE)
- ASTM D 323, D 4953 (Correlation Formulas)
- ASTM D 6378 - Vapor Pressure of Gasoline (VPx)
- ASTM D 6377 - Vapor Pressure of Crude Oil
- EN 13016 (ASVP, AVP)
- 10 mL Sample
- 5 Minutes Testing Time
- Automatic Calibration
- Vapor Pressure Curve
- RS 232 Interface and MINIWIN Software
- EPA Approved

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TECHNICAL DATA

<table>
<thead>
<tr>
<th>MINIVAP</th>
<th>VPS</th>
<th>VPSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range:</td>
<td>20 to 60°C</td>
<td>0 to 100 °C</td>
</tr>
<tr>
<td></td>
<td>68 to 140°F</td>
<td>32 to 212 °C</td>
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<tr>
<td>Pressure range:</td>
<td>0 to 300 kPa</td>
<td>0 to 500 kPa</td>
</tr>
<tr>
<td>Vapor/Liquid-Ratio:</td>
<td>4:1</td>
<td>4:1 to 0.02:1</td>
</tr>
<tr>
<td>Power requirements:</td>
<td>100/120/230/240 V AC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50/60 Hz, 65 W</td>
<td></td>
</tr>
<tr>
<td>Field application:</td>
<td>12 V/4A DC</td>
<td></td>
</tr>
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<td></td>
<td>(vehicle battery)</td>
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<td>7.7&quot; x 12.4&quot; x 6.9&quot;</td>
<td></td>
</tr>
<tr>
<td>Weight:</td>
<td>8 kp (18 pounds)</td>
<td></td>
</tr>
</tbody>
</table>

Accessories: Printer, PC, MINIWIN and 6-position sampler recommended
MINIVAP LPG
The Only Alternative to the Traditional Bomb Method

- ASTM D 1267 Equivalent
- Friendly to the Environment
- Easy to Use
- 13 mL Sample
- Test Results within 5 minutes
- Automatic Sample Introduction

NEW METHOD
MINIVAP LPG is a stand-alone unit for fully automatic vapor pressure determination of liquified petroleum products. The measuring principle utilizes the built-in piston for automatic sample introduction and sample chamber volume adjustment. It offers safe and easy operation and reduces pollution of the environment. A printer with a serial interface can be connected directly for immediate printout of the measured data. In the field, the tester is powered from a vehicle battery and the measured data are stored in the internal memory for later documentation.

SIGNIFICANCE AND USE
(from ASTM D 1267)
Information on the vapor pressures of liquefied petroleum gas products under temperature conditions from 37.8 to 70°C (100 to 158°F) is pertinent for the selection of properly designed storage vessels, shipping containers, and customer utilization equipment to ensure safe handling of these products. Determination of the vapor pressure of liquefied petroleum gas is important for safety reasons to ensure that the maximum operating design pressures of storage, handling, and fuel systems will not be exceeded under normal operating temperature conditions. For liquefied petroleum gases, vapor pressure is an indirect measure of the most extreme low temperature conditions under which initial vaporization can be expected to occur. It can be considered a semi-quantitative measure of the amount of the most volatile material present in the product.

EQUIVALENT TO ASTM D 1267
The test results are equivalent to ASTM D 1267 but with a significant smaller sample volume and a striking simplified and reliable measuring procedure. The procedure of filling to 3.3 or 3 mL and expansion to 5 mL with a final vapor/liquid-ratio of 1:2 or 2:3 is consistent to the purging and filling procedure of ASTM D 1267 (33.3% or 20% upper chamber).

PROTECT THE ENVIRONMENT
Only 10 mL of LPG are disposed off during the filling and measuring procedure.
INCREASED SAFETY
The much smaller sample volume improves safe handling.

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>5 to 70°C</td>
</tr>
<tr>
<td></td>
<td>41 to 158°F</td>
</tr>
<tr>
<td>Pressure range</td>
<td>0 to 20,000 hPa</td>
</tr>
<tr>
<td></td>
<td>0 to 2000 kPa</td>
</tr>
<tr>
<td></td>
<td>0 to 20 atm</td>
</tr>
<tr>
<td></td>
<td>0 to 275 psi</td>
</tr>
<tr>
<td>Power requirements</td>
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<td>Weight</td>
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</table>

**Accessories:** Printer recommended

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MINIVOL LVR
Determination of the Vapor/Liquid-Ratio Temperature

- **ASTM D 5188**
- Fully Automatic
- Wide Range
- 5 mL Sample
- Results within 5 Minutes

NEW DESIGN
MINIVOL LVR is a tester for the automatic determination of the Vapor/Liquid-Ratio temperature. Nonviscous liquids like gasoline, solvents and other highly volatile compounds can be tested with high precision in a range of 20 to 80°C (68 to 176°F). The nominal pressure for the test can be adjusted between 50 kPa and 200 kPa.

FULLY AUTOMATIC
The instrument performs fully automatically with a sample volume of 5 mL only. The syringe is filled with the sample and inserted into the Luer-lock on the right hand side of the instrument.

SIGNIFICANCE AND USE (ASTM D 5188)
The tendency of a fuel to vaporize in automotive engine fuel systems is indicated by the Vapor/Liquid-Ratio of the fuel. Automotive fuel specifications generally include T(V/L=20) limits to ensure products of suitable volatility performance. Studies of vapor lock behavior are best performed by measuring multiple point measurements at different nominal pressures.

TEST METHOD
The measuring chamber with a volume of 15 mL is evacuated and heated above the expected temperature. After flushing the chamber with sample and further evacuation, the exact amount of liquid for the first point is injected and the temperature is decreased until the nominal pressure (e.g. 101.3 kPa) is observed. The results are calculated according to

\[ \frac{V}{L} = \frac{V - v}{v} \]

V... Volume of the test chamber
v... injected sample volume

MULTIPLE POINT MEASUREMENT
For multiple point evaluation, the test is started with V/L=100 and the next steps of V/L=80 down to V/L=4 are measured consecutively by adding the respective amount of sample.

MAGNETIC STIRRER
A magnetic stirrer inside the measuring chamber serves for fast equilibrium and
short measuring time.

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of measuring cell:</td>
<td>15 mL</td>
</tr>
<tr>
<td>V/L: Single point</td>
<td>20</td>
</tr>
<tr>
<td>V/L: Multiple point</td>
<td>4 to 100</td>
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<tr>
<td>Temperature range:</td>
<td>20 to 80°C</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>8 to 30 psi</td>
</tr>
<tr>
<td></td>
<td>0.5 to 2 atm</td>
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<tr>
<td>Power requirements:</td>
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<td>Weight:</td>
<td>8 kp (18 pounds)</td>
</tr>
</tbody>
</table>

**Accessories:** Vacuum pump required, Printer recommended

---

**GRABNER INSTRUMENTS**  
Messtechnik Ges.m.b.H.  
A-1220 Vienna/Austria  

Dr. Otto-Neurath-Gasse 1  
Phone +43/1/282 16 27-0  
Fax +43/1/280 73 34

http://www.grabner-instruments.com/m_lvr.htm  
6/25/01
MINIVAP VOC
The Modern Replacement of the Isoteniscope

- For the Low End of Vapor Pressure
- Volatile Organic Compounds
- Friendly to the User
- 1 mL Sample
- Results within 5 Minutes
- Fully Automatic Outgassing

NEW DESIGN
MINIVAP VOC is an instrument for the automatic determination of the vapor pressure of pure and contaminated organic compounds and low vapor pressures of various substances, even solids, at test temperatures of 10 to 100°C (50 to 212°F). The generally low vapor pressures can be measured up to 100 kPa (14 psi, 760 mm Hg). The minimum detectable vapor pressure is 0.5 kPa (0.05 psi). Dissolved and entrained fixed gases are removed from the sample by evacuation at a low temperature to minimize composition changes.

APPLICATIONS
(From ASTM D 2879-86) The vapor pressure of a substance reflects a property of the sample as received, including most volatile components, but excluding dissolved fixed gases such as air. Vapor pressure is a thermodynamic property which is dependent only upon composition and temperature for stable systems. Government regulations require vapor pressure values for practically all liquids which are stored or shipped because of safety and environmental protection reasons.

ASTM D 2879 (ISOTENISCOPE)
An isoteniscope is the standard instrument for measuring low vapor pressures. This method is very tedious to use and needs highly skilled and experienced personnel especially for the outgassing procedure. The measurement is time consuming and not very reliable. In MINIVAP VOC the outgassing procedure is performed at a low temperature and it can be assumed with high confidence that the composition change of the substance is minimized.

AUTOMATIC PROCEDURE
The sample is filled into the sample cup. The temperature program together with the outgassing procedure is performed fully automatically.

MAGNETIC STIRRER
Stirring is vital for the outgassing procedure and is accomplished during the whole measuring procedure.
After an equilibrium time of 1 minute, the observed pressure is displayed and documented on the directly connected printer as the vapor pressure of the sample.

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>0 to 100°C</td>
</tr>
<tr>
<td></td>
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**Accessories:** Vacuum pump required, Printer recommended
MINIVAP ON-LINE
The On-Line Money Saver

- On-line Compliance Monitoring for
  - Vapor Pressure of Gasoline, LPG and Crude Oil
  - and Vapor/Liquid-Ratio Temperature of Gasoline (V/L=20)
- ASTM D 6378 - Vapor Pressure of Gasoline (VPx)
- ASTM D 323, D 4953, D 5191 (Correlation Formulas)
- ASTM D 6377 - Vapor Pressure of Crude Oil
- ASTM D 5188 - V/L-Ratio: T (V/L = 20)
- ASTM D 1267 - Vapor Pressure of LPG
- One Single Instrument for
  - Up to 3 Sample Streams
- 5 Minutes Cycle Time
- Automatic Calibration
- Explosion Proof-Class I
- Low Maintenance

CERTIFIED TECHNOLOGY
The measuring principle is based on the patented triple expansion method of Grabner Instruments’ worldwide approved and accepted laboratory vapor pressure tester for gasoline and crude oil: MINIVAP VPS. The US-EPA declared MINIVAP as the official reference instrument for the USA in 1993.

ONE INSTRUMENT FOR ALL RELEVANT ASTM STANDARDS
With MINIVAP ON-LINE, the vapor pressure of gasoline (D 6378 / D 5191), crude oil (D 6377 / D 323), liquid petroleum gas (D 1267) and the vapor-liquid ratio temperature of gasoline (D 5188) can be determined. With possible connection of up to 3 different sample streams, all of these measurements can be performed with one single instrument.

ON-LINE CONVENIENCE LABORATORY PRECISION
The advanced MINIVAP method considerably improves the quality of your measurement and leads to a much better accuracy. This offers the possibility to blend as close as 0.3 kPa (0.05 psi) to the official limits, saving refineries thousand of dollars each year.

REMOTE CONTROLLED
The data is transferred safely via Fiber-Optics to the central controller outside the explosion sensitive area. The controller continuously displays the actual vapor pressure and can forward the results to a LIM-system via the analog outputs.

AUTOMATIC CALIBRATION
A fully automatic calibration of the measuring unit is performed with a vapor pressure measurement of neo-hexane, or other standard liquids. It can either be started manually, or automatically in programmable intervals.
TECHNICAL DATA

Temperature range: 30 to 60°C (86 to 140°F)
Pressure range: 0 to 1000.0 kPa (0 to 150.00 psi)
Repeatability: 0.3 kPa (0.05 psi)
Reproducibility: 0.7 kPa (0.1 psi)
Power requirements: 100/120/230/240 V AC, 50/60 Hz, 65 W
Physical dimensions: 580 x 1060 x 260 mm
Weight: 50 kg (110 lbs)

MINIVAP ON-LINE consists of four main parts:

1. Sample conditioning system:

The sample conditioning system is mounted on a stainless steel plate consisting of a manual input and output valve for the connection to the sample stream. The liquid flows in the sample loop with a minimum flow rate of 2 L/min and a maximum pressure of up to 7000 kPa (1000 psi). The sample passes through a flow-indicator to a self-cleaning bypass-filter with a desirable, small secondary volume. The sample pressure after the filter is regulated with a pressure regulator having two pressure gauges for inlet and outlet. Then, the sample is fed via the sample outlet valve directly to the sample input of the enclosure for measurement. An atmospheric drain outlet for the sample waste disposal and a second drain outlet with less than 100 kPa (14 psi) for the pressure relieve valve of the pressure regulator is mounted on the plate. The standard calibration liquid is contained in a 250 mL bottle secured in a stainless steel box. Up to three sample streams can be connected and monitored consecutively.

2. Purging system:

The purging system is mounted beside the measuring system. It is a pressurization or purging system which operates on a supply of compressed inert gas. It is designed to regulate and monitor the pressure of a sealed (protected) enclosure, in order to prevent ignitable dust accumulation or remove and prevent flammable vapor accumulation within the enclosure. In Class 1 Areas, the system is designed to accomplish programmable air exchanges and maintain a "safe" pressure on the enclosure. In addition, the system includes an electrical power control unit (EPCU) that monitors system operation and controls enclosure power. All start-up requirements must be satisfied before the EPCU will energize the power to the enclosure. These processes reduces the Hazardous (Classified) Area Rating within the enclosure, in accordance with the CENELEC 1/IIIB, EN 50016 (European system) or the NEMA Class 1, BCD, Div2, Type "X", T6 (US system).

3. Measuring system:
The heart of the equipment is the measuring system with the measuring unit and the controller. The measuring unit consists of the measuring cell which is heated and cooled by peltier elements, the piston with the pressure transducer and the piston drive. It rests on a hinge of a heavy aluminum plate and is connected to the system with 4 unmistakable connectors. The sample inlet and outlet are linked via two Swagelok quick connectors to the magnetic valves. These valves are connected to the sample conditioning system and to the calibration fluid container and control the sample flow through the cell. The maintenance is very easy since the measuring units can be exchanged in less than one minute. The measuring units are interchangeable since the values for pressure and temperature are stored in a FLASH-RAM installed in the measuring unit. As soon as the microprocessor-controller is connected, the values are transferred. The controller with its large display is mounted on two hinges and can be turned out from the enclosure for easy access. The complete measuring system is housed in a stainless steel enclosure which is continuously purged with nitrogen.

4. Central Controller

The central controller is placed in a non-hazardous area and is connected via a glass fiber optic cable to the measuring system for remote control. Furthermore, the measured values are displayed and prepared for further data transfer. The unit is housed in a 19”/4HU (450x185x260 mm) rack with a built-in power supply and up to 6 controller inserts. For each measuring channel one insert with its own display is installed. All inserts are serially connected to a fiber optic modem, which is installed in the power supply. A complete remote control of the measuring system is possible. Two standard RS 232 interfaces for direct connection of a printer and for remote control are incorporated in each controller. Additionally, each controller unit accommodates independent inputs and outputs: 1 analog output 0 to 20 mA Analog signal for the measured vapor pressure or vapor-liquid-ratio temperature (calibrated by the user) 4 digital inputs freely programmable for remote control 6 digital outputs (2 A relays) freely programmable for alarm and control. Alarms can be programmed in the central controllers directly. The analog output may be used for simple process regulators.
Crude Oil Package
The Industry Standard for Vapor Pressure Testing of Crude Oil According to ASTM D 6377

- MINIVAP VPS or VPSH
- ROCKING PLATE
- FLOATING PISTON CYLINDER (FPC250)

- ASTM D 6377 - Vapor Pressure of Crude Oil
- Fully Automatic Procedure
- Results within 10 minutes
- Only 10 mL Sample

MINIVAP VPS or VPSH
MINIVAP VPS and MINIVAP VPSH are compact, portable and fully automatic instruments for the vapor pressure determination of liquids. The unique piston based measuring principle for automatic sample introduction and expansion developed by GRABNER INSTRUMENTS, offers high accuracy and easy operation.

FLOATING PISTON CYLINDER (FPC250)
The new Floating Piston Cylinder (FPC250) was designed in cooperation with Norwegian offshore personnel specifically for ASTM D 6377. A mechanical stirrer is included to ensure uniform samples. No valve stems or handles protrude from the cylinder, reducing hazards.

ROCKING PLATE
MINIVAP is placed on the Rocking Plate to shake the sample inside the measuring cell, reducing the equilibrium time significantly.

STOP WASTING YOUR TIME WITH SAMPLING PROCEDURE OF ASTM D 323
The pressurized crude oil from the FPC or pipeline is directly transferred into the measuring chamber and the vapor pressure is measured against vacuum by a single expansion. The derived precision is significantly better than the classical method of D 323. Cooling and air saturation are NOT required!

APPLICATIONS
Over the last 10 years, the outstanding performance of the MINIVAP VPS and MINIVAP_VPSH has proven effective in refineries, pipeline companies and independent test laboratories all over the world.

LABORATORY
Applications include the standard test methods for vapor pressure of crude oil in the laboratory or production plant, and off-shore platforms.
MINIVAP VPSH further includes the measurement of the vapor pressure at vapor liquid ratios down to 0.02:1 to simulate the situation in oil tanks.

ON-LINE
MINIVAP ON-LINE is the first and only equipment for vapor pressure determination of crude oil using the expansion method ASTM D 6377.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>MINIVAP</th>
<th>VPS</th>
<th>VPSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range:</td>
<td>20 to 60°C</td>
<td>0 to 100 °C</td>
</tr>
<tr>
<td></td>
<td>68 to 140°F</td>
<td>32 to 212 °C</td>
</tr>
<tr>
<td>Pressure range:</td>
<td>0 to 300 kPa</td>
<td>0 to 500 kPa</td>
</tr>
<tr>
<td>Vapor/Liquid-Ratio:</td>
<td>4:1</td>
<td>4:1 to 0.02:1</td>
</tr>
<tr>
<td>Power requirements:</td>
<td>100/120/230/240 V AC</td>
<td>50/60 Hz, 65 W</td>
</tr>
<tr>
<td>Field application:</td>
<td>12 V/4A DC</td>
<td>(vehicle battery)</td>
</tr>
<tr>
<td>W x H x D:</td>
<td>196 x 315 x 175 mm</td>
<td>7.7&quot; x 12.4&quot; x 6.9&quot;</td>
</tr>
<tr>
<td>Weight:</td>
<td>8 kp (18 pounds)</td>
<td></td>
</tr>
</tbody>
</table>

FPC250

| Diameter/length | 48/415 mm         |
| Sample volume   | 250 mL            |
| Maximum pressure| 7000 kPa           |
MINIWIN
Most of all testers from GRABNER INSTRUMENTS can be remote controlled by a personal computer. The PC is connected to the serial interface of the tester with the special connection cable A1000-120-00 supplied with the software. MINIWIN allows easy and quick sample identification, programming of the measuring program, data transfer to and from the PC to a central computer as well as printouts on a printer connected to the PC.

**Hard- and software requirements:**
IBM compatible PC with 80386 processor or higher,
1 free serial interface (RS 232 C) for each connected tester,
4 MB RAM or more, hard-disk drive with 3 MB free available space,
MS-DOS operating system V 5.0 or higher,
MICROSOFT WINDOWS 3.1 or higher,
(MICROSOFT EXCEL 4.0 or higher)

**Switch box for multiple remote control**
Up to 6 equal or different testers can be remotely controlled by one PC by using the SWITCH BOX A1000-500-00 with one interface to the PC and 6 interfaces to the 6 testers.