

MODELS 2470/2470DP/2475



High pressure gas piston gauges

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- Model 2470: 13.5 mbar to 207 bar gauge
- Model 2470DP: Calibrate ΔP devices at static line pressures from 7 to 207 bar
- Model 2475: 12 to 1035 bar gauge
- Accuracy to 0.0025% of reading
- Gas-operated, gas-lubricated piston/cylinders eliminate potential contamination of device under test



MODELS 2470 / 2470DP / 2475

High pressure gas piston gauges

MODEL 2470

The Model 2470 Gas Piston Gauge is capable of generating gauge pressures from 13.5 mbar to 207 bar with an accuracy of 0.0015% of reading to 14 bar and 0.0025% of reading to 207 bar. Operating beyond the typical upper pressure limits of existing gas-operated piston gauges, the Model 2470 functions easily for this pressure range due to Ruska instrument's unique ability to manufacture gas-operated / gas-lubricated piston/cylinder assemblies. Since fluid lubrication is not required, you can be assured that calibrations can be performed without the possibility of contaminating the device under test. The model 2470 is ideal for calibrating digital pressure indicators and controllers, transducers and any other pressure calibration or measuring device where only gauge pressures are required from 13.5 mbar to 207 bar. Simple design provides an economical price for a high accuracy laboratory standard.

The Model 2470 has recently been enhanced to allow the use of three different piston/cylinder assemblies. Select one, two or all three piston/cylinders depending on your particular pressure range requirements:

Low Range	13.5 to 3500 mbar
Mid Range	115 mbar to 13.5 bar
High Range	7 to 207 bar

The Model 2470 mass set is machined from nonmagnetic stainless steel and is provided with a trim mass set to allow increments to within the resolution of each piston/cylinder (1 PPM). A storage case is provided to contain the entire mass set and up to three piston/cylinders.

The instrument base requires minimal space and is designed with value in mind. A pressure housing containing the piston/cylinder is mounted on a circular base plate. Three levelling screws and a circular level vial provide easy adjustment of the piston axis to a vertical position.

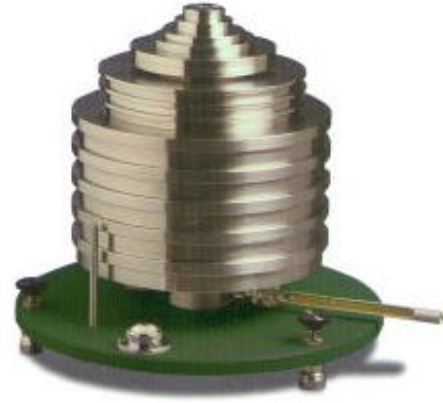
The new Model 2470-800 Pressure Control Pack (PCP) provides an easy to use system for introducing pressure from the gas supply source to the Model 2470 and device under test. The PCP includes supply, cutoff and vent valves, a fine tune pressure adjuster and a test port reference gauge.

The Model 2455 Deadweight Gauge Monitor adds a degree of automation to each of the gas piston gauges presented in this brochure in addition to all of Ruska's hydraulic and gas operated piston gauges. The Model 2455 monitors piston temperature, float position, sink rate and optionally air density. Float position is displayed graphically and numerically, while sink rate, piston temperature and air density are numerically displayed, real-time.

In addition to a local display, the Model 2455 can transmit all the above information via a standard RS-232 interface or optional IEEE-488, to WinPrompt® software for Windows, a powerful calibration management tool. WinPrompt provides the ability to create procedure files that contain a table of pressures required to calibrate a particular device. For each pressure, WinPrompt applies all applicable correction factors and provides the user with the masses required to generate the requested pressure. Every time the device returns for calibration, simply load the procedure file and begin the calibration sequence. Once all the pressures have been generated, and the reading from the device under test entered for each pressure point, the file can be saved as a calibration file. A simple calibration report can be printed directly from WinPrompt. Since WinPrompt supports the Dynamic Data Exchange (DDE) function of Windows, all calibration data can be linked to a word processor for customized calibration reports or a spreadsheet application for numerical and graphical analysis.

Additional details and specifications are provided in a separate brochure specifically covering the Model 2455 Deadweight Gauge Monitor and WinPrompt software.

For calibrations where gauge and absolute mode pressures are required, please refer to Ruska's Model 2465 Gas Piston Gauge which operates from 14 Mbar to 70 bar and provides an uncertainty of 0.0015% of reading.



Model 2470 Gas Piston Gauge



Model 2470-800 Pressure Control Pack



Model 2455 Deadweight Gauge Monitor and WinPrompt software for Windows



Model 2470DP Gas Piston Gauge

Model 2470 DP

The Model 2470 Differential Pressure Gas Piston Gauge is a versatile, all-in-one instrument developed for the primary purpose of calibrating ΔP transmitters, transducers and gauges. The integral design of the Model 2470DP combines all the components required to perform a differential pressure calibration at elevated, static line pressures, ensuring knowledge of your instruments performance under actual operating conditions.

The flexibility of the Model 2470DP allows it to operate like a single deadweight gauge for calibrating gauge mode devices, or crossfloating other gas piston gauges, from 7 to 207 bar with an accuracy of 0.0025% of reading.

In differential mode, the Model 2470DP is capable of generating any differential pressure within a resolution of 1 PPM, from 7 to 207 bar, of the combined line and differential pressure. For example, a transmitter with a full scale of 100 in.H₂O can be calibrated at 60 bar line pressure in increments, and with a total uncertainty, of 0.025 in.H₂O.

The Model 2470DP is a self contained instrument and includes all supply, cutoff and vent valves along with two precise pressure adjusters to finely set and adjust each piston's float position. Ruska's Model 2413 Differential Pressure Cell and Indicator is also integrated into the Model 2470DP to assist the operator with establishing zero differential pressure at the desired line pressure. The operator opens the bypass valve which interconnects the two piston gauges and then applies the mass load to generate the desired line pressure. Pressure is introduced from the gas supply source by opening the inlet valves. The operator uses the precise pressure adjusters to float each piston to achieve a balance as indicated by the Differential Null Indicator. The bypass valve is then closed and additional weights are added to one piston to generate the differential pressure. Each piston's float position is independently maintained using the precise pressure adjusters. After completion of the differential calibration, zero can be rechecked by returning to the original balanced condition.

The Model 2455 Deadweight Gauge Monitor can also be used with the Model 2470DP. Since the Model 2455 is a dual channel instrument, it can display temperature, float position and sink rate for each side simultaneously.

Model 2475 System

For specialized applications that require calibration of pneumatic devices over 207 bar, especially those used for O₂ service, the Model 2475 Helium Piston Gauge offers a unique solution. The Model 2475 is capable of generating pressures from 12 to 1035 bar using only helium gas as the media. Helium eliminates the potential problems of nitrogen at high pressure such as the supercritical solvent action and long thermal stabilization times. And, since the Model 2475 piston/cylinder is gas-operated and gas-lubricated, there is no potential for contamination of the device under test.

The Model 2475 is supplied as a complete, functionally tested bench system. In addition to the deadweight gauge, mass set and piston/cylinder, the system includes a gas intensifier to boost bottle pressure to the desired set point (up to 1035 bar), a hand pump for precisely adjusting system pressure to set the piston float position, a high pressure reference gauge for ease of use and safety, and a connector block to attach the device under test. All the individual components are mounted to a hardwood table which includes tool and filing storage, and interconnected with appropriately rated pressure fittings and tubing. The system is thoroughly pressure and leak tested prior to shipment.

The customer need only to provide a supply bottle of industrial grade air or nitrogen which is used to drive the intensifier and zero-grade helium which is the test media, to begin performing calibrations. As with all other Ruska deadweight gauges, the optional Model 2455 Deadweight Gauge Monitor can be used to monitor piston temperature, float position and sink rate of the Model 2475 while also monitoring all environmental influences. Using the Model 2455 in conjunction with WinPrompt software provides an automated approach to performing high accuracy, high pressure calibrations with ease.



Model 2475 Helium Piston Gauge System

MODELS 2470/2470DP/2475



Specifications

MODEL 2470

Instrument Base

Pressure range: 0 to 207 bar g
Includes three point levelling feet, level vial, thermometer, split column and mass adaptor for compatibility with low and mid range piston/cylinders or existing 2465 piston/cylinders.

Piston/Cylinder Assemblies

Low Range

Pressure range: 13.5 to 3500 mbar
Pressure accuracy: 0.0015% of reading or 0.001 mbar^b
Material: piston is 440C stainless steel, cylinder is cemented tungsten carbide.

Mid Range

Pressure range: 115 mbar to 13.5 bar
Pressure accuracy: 0.0015% of reading or 0.005 mbar^b
Material: piston and cylinder are cemented tungsten carbide

High Range

Pressure range: 7 to 207 bar
Pressure accuracy: 0.0025% of reading
Material: piston and cylinder are cemented tungsten carbide

Mass Set

Total mass: 17.7 kg
Maximum platter mass: 2.4 kg
includes trim mass set (1 mg to 20 g)

Pressure Control Pack (optional)

Pressure range: 0 to 207 bar
Dimensions: 18 cm H x 43.2 cm W x 32 cm D
All supply and test connections are ¼ NPTF

Model 2470DP

Instrument Base

Pressure range: 0 to 207 bar g
Includes dual pressure column assemblies, pressure supply, cutoff and vent valves, reference gauges for test port and supply pressure, fine increment pressure adjusters, adjustable levelling feet, level vial and integrated Model 2413 DP Cell and Indicator.

Piston/Cylinder

Pressure range: 7 to 207 bar
Gauge pressure accuracy: 0.0025% of reading
 ΔP Accuracy: 0.0025% of differential pressure plus the greater of 1 ppm or 0.01 mbar of static line pressure
Material: piston and cylinder are cemented tungsten carbide

Mass Set

Total mass: 17.7 kg
Maximum platter mass: 2.4 kg
includes trim mass set (1 mg to 20 g)

PERFORMANCE (2470 and 2470DP)

Precision (type A uncertainty)

Better than 3 ppm^a

Long-term stability

Better than 3 ppm per year^a

Resolution

1 ppm pr 1 mg^b

Model 2475

Instrument Base

Pressure range: 0 to 1035 bar
Includes three point levelling system with level vial

Piston/Cylinder Assembly

Pressure range: 12 to 1035 bar
Pressure accuracy: 0.0045% of reading
Material: piston and cylinder are cemented tungsten carbide

Mass Set

Total mass: 90 kg
Maximum platter mass: 5 kg
Includes trim mass set (5 mg to 100 g)

System Components

Instrument base
Piston/cylinder
Mass set
Hand pump with reference gauge
Connector block (to connect device under test)
Reference gauge
Pressure intensifier with control manifold
All required valves, fittings and tubing. All components are mounted to a hardwood table with storage and filing drawers, interconnected and pressure and leak tested prior to shipment.

Table Dimension

182 cm W x 76 cm D x 79 cm H

Pressure Media

Intensifier drive gas: air or nitrogen
Min/Max drive pressure: 100/117 bar
Test media: helium

Performance

Precision (type A uncertainty)

Better than 5 ppm^a

Long-term stability

Better than 5 ppm per year^a

Resolution

1 ppm or 1 mg^b

General

Electrical power (2470DP and 2475 only)

115/230 VAC, 50/60 Hz, 15 W

Temperature

Operating temperature 15-28°C; storage temperature -20 to 70°C

Humidity

Operating humidity 20-75% relative humidity, noncondensing
storage humidity 0-90%

^aValues are reported at the 95% confidence level (2 σ)

^bWhichever is greater

Expression of accuracy (uncertainty) conforms with the recommendations of the ISO Guide to the Expression of Uncertainty in Measurement.

Due to Ruska Instrument's process of continuous improvement, the printed specifications are subject to change without notice.

Agent



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