FLUKE®

Calibration

# Model 2485

## Ruska Hydraulic Piston Gauge

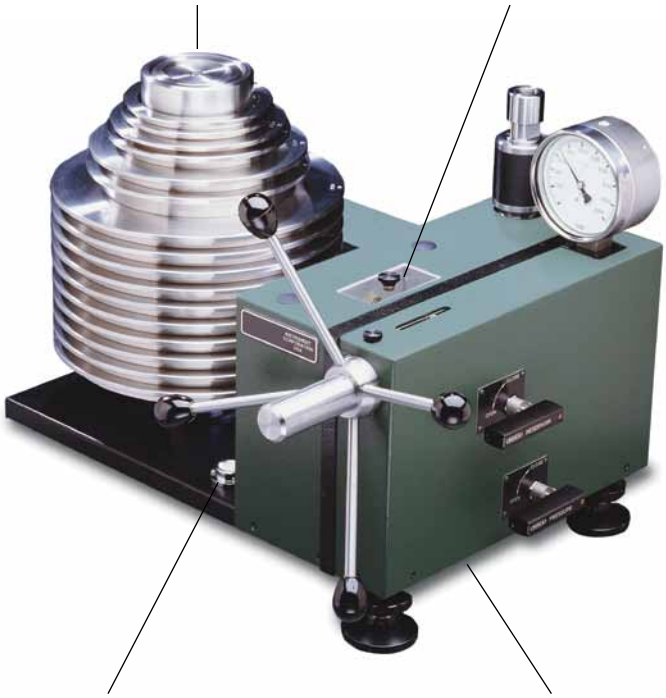
## Technical Data

### Features

- Pressure range from 10 to 72 500 psi (0.5 to 5 000 bar)
- Accuracy to 0.0025 % of reading
- Pressure increments in psi and bar
- Available as a completely integrated benchtop system
- Resolution less than 1 ppm
- Unique PistonSafe™ system with non-rigid mass loading table for maximum piston protection
- Easy-to-handle, 5 kg (11 lb) mass platters

Mass platters for the Model 2485 are easy to handle_maximum platter weight is 5 kg (11 lb). Masses are single-piece construction with no loose-fill materials for highest accuracy.

Fluid reservoir. The Model 2485 uses dioctyle sebacate (DOS) oil as the pressure medium.



The Model 2485 contains a sensitive level indicator to facilitate precise alignment of the piston axis.

The Model 2485 contains all components needed, including a positive displacement pump, in a compact benchtop system

The Model 2485 hydraulic piston gauge is a high precision standard that provides unsurpassed performance in the field of hydraulic piston pressure gauge metrology. The Model 2485 continues the Fluke Calibration standard of excellence, building on over 50 years of piston gauge manufacturing expertise. This instrument can be used to calibrate virtually any pressure device including other industrial or portable piston gauges, transducers, transmitters, gauges, or pressure switches. Available in dioctyl sebacate (DOS) oil, the Model 2485 can also be used in multiple media systems to facilitate calibrations of the wide variety of instrumentation in use today.

Each Model 2485 system includes a calibration report traceable to the U.S. National Institute of Standards and Technology (NIST). Traceability to other national or international standards organizations is also available.

### A compact, space-saving design

The Model 2485 is designed for easy use and for the space limitations of today's calibration environment. The entire benchtop system requires less than two square feet of bench space. The main pressure housing secures the piston/cylinder assembly and provides support for the mass load. Two adjustable support legs and a permanently attached, sensitive level indicator facilitate precise alignment of the piston axis. A fixed support leg directly underneath the main pressure housing supports the load and eliminates platform distortion so that continuous level adjustments are not needed. An auxiliary pressure housing, fluid reservoir, valves and positive displacement pump are enclosed by a simple cover that is easily removed for servicing internal components. The auxiliary housing also provides a convenient location to connect a device under test. A rapid fill pump is used to quickly purge hydraulic lines of air prior to starting the calibration procedure.

Other design features include a valve for connecting to an external reservoir (useful for applications where a reservoir larger than 250 mL (8.5 oz) is needed), and a liquid-in-glass thermometer to aid in compensating for temperature effects. Reservoir and system isolation valves allow for pump recharging when

returning the system to atmosphere. The drive motor can be used to provide consistent relative motion between the piston and cylinder when the inertia of a small mass load is insufficient to maintain adequate free rotation time.

## Mass set

The mass set for the Model 2485 includes:

- A hanger or sleeve mass, used to keep the center of mass below the piston
- Nineteen 5 kg platters
- Mass platters in incremental denominations [down to 200 g (7 oz)] for a total of 100 kg (3.5 oz)

Each mass is adjusted to within 50 ppm of the nominal mass denomination and calibrated to 5 ppm. Each mass is marked with the serial number of the set, a sequence number and the nominal mass denomination. The mass set is supplemented with a laboratory-style trim mass set, with denominations to 5 mg (0.0002 oz), to generate any pressure within the range and resolution of the instrument.

## Piston/cylinder assemblies

The Model 2485 piston/cylinder assemblies are simple in configuration and there are no mounting flanges or other geometric irregularities that can result in complicated stresses in the cylinder. This design minimizes stress due to mounting and sealing, and allows quick and easy changeout of all ranges without special tools.

The effective area of each Model 2485 piston/cylinder assembly is adjusted so that a given load in kilogram denominations will generate nominal pressure increments in either English (psi) or SI units (bar). All assemblies are identified with a pressure unit/increment designator and serial number.

## Quality materials, quality manufacturing

All piston/cylinder assemblies are manufactured from cemented tungsten carbide, offering superior strength and proven durability for:

- Low distortion
- Virtually undetectable hysteresis
- Excellent long-term stability
- A very low thermal coefficient

The manufacturing techniques used for the Model 2485 piston/cylinder assemblies ensure undetectable pressure change due to speed or direction of rotation, resolution better than 1 ppm, a sink rate typically less than 0.25 mm (0.01 in) per minute at maximum pressure and a useable pressure range down to 1% of full scale (FS).

## Protecting your investment

The Model 2485 features the PistonSafe system, a unique non-rigid system that results in automatic centering of the mass load and protection of the piston/cylinder assembly from forces induced by loading and unloading masses. The system minimizes lateral forces, maintains the vertical force along the piston axis, reduces friction, and promotes a higher level of performance than with rigidly mounted load. The piston and cylinder components are fully protected should the pressure be released while under load, or the load removed while at full pressure. Installation or change of piston/cylinder ranges is quick and easy and can be completed in minutes without special tools.

## Optional

For more consistent calibrations, use Model 2456 deadweight gauge monitor and WinPrompt® calibration software.

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# Specifications

| | |
|---|---|
| **General** | |
| Electrical power | 115/230 V ac, 50/60 Hz, 15 W |
| Pressure range | 10 psig to 20 000 psig (0.5 bar to 1 000 bar),<br>10 psig to 72,500 psig (0.5 to 5 000 bar) with high pressure intensifier |
| Accuracy* | 10 psig to 1 000 psig (0.5 bar to 50 bar); 25 ppm of reading or 13.8 Pa (whichever is greater)<br>100 psig to 10 000 psig (5 bar to 500 bar); 35 ppm<br>200 psig to 20 000 psig (10 bar to 1 000 bar); 35 ppm<br>1 000 psig to 72 500 psig (75 bar to 5 000 bar); 100 ppm |
| Temperature | Operating temperature: 18 °C to 28 °C (64 °F to 82 °F)<br>Storage temperature: 20 °C to 50 °C (68 °F to 122 °F) |
| Humidity | Operating humidity: 20 % to 75 % RH, non-condensing<br>Storage humidity: 0 % to 90 % RH, non-condensing |
| Weight | 40 kg (90 lb); excluding masses |
| Dimensions (H x W x D) | 51 cm x 51 cm x 36 cm (20 in x 20 in x 14 in) |
| Pressure medium | Dioctyl sebacate (DOS) oil |
| **Piston and cylinders** | |
| Materials | Cemented tungsten carbide |
| Thermal coefficient | .0000091/°C |
| Resolution | Less than 1 ppm, or 20 mg |
| Precision | Less than 5 ppm (2s typical) |
| Stability (per year) | Less than 5 ppm |
| **Mass set** | |
| Construction | Single-piece construction, 26 pieces plus trim set of nonmagnetic, austenitic, 300 Series stainless steel with no loose-fill materials |
| Calibration | Trimmed to 50 ppm of nominal, calibrated to 5 ppm |
| Weight | Set: 100 kg (220 lb)<br>Maximum platter: 5 kg (11 lb)<br>Cases: first case 16 kg (35 lb), other cases 23 kg (50 lb) |
| Case dimension (H x W x D) | First case: 34 cm x 33 cm x 25 cm (13.5 in x 13 in x 10 in)<br>Other cases: 32 cm x 33 cm x 20 cm (12.5 in x 13 in x 8 in) |
| **Optional** | |
| Model 2456 deadweight gauge monitor with WinPrompt calibration software<br>ISO-17025 accredited calibration (certificate) | |

* Accuracy as used here is defined as the 2-sigma root-sum-square total uncertainty in pressure as determined from the method described in ISO "Guide to the Expression of Uncertainty in Measurement," and represents a 95% level of confidence. These claims are subject to limitations in the state-of-the art uncertainty where available in pressure measurement at NIST and on strict procedure, training and environmental controls at the location where used.

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