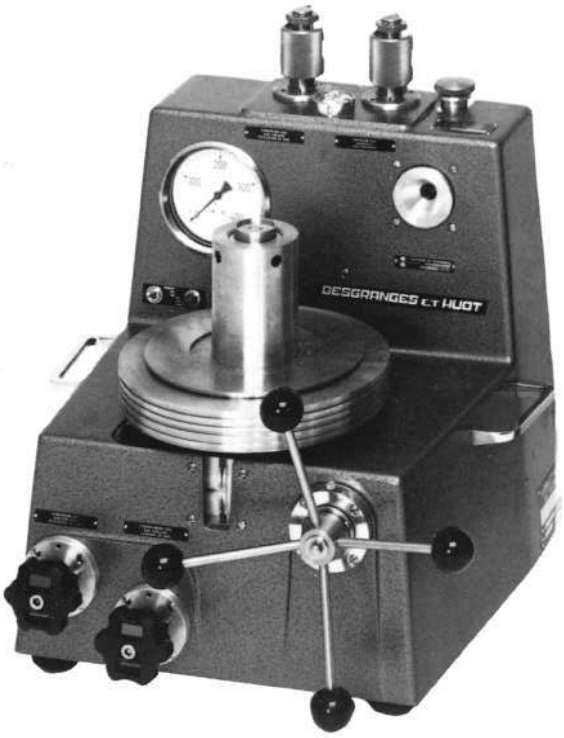
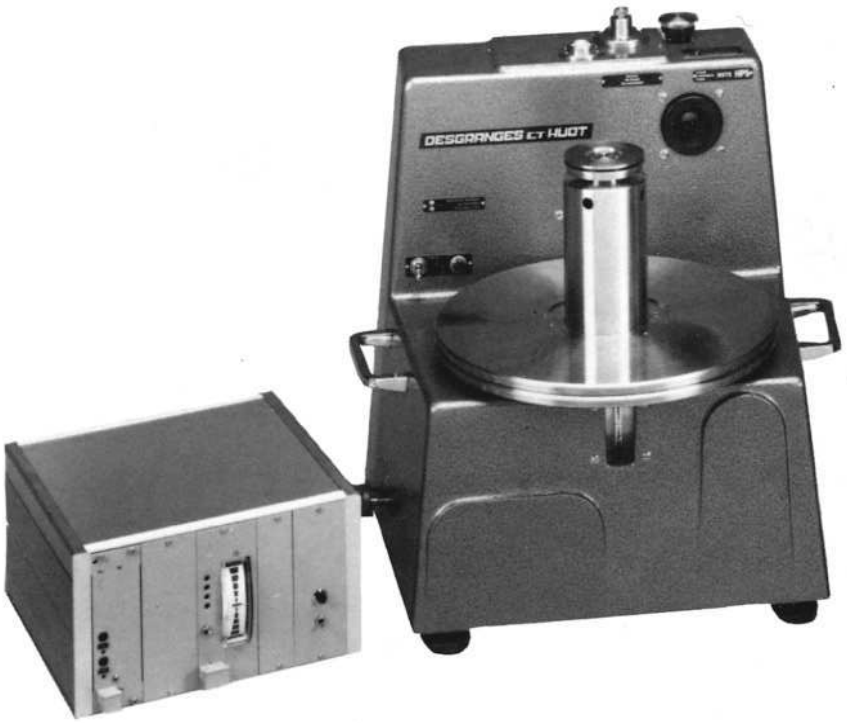
TYPE 5000

5200 SERIES GAS OPERATED PRESSURE BALANCES FOR PRESSURE FROM 0.02 TO 100 MPa (3 TO 16000 PSI)



MODEL 5202

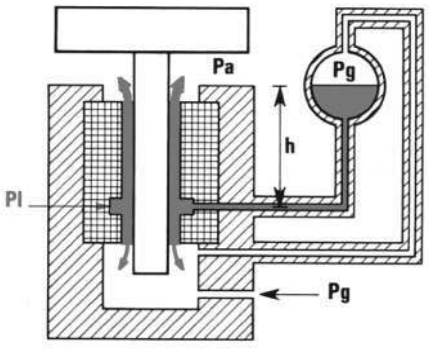


MODEL 5213

5200 GENERAL DESCRIPTION 5200

The 5200 Series consists of four models. These are Models 5201, 5202, 5203 and 5213. All models in the series have liquid lubricated gas operated piston-cylinders and use any non-corrosive gas as the pressurized test medium. All models, except Model 5213, include built-in pressure controls so that only a pressure source equal to the maximum operating pressure need be supplied to operate. The models differ in their maximum working pressure.

The 5200 Series is intended for applications where the test medium is a gas. They allow gas operation over a very wide range eliminating the need for difficult to use oil/gas interfaces or separators that add uncertainty to the measurement process. When both oil and gas capability are required, rather than using an interface, the combination of a 5200 Series instrument and a 5300 Series instrument using one common mass set should be considered.



Pg = gas pressure measured $P = Pg + \rho l\ gh$

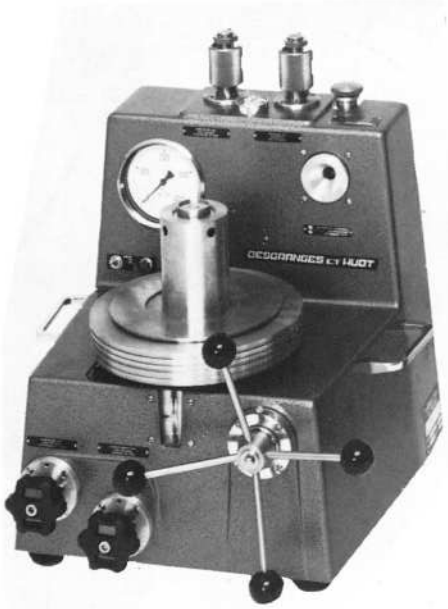
Pl = liquid pressure $Pl > Pg$

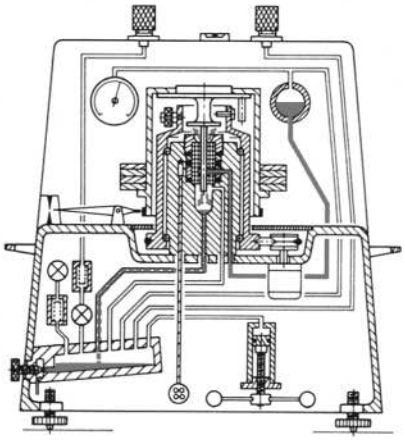
Pa = atmospheric pressure

Liquid lubrication overcomes the disadvantadges of lubricating with a gas. It eliminates the gas leak between the piston and the cylinder so the system is hermetic. The system is not affected by particulate and other contaminants in the test medium and normal gasses can be used with no detrimental effect. Piston drop rates are even lower than those typically found in a hydraulic piston gauge and the problems of pistons sticking and requiring frequent disassembly and cleaning are eliminated. Metrological performance meets and often exceeds that of gas lubricated gauges and it is much more consistent. Working directly in gas saves time because the regulatory action of the piston works directly on the test medium facilitating rapid pressure stabilization. The principle of operation of the liquid lubricated gas piston-cylinder is quite simple. The measured pressure, Pg, is applied to the bottom of the piston-cylinder and to the top of a visible level reservoir. A connection is made between the reservoir and the cylinder allowing liquid to enter the space between the piston-cylinder. The pressure of the liquid in the space, Pl, is equal to the gas pressure Pg, plus the liquid head, h. The liquid pressure in the space will always be higher than the gas pressure by the amount of the liquid head regardless of the gas pressure value. Since h is small, and the space between the piston and cylinder is minute, the bleed of liquid into the system is very small. The internal tubing of each 5200 Model is configured so that the minute amounts of liquid that enter the system drop directly to a sump and can easily be purged. Studies have been made to determine the amount of liquid that mixes with the gaseous test medium. The liquid that does mix appears to do so on a molecular level only and using proper procedures no significant contamination of the test system occurs.

All 5200 Models can be supplied to operate using Krytox™, a Fluorinated synthetic fluid, to lubricate the piston-cylinder in oxygen service applications.

5200 MODELS 5201, 5202, 5203 AND 5213 5200





MODEL 5202

MODEL 5213

Models 5201, 5202 and 5203 differ one from the other only in their maximum operating pressures which are 4000, 8000 and 16000 psi respectively. All three models include built-in pressure controls for the operator to set and adjust pressures. Model 5213 operates to 16000 psi but does not include pressure controls. When selecting a model the user should consider the possibility of future range expansion.

CAPABILITIES

Lowest-highest achievable pressure :
- Models 5213 and 5203 : 0.02 - 100 MPa
- Model 5202 : 0.02 - 40 MPa
- Model 5201 : 0.02 - 20 MPa

Piston-cylinders available :
- Type 5000 from Kn = 0.1 MPa/kg to Kn = 2 MPa/kg.

Mass sets available : all Type 5000 up to 80 kg.

Accuracy classes available :
- N and S, see Metrological Specifications p. 7 and 8.

Piston-cylinder mounting system :
- oil lubricated gas type (reentrant).

Piston position monitoring :
- Mechanical fulcrum (electronic as an option).

Test medium : Any non-corrosive gas.

Lubricating fluid : Nuto H5 (Krytox™ as an option).

5200 SERIES PISTON-CYLINDER AND MASS SET COMBINATIONS