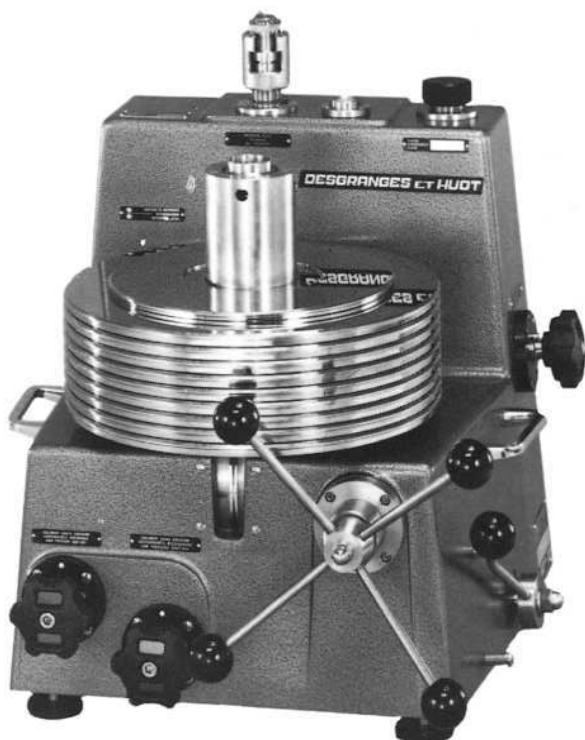
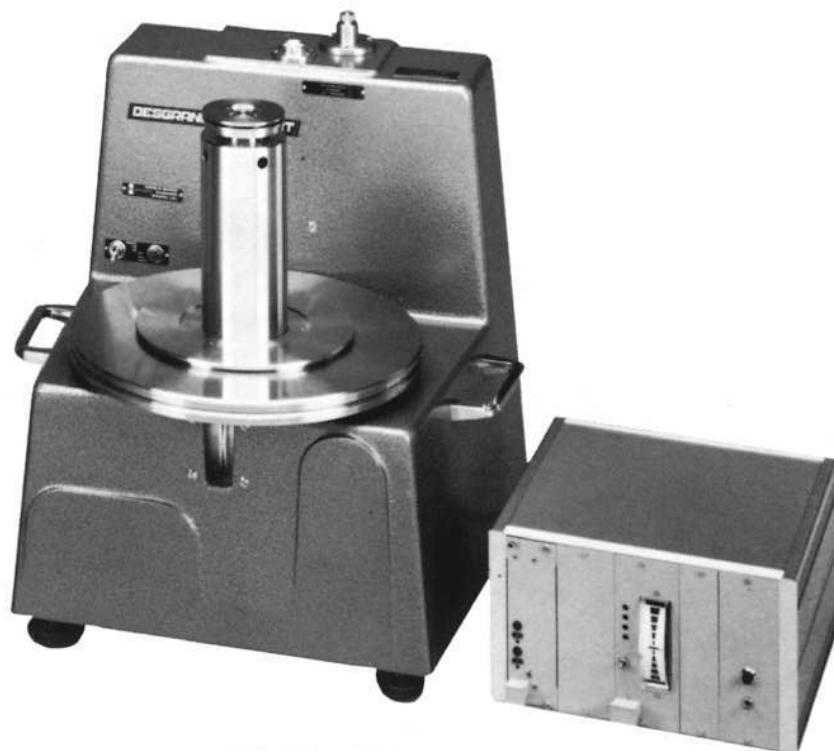


TYPE 5000

5300 SERIES OIL OPERATED
FOR PRESSURE FROM 0.02 TO 500 MPa
(4 TO 50000 PSI)



MODEL 5306



MODEL 5316

5300

GENERAL DESCRIPTION

5300

The 5300 Series consists of six different models of oil operated pressure balances. These are Models 5301, 5302, 5303, 5304, 5306 and 5316. All models in the series use Type 5000 oil lubricated piston-cylinders and oil as the pressurized test medium. The large selection of different models allows the user to select the instrument best suited to his current and future requirements. The models differ in the following areas :

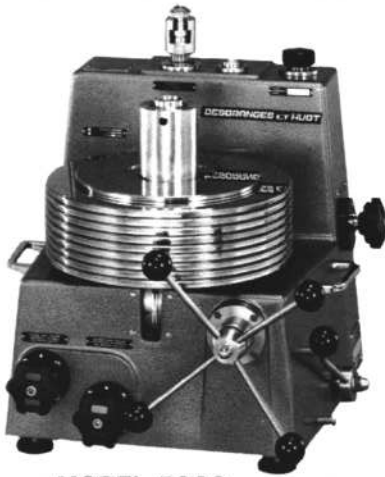
Maximum working pressure : Maximum working pressure is limited to the fittings and hardware used in the model to either 150 or 500 MPa. In practice, maximum pressure may also be limited by the piston-cylinder and mass set combinations the model can accommodate.

Maximum mass load : Piston-cylinder mounting posts and mass loading bells are produced in two lengths. The short bell can accept a maximum of 80 kg of mass. The long bell can accept a maximum of 100 kg of mass. Both bells may be used with lesser values.

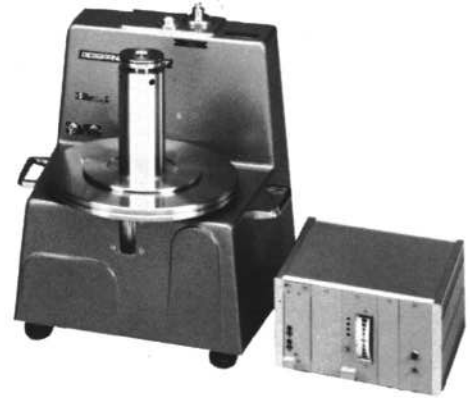
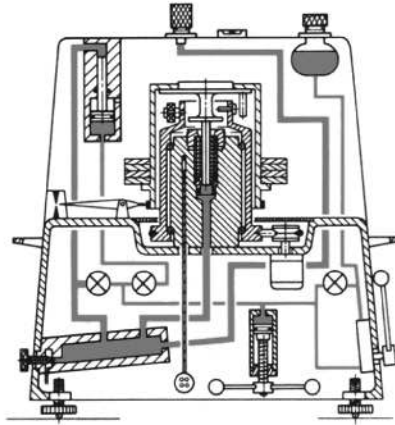
Piston-cylinder mounting : All models except Model 5301 use the simple free deformation mounting system in which the cylinder is allowed to deform freely with pressure. The free deformation mounting system cannot accept a piston-cylinder of K_n less than 0.5 MPa/kg (72.5 psi/kg) and therefore cannot operate at less than 0.1 MPa (15 psi). The re-entrant system can accept any K_n but cannot operate above 150 MPa.

Built-in pressure generation and control : Each model has either no pressure generation and control capability, 150 MPa capability or 500 MPa capability. In practice, maximum pressure may also be limited by the piston-cylinder and mass set combinations the model can accommodate.

The selection of a model within the 5300 Series should begin with the determination of what current and future pressure range requirements are as well as with what accuracy the range needs to be covered. The use of a 1000 Series Divider or Multiplier will also have an effect on 5300 Series model and range.



MODEL 5306



MODEL 5316

Model 5306 is the top of 5300 Series line with a maximum possible range of 0.1 to 500 MPa. The long mounting post accommodates a 100 kg mass set making it possible to exploit each piston-cylinder over its maximum usable range. A built-in 5:1 pressure intensifier gives manual 500 MPa pressure generation capability and assists the operator at all pressures. Model 5306 must be used for pressures over

20000 psi and should also be considered when there will be extensive work over 15000 psi. The built-in intensifier reduces by a factor of five the effort required to operate the variable volume. Model 5316 is identical to a Model 5306 but has no built-in pressure generation capability

CAPABILITIES

Lowest-highest achievable pressure :

0.1 to 500 MPa

Built-in generation and control capability : 500 MPa by hand pump, variable volume and 5:1 pressure intensifier.

The variable volume can be refilled without depressurizing the system. Model 5316 has no capability.

Maximum pressure rating : 500 MPa.

Accuracy classes available :

All, see Metrological Specifications p. 7 and 8.

Piston-cylinders available :

All type 5000 of $K_n = 0.5$ MPa/kg and above.

Mass sets available : All Type 5000.

Piston-cylinder mounting system :

Simple free deformation.

Piston-position monitoring :

Mechanical fulcrum (electronic as an option).

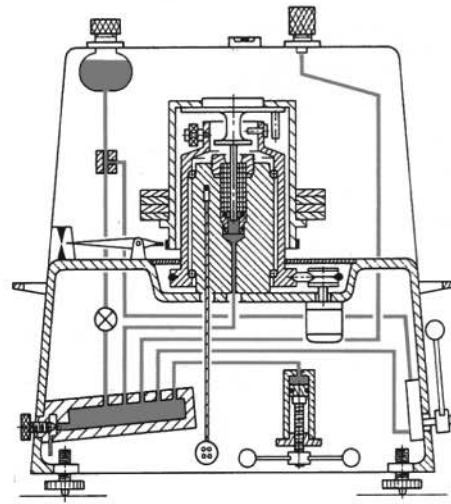
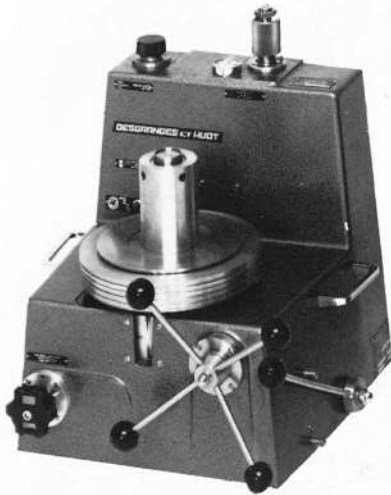
Mounting post length : long.

Pressurized medium :

Di-2-ethyl hexyl sebacate. Other oils available.

MODEL 5306 AND MODEL 5316 PISTON-CYLINDER AND MASS SET COMBINATIONS

Mass →	0.2 kg	20 kg	30 kg	40 kg	50 kg	60 kg	80 kg	100 kg
Piston K_n								
↓	0.1 MPa	10	15	20	25	30	40	50 MPa
0.5 MPa/kg								
	20 psi	2000	3000	4000	5000	6000	8000	10 000 psi
100 psi/kg								
	0.2 MPa	20	30	40	50	60	80	100 MPa
1 MPa/kg								
	40 psi	4000	6000	8000	10 000	12 000	16 000	20 000 psi
200 psi/kg								
	50 psi	5000	7500	10 000	12 500	15 000	20 000	25 000 psi
250 psi/kg								
	0.4 MPa	40	60	80	100	120	160	200 MPa
2 MPa/kg								
	60 psi	6000	9000	12 000	15 000	18 000	24 000	30 000 psi
300 psi/kg								
	100 psi	10 000	15 000	20 000	25 000	30 000	40 000	50 000 psi
500 psi/kg								
	1 MPa	100	150	200	250	300	400	500 MPa
5 MPa/kg								



MODEL 5304

Model 5304 has a maximum possible range of 0.1 to 150 MPa. The long mounting post accommodates a 100 kg mass set making possible to exploit each piston-cylinder over its maximum usable range up to 150 MPa. Model 5304 is recommended when pressures will not exceed 150 MPa but a 100 kg mass set will be loaded, for example when

a 40 - 20000 psi range is desired using a $K_n=200$ psi/kg piston-cylinder. If extensive work at and above 100 MPa will be necessary a Model 5306 with a built-in intensifier should be considered as it reduces the effort required to operate the variable volume by a factor of five.

CAPABILITIES

Lowest-highest achievable pressure :
0.1 to 150 MPa

Built-in generation and control capability :
150 MPa by hand pump, variable volume.

Maximum pressure rating : 150 MPa.

Piston-cylinders available :

All Type 5000 of $K_n = 0.5$ MPa/kg and above.

Accuracy classes available :

All, on 5303, all but S2 on 5302.

See Metrological Specifications p. 7 and 8.

Mass sets available : All Type 5000.

Piston-cylinder mounting system :

Simple free deformation.

Piston position monitoring :

Mechanical fulcrum (electronic as an option).

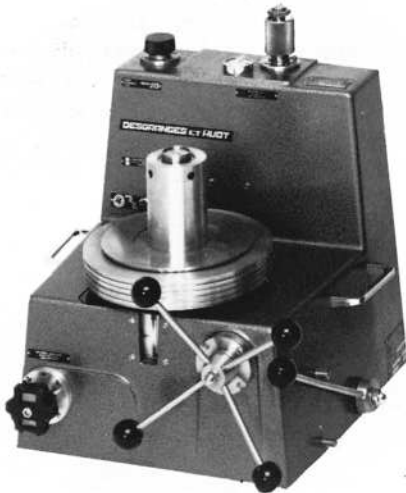
Mounting post length : long.

Pressurized medium :

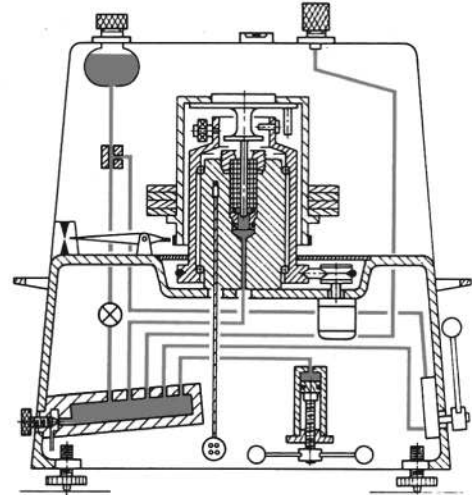
Di-2-ethyl hexyl sebacate. Other oils available.

MODEL 5304 PISTON-CYLINDER AND MASS SET COMBINATIONS

Mass →	0.2 kg	20 kg	30 kg	40 kg	50 kg	60 kg	80 kg	100 kg
Piston K_n								
↓	0.1 MPa	10	15	20	25	30	40	50 MPa
0.5 MPa/kg								
100 psi/kg	20 psi	2000	3000	4000	5000	6000	8000	10 000 psi
1 MPa/kg								
0.2 MPa	20	30	40	50	60	80	100 MPa	
200 psi/kg								
40 psi	4000	6000	8000	10 000	12 000	16 000	20 000 psi	
250 psi/kg								
50 psi	5000	7500	10 000	12 500	15 000	20 000 psi		
2 MPa/kg								
0.4 MPa	40	60	80	100	120	150 MPa		
300 psi/kg								
60 psi	6000	9000	12 000	15 000	18 000	21 750 psi		
500 psi/kg								
100 psi	10 000	15 000	20 000 psi					
5 MPa/kg								
1 MPa	100	150 MPa						



MODEL 5303



Models 5303 and 5302 have a maximum possible range of 0.1 to 150 MPa. The short mounting post accommodates an 80 kg mass set. Models 5303 and 5302 are recommended when pressures will not exceed 150 MPa and range and increment considerations do not make loading a 100 kg mass set necessary. Model 5302 is a simplified version of Model 5303 that has a fixed reference mark for piston position

monitoring rather than a mechanical lever. Model 5302 is not available with accuracy better than S and is recommended in field applications and applications where best accuracy is not required. For extensive work at and above 100 MPa a Model 5306 with a built-in intensifier should be considered.

CAPABILITIES

- Lowest-highest achievable pressure :
0.1 to 150 MPa
- Built-in generation and control capability :
150 MPa by hand pump, variable volume.
- Maximum pressure rating : 150 MPa.
- Piston-cylinders available :
All Type 5000 of $K_n = 0.5$ MPa/kg and above.
- Accuracy classes available :
All, see Metrological Specifications p. 7 and 8.

- Mass sets available : All Type 5000 up to 80 kg.
- Piston-cylinder mounting system :
Simple free deformation.
- Piston position monitoring :
Mechanical (electronic as an option), fixed reference mark on 5302.
- Mounting post length : short.
- Pressurized medium :
Di-2-ethyl hexyl sebacate. Other oils available.

MODEL 5303 AND MODEL 5302 PISTON-CYLINDER AND MASS SET COMBINATIONS

	5302			5303			
Mass → Piston K_n ↓ 0.5 MPa/kg	0.2 kg	20 kg	30 kg	40 kg	50 kg	60 kg	80 kg
0.1 MPa	0.1 MPa	10	15	20	25	30	40 MPa
100 psi/kg	20 psi	2000	3000	4000	5000	6000	8000 psi
1 MPa/kg	0.2 MPa	20	30	40	50	60	80 MPa
200 psi/kg	40 psi	4000	6000	8000	10 000	12 000	16 000 psi
250 psi/kg	50 psi	5000	7500	10 000	12 500	15 000	20 000 psi
2 MPa/kg	0.4 MPa	40	60	80	100	120	150 MPa
300 psi/kg	60 psi	6000	9000	12 000	15 000	18 000	21 750 psi
500 psi/kg	100 psi	10 000	15 000	20 000 psi			
5 MPa/kg	1 MPa	100	150 MPa				

Model 5301 is identical to Model 5303 but with a re-entrant piston-cylinder mounting system. All other 5300 Series standards use the simple free deformation mounting system which results in superior sensitivity, linearity and repeatability. For this reason, Model 5301 is not available in S2 accuracy. The advantage of the re-entrant mounting system is that it can accommodate piston-cylinders starting with $K_n = 0.1$ MPa/kg and thus can

supply a range starting at 3 psi. Model 5301 should be selected only when low pressure oil measurements are absolutely imperative. Due to the relatively large uncertainties associated with oil heads at low pressures DH does not recommend working with oil under 0.5 MPa. Those requiring high accuracy at pressures below 0.5 MPa should consider a 5200 Series gas operated pressure balance or a 1000 Series gas operated divider.

CAPABILITIES

Lowest-highest achievable pressure :

0.02 to 150 MPa

Built-in generation and control capability :

150 MPa by hand pump, variable volume.

Maximum pressure rating : 150 MPa.

Piston-cylinders available : all Type 5000.

Accuracy classes available :

All but S2, see Metrological Specifications p. 7 and 8.

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

Piston-cylinder mounting system : Re-entrant.

Piston position monitoring :

Mechanical (electronic as an option).

Mounting post length : short.

Pressurized medium :

Di-2-ethyl hexyl sebacate. Other oils available.

MODEL 5301 PISTON-CYLINDER AND MASS SET COMBINATIONS

Mass → Piston K_n ↓	0.2 kg	20 kg	30 kg	40 kg	50 kg	60 kg	80 kg
0.1 MPa/kg	0.02 MPa	2	3	4	5	6	8 MPa
20 psi/kg	4 psi	400	600	800	1000	1200	1600 psi
0.2 MPa/kg	0.04 MPa	4	6	8	10	12	16 MPa
50 psi/kg	10 psi	1000	1500	2000	2500	3000	4000 psi
0.5 MPa/kg	0.1 MPa	10	15	20	25	30	40 MPa
100 psi/kg	20 psi	2000	3000	4000	5000	6000	8000 psi
1 MPa/kg	0.2 MPa	20	30	40	50	60	80 MPa
200 psi/kg	40 psi	4000	6000	8000	10 000	12 000	16 000 psi
250 psi/kg	50 psi	5000	7500	10 000	12 500	15 000	20 000 psi
2 MPa/kg	0.4 MPa	40	60	80	100	120	150 MPa
300 psi/kg	60 psi	6000	9000	12 000	15 000	18 000	21 750 psi
500 psi/kg	100 psi	10 000	15 000	20 000 psi			
5 MPa/kg	1 MPa	50	100	150 MPa			