

MODEL GPSII
HIGH PRESSURE HYDRAULIC GENERATOR & CALIBRATOR



1. DESCRIPTION

The new GPSII is a high precision automatic pressure standard that meets the claims and needs of any user facing automatic calibration requirement such as instrument manufacturers and control and calibration laboratories.

2. PRESSURE MEASUREMENT PRINCIPLE

Pressure is measured with a built in high accuracy oscillating quartz pressure sensor, which gives excellent metrological specifications including very high sensitivity, repeatability and stability over time and which is not sensitive to vibration.

Those excellent metrological specifications allow to modelize the sensor on 3 sub-ranges with the best performance level, therefore each GPSII offers 3 measuring ranges. These ranges can be selected manually by the user or automatically when the GPSII is in « autorange » mode.

The GPSII pressure sensor is an absolute sensor. An internal barometer allows the GPSII user to choose between the absolute and gauge mode.



DH·Budenberg

La Référence en Pression

3. PRESSURE GENERATION PRINCIPLE

The GPSII automatic pressure generation technique is based on an original concept that combines fast pressure build-up and very fine pressure control.

- First, the circuit is primed by applying pneumatic pressure in the liquid tank, hence quickly pressurising the hydraulic fluid.
- Then an air controlled variable volume allows generating pressure steps.
- Finally very fine pressure regulation is obtained through very precise displacements of the variable volume.

4. OPERATION OF THE GPSII

All GPSII functions can be executed locally thanks to a large graphic color screen combined with a front panel keyboard :

- Pressure measurement settings (range, autorange mode, pressure unit, display resolution, gauge or absolute mode,...)
- Pressure generation settings (approach window, stability criteria, generation mode,...)
- Pressure point generation command

The GPSII also offers a complete set of macro commands and computer communication ports (RS232 and IEEE488) which allow its integration within a totally automated pressure calibration system.

GPSII can be combined with DH-Budenberg Pascal™ software to constitute a global solution for pressure measurement instrument calibration

5. TECHNICAL SPECIFICATIONS

5.1.– MODEL GPSII-A03000

Main range: 5 to 210 bar (21 MPa, 10000 psi)
Sub-ranges: 5 to 140 bar (14 MPa, 6500 psi)
5 to 70 bar (7 MPa, 3300 psi)

Metrological performances

Accuracy : $\pm 0.01\%$ of each sub-range
Resolution : $\pm 0.0001\%$ FS
Hysteresis : $\pm 0.001\%$ FS
Repeatability : $\pm 0.002\%$ FS
Linearity : $\pm 0.001\%$ FS
Temperature effect : Fully compensated within operating range

Generation Performances

Control precision : $\pm 0.005\%$ FS
Optimum circuit volume : 100 cc
Working fluid : water or oil (to be specified at time of order)

Others

Computer interface : RS232C & IEEE488
Power supply : 110~240 Vac / 50~60 Hz
Drive Air to 7 : ± 1 bar
Dimensions : 300 x 500 x 51 cm - 40 kg

5.2.– MODEL GPSII-A06000

Main range: 5 to 420 bar (42 MPa, 10000 psi)
Sub-ranges: 5 to 280 bar (28 MPa, 6500 psi)
5 to 140 bar (14 MPa, 3300 psi)

Metrological performances

Accuracy : $\pm 0.01\%$ of each sub-range
Resolution : $\pm 0.0001\%$ FS
Hysteresis : $\pm 0.001\%$ FS
Repeatability : $\pm 0.002\%$ FS
Linearity : $\pm 0.001\%$ FS
Temperature effect : Fully compensated within operating range

Generation Performances

Control precision : $\pm 0.005\%$ FS
Optimum circuit volume : 100 cc
Working fluid : water or oil (to be specified at time of order)

Others

Computer interface : RS232C & IEEE488
Power supply : 110~240 Vac / 50~60 Hz
Drive Air to 7 : ± 1 bar
Dimensions : 300 x 500 x 51 cm - 40 kg

5.3.- MODEL GPSII-A10000

Main range: 5 to 700 bar (70 MPa, 10000 psi)
Sub-ranges: 5 to 460 bar (46 MPa, 6500 psi)
5 to 230 bar (23 MPa, 3300 psi)

Metrological performances

Accuracy : $\pm 0.01\%$ of each sub-range
Resolution : $\pm 0.0001\%$ FS
Hysteresis : $\pm 0.001\%$ FS
Repeatability : $\pm 0.002\%$ FS
Linearity : $\pm 0.001\%$ FS
Temperature effect : Fully compensated within operating range

Generation Performances

Control precision : $\pm 0.005\%$ FS
Optimum circuit volume : 100 cc
Working fluid : water or oil (to be specified at time of order)

Others

Computer interface : RS232C & IEEE488
Power supply : 110~240 Vac / 50~60 Hz
Drive Air to 7 : ± 1 bar
Dimensions : 300 x 500 x 51 cm - 40 kg

5.4.- MODEL GPSII – A15000

Ø Main range: 5 to 1000 bar (100 MPa, 14500 psi)
Ø Sub-ranges: 5 to 700 bar (70 MPa, 10100 psi)
5 to 350 bar (35 MPa, 5000 psi)

Metrological performances

Ø Accuracy : $\pm 0.01\%$ of each sub-range
Ø Resolution : $\pm 0.0001\%$ FS
Ø Hysteresis : $\pm 0.001\%$ FS
Ø Repeatability : $\pm 0.002\%$ FS
Ø Linearity : $\pm 0.001\%$ FS
Ø Temperature effect : Fully compensated within operating range

Generation Performances

Ø Control precision : $\pm 0.005\%$ FS
Ø Optimum circuit volume : 100 cc
Ø Working fluid : water or oil (to be specified at time of order)

Others

Ø Computer interface : RS232C & IEEE488
Ø Power supply : 110~240 Vac / 50~60 Hz
Drive Air to 7 ± 1 bar
Ø Dimensions : 300 x 500 x 51 cm - 40 kg

5.5.- MODEL GPSII – A20000

- Ø Main range: 5 to 1500 bar (150 MPa, 14500 psi)
- Ø Sub-ranges: 5 to 1000 bar (100 MPa, 10100 psi)
5 to 500 bar (50 MPa, 5000 psi)

Metrological performances

- Ø Accuracy : $\pm 0.01\%$ of each sub-range
- Ø Resolution : $\pm 0.0001\%$ FS
- Ø Hysteresis : $\pm 0.001\%$ FS
- Ø Repeatability : $\pm 0.002\%$ FS
- Ø Linearity : $\pm 0.001\%$ FS
- Ø Temperature effect : Fully compensated within operating range

Generation Performances

- Ø Control precision : $\pm 0.005\%$ FS
- Ø Optimum circuit volume : 100 cc
- Ø Working fluid : water or oil (to be specified at time of order)

Others

- Ø Computer interface : RS232C & IEEE488
 - Ø Power supply : 110~240 Vac / 50~60 Hz
Drive Air to 7 ± 1 bar
- Dimensions : 300 x 500 x 51 cm - 40 kg

6. COFRAC CALIBRATION

Optionally, the GPSII can be calibrated by our COFRAC accredited Laboratory of Metrology (Accreditation # 2 - 1033). An official calibration certificate is then issued that guarantees that any pressure measurement made with the GPSII is traceable to French and International Standards.

According to our calibration laboratory environment and means, the following maximum uncertainty on the measurements is expected:

$$\pm (0.01\% \text{ of each sub range} + 0.005\% \text{ of reading})$$

This uncertainty includes the reference standards uncertainties, transfer errors, intrinsic performances of the GPSII, drift over three months, as well as the influence of environmental conditions
The uncertainty is thus a global uncertainty by comparison with the true pressure. In accordance with prevailing rules and standards, it is expressed in two standard deviations (K=2)

PASCAL™ SOFTWARE

1 GENERAL DESCRIPTION

The Pascal software is a Microsoft Windows-based metrology software package, which provides an easy, fast and economical way to the production of high quality and traceable calibration results of your pressure instrumentation.

Pascal controls the different steps of the pressure calibration :

- Ø It drives a pressure standard for the automatic reference pressure measurement
- Ø It drives automatic pressure generator/controller for calibration cycles
- Ø It drives data acquisition system for transmitters output reading
- Ø It prints and stores calibration reports

Pascal features :

- Ø Programming of calibration cycles, pre-set, discrete, repeated.
 - Ø Full scale tests.
 - Ø Automatic calibration of 1 to 10 instruments (transducers, transmitters, dial gauges, calibrators...)
 - Ø Instrument adjustment.
 - Ø Calculation of instrument specifications (linearity, hysteresis, deviation, repeatability)
 - Ø Regression calculations
 - Ø Calculation of global uncertainty to two standard deviations.
 - Ø Data processing
 - Ø Error graphs
 - Ø Print-out of calibration certificates
 - Ø Transfer of results to Microsoft Excel, Microsoft Works or Lotus 1-2-3.
- (* Requires the DMP40 data-acquisition unit)

2 COMPUTER REQUIREMENTS

Computer : IBM PC or 100% compatible with HDD with 20 MB available memory, 3 ½ floppy disk drive, VGA color monitor, mouse, LPT and serial ports

Processor : 486Dx66 or above

RAM : 4 MB minimum

Operating system : MS-Windows 3.1 or higher.

Interfacing of the calibration system to the computer may be performed through additional serial ports (COM3 and COM4 ports), or via an IEEE488 bus controller card (from Hewlett Packard, Capital Equipment Corporation, National Instruments).

3 INSTRUMENTS SUPPORTED

Pascal may drive the following instruments :

Pressure standards : D&H 20000, DPG series, RPM, DH 365, GPS, PPC, GPC and DPM series

Pressure controllers : D&H GPS, GPC and PPC series and any manual pressure controllers

Data acquisition units, and power supply units :

A wide range of data acquisition and power supply units may be driven by Pascal. The standard version of Pascal integrates a driver for type Keithley 2000 multimeters.

Please consult D&H for the list of others drivers available in option, including the Desgranges et Huot I/O modules for 2 or 10 channels.

Pressure calibrators : These pressure portable calibrators may be interfaced for calibration : D&H DH 365 and DH 200.
Beamex PC105 and PC106 and Druck DPI605