

60 GDS Helpsheet



*World Leaders in Computer Controlled Testing
Systems for Geotechnical Engineers and Geologists*

Hardware

ELD, STD, STDv2 & ADV Controller Comparison

1. Introduction

GDS have a number of pressure controllers available, with the accuracy of each greatly depending on the client's needs and wants. The relevant uses range from commercial-based to high accuracy research-based applications. These include the Enterprise Level Controller, the Standard Controller (v1 available until the end of 2009, v2 introduced in 2010), and the top of the line Advanced Controller.

2. Controller comparison

The Enterprise Level Digital Pressure Controller (ELDPC) was developed with the commercial sector in mind. It has a reduced size compared to any other controller in the GDS range which makes it ideally suited for life in a commercial testing laboratory. The controller functions with the application of a rolled ballscrew, of relevant accuracy, with a simple linear guide and production gearbox. The ELDPC fits neatly in the GDS range of pressure controllers between the premier product, namely the Advanced Controller, and the mid-range Standard Controller. It is suitable for applications which require a maximum pressure capacity of 1000kPa. The resolution of pressure measurement is 1 kPa. Volume resolution is 1 cu mm. It takes advantage of a full speed USB 2.0 interface and therefore is controlled directly from the computer. No Rs232 MUX required. The volumetric capacity is a nominal 200cc.

The Standard Digital Pressure Controller (STDDPC) was designed for use as a general purpose laboratory pressure source and volume change gauge. It is aimed at applications such as undergraduate teaching and commercial/production testing where a higher pressure is required. The controller makes use of a general purpose rolled ballscrew, with a simple linear guide and production gearbox. Pressure resolution is 0.1kPa in the v2 unit (1kPa in the v1 unit). In both the v1 and v2 units the pressure is displayed to 1kPa on the controller display, but the v2 unit has the ability to display the pressure to 0.1kPa when using GDSLAB software. Volume resolution is 1 cu.mm. Volume accuracy is 0.25% of the reading, pressure accuracy is 0.15%. The computer interface takes advantage of a full speed USB 2.0 interface in the v2 unit, whereas the v1 unit has an RS232 interface. A multiplexer (MUX) is therefore required to control the numerous devices from the PC with a v1 STDDPC. The GDS MUX controls up to 4 devices from any serial port on your PC. The pressure cylinder on the STDDPC is painted. The volumetric capacity is a nominal 200cc.

The Advanced Digital Pressure Controller (ADVDP) is designed for research work. It is suitable for high accuracy applications such as postgraduate and post-doctoral projects and to support GDS advanced systems. It has an accuracy of both pressure and volume change better than 0.1% of full range. The ballscrew is a precision ground screw and the gearbox and linear guides are high precision devices - the whole construction is designed for the highest quality. Resolution on pressure in enhanced precision is 0.2 kPa (displayed to 1kPa on the display, 0.2kPa within software when read over the PC interface). Volume accuracy is 0.1% of reading, with a volume resolution of 1 cu.mm. It has the option to be controlled either by an RS232 interface or an IEEE-488 computer interface. A computer containing an IEEE-488 card can handle 15 devices. If using the RS232 connector, a MUX will be required controlling up to 4

devices. The pressure cylinder is bright nickel plated. Volumetric capacities are both 200cc (pressure ranges between 0.1 and 150MPa) and 1000 cc (with pressure ranges between 0.1 to 2MPa also).

3. Summary

The **ELDPC** controller is approximately **20% cheaper** than the STDDPC controller and is suitable for commercial laboratory environments which only require a maximum pressure capacity of 1000 kPa.

The **STDDPC (v1 or v2)** controller is about **40% cheaper** than the ADVDPCC controller and is suitable for general purpose pressure control and volume change measurements, in teaching and production laboratories.

The **ADVDPCC** controller is about **40% more expensive** than the STDDPC controller and is suitable for precise control and measurement of pressure and volume change, in all applications including research laboratories.

Figure 1 shows an example of pressure seek performance characteristics between each controller (set to 800 kPa and increased by 100 kPa, full triaxial cell). Note: data should be used as a guide only as performance will change with size of triaxial cell, stiffness of cell, compressibility of the fluid etc.

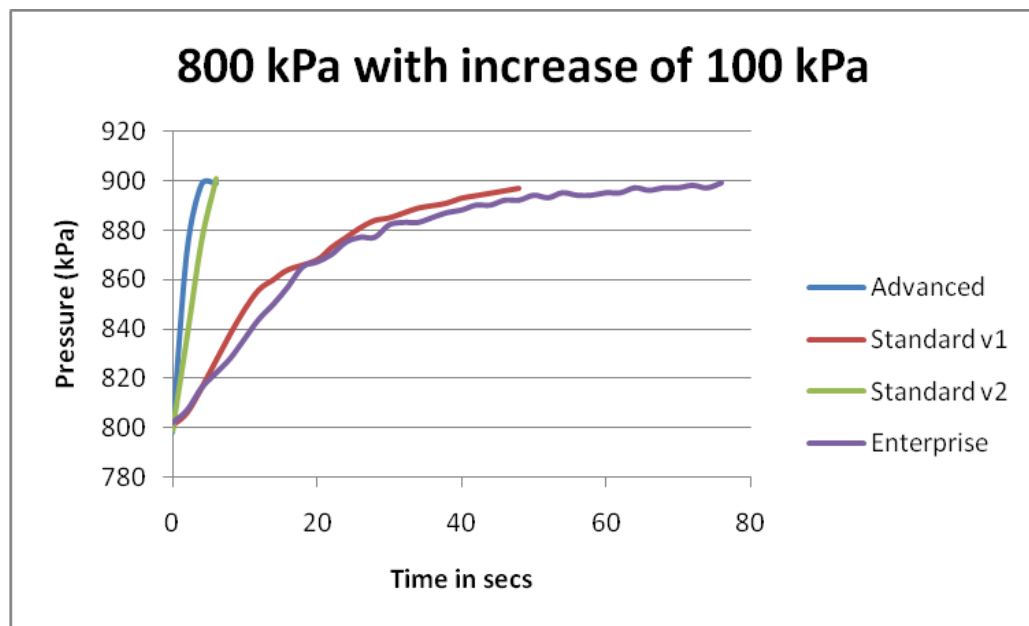


Figure 1. Performance comparison of all available GDS controllers

The key differences between the ELDPC, the STDDPC and the ADVDPCC controllers are detailed in Table 1 below.

Table 1. Enterprise Level (ELDPC), Standard (STDDPC), and Advanced (ADVDP) pressure/volume controllers comparison chart

Feature	Enterprise Level Pressure/Volume Controller	STD pressure/volume controller	STD Pressure/Volume Controller v2	ADV pressure/volume controller
Accuracy (pressure and volume)	0.25% FRO	0.15% FRO	0.15% FRO	Better than 0.1% FRO
Pressure range	1 MPa	1, 2, 3, 4 MPa	1, 2, 3, 4 MPa	0.1, 0.2, 0.4, 0.8, 1, 2, 4, 8, 16, 20, 32, 64 MPa
Pressure Display Readable to	1 kPa	1 kPa	1 kPa	1 kPa
Resolution of logging via software	1 kPa (1000 device)	1 kPa	0.1 kPa	0.2 kPa (2000 kPa device)
Pressure calibration	One point calibration (FRO)	One point calibration (FRO)	One point calibration (FRO)	Multipoint calibration, certified with table.
Resolution (volume)	1 mm ³ (0.001 cc)	1 mm ³ (0.001 cc)	1 mm ³ (0.001 cc)	0.5 mm ³
Volumetric range	200 cc	200 cc	200 cc	200 cc, 1000 cc (2 MPa only)
Ball screw	Rolled – lead error 100 µm in 330 mm	Rolled – lead error 100 µm in 330 mm	Rolled – lead error 100 µm in 330 mm	Ground – lead error 25 µm in 330 mm
Linear guide	Rolled – error unspecified	Rolled – error unspecified	Rolled – error unspecified	Ground – running parallelism error 20 µm in 500 mm
Gearbox	Class C	Class C	Class C	Class A, precision
Volumetric accuracy	0.4% measured	Better than 0.25%, calculated	Better than 0.25%, calculated	Better than 0.1%, certified
Interface options	USB	RS232 Option for analogue outputs of pressure and volume	USB	RS232 or IEEE - 488
Resolution of control	1 kPa	1 kPa	0.1 kPa	0.5 kPa (2000 kPa device)
Material and finish of pressure cylinder	Brass, painted	Brass, painted	Brass, painted	Brass, bright nickel plated and polished
Size (mm)	500 x 100 x 125	600 x 230 x 195	620 x 100 x 140	860 x 230 x 220 (2 MPa) 860 x 230 x 230 (1000 cc) 860 x 230 x 260 (32 MPa) 860 x 230 x 330 (64 MPa)
Weight	5.5kg (empty)	14 kgf	10.2kg (empty)	20 - 25 kgf
Electrical supply (universal)	100-240V AC, 50-60Hz, 0.7A. Max Consumption: 20W. Typical Consumption: <12W	85 VAC to 260 VAC; 120 to 370 VDC 47 – 440 Hz	100-240V~1.6A MAX, 50-60Hz	85 VAC to 260 VAC; 120 to 370 VDC 47 – 440 Hz