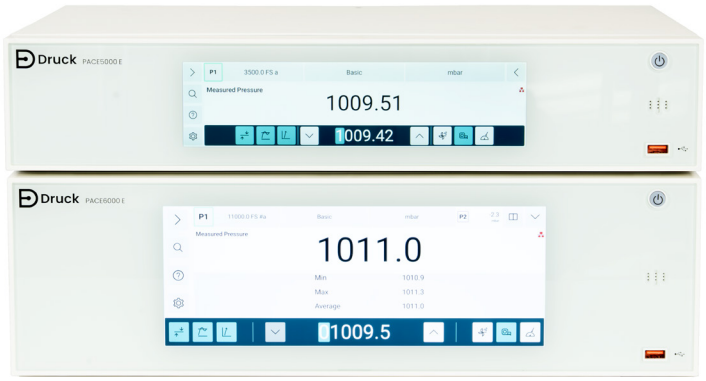

TERPS® Performance

PACE5000 E & PACE6000 E

Modular Pressure Controllers

Speed and Accuracy. No Compromises.

Applications and Industries

Laboratory, manufacturing, R&D and Calibration applications in:

- Aerospace, Defence and Space
- Energy
- Healthcare and Pharmaceutical
- Electronic and Semi-con
- Transport
- Metrology and Calibration
- Environmental
- Industrial manufacturing & testing

Highlights

- Industry leading controller performance (speed, accuracy and stability)into large or small volumes

  1.5 seconds to a stable setpoint
  0.001%FS control stability

- Highest accuracy/lowest uncertainty sensor measurement (12-month specification)

  5Pa uncertainties possible due to sensing technology

- Simple and intuitive UI with context sensitive help and a large touchscreen display
- Testbench interfacing with HDMI monitor output, mouse keyboard
- 'Drop in' replacement for PACE5000 and PACE6000 with Control Module backwards compatibility and emulation modes for DPI510 and DPI520
- Standards compliant communication, GPIB IEEE-488 (option), RS232, SCPI-99, USBTMC, LXI 1.6 standard (VXI-11 &HiSLIP), NI IVI-C and LabVIEW certified instrument drivers

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PACE5000 E chassis

- Single channel pressure controller chassis
- Can be used with any interchangeable PACE CM control module as a bench top or rack mounted pressure controller
- The ideal option for end of line testing and production as well as wider industrial applications due it's speed and control stability but equally suited to a laboratory and workshop environment.

PACE6000 E chassis

- Dual channel pressure controller chassis
- With two PACE CM control modules fitted the PACE6000 E can be used in single, auto-ranging or simultaneous dual pressure control mode*
- No module pressure range ratio limit
- Increased flexibility due to its multi-channel capability and often chosen for calibration and lab-based work due to the stability and accuracy of the measurement but equally capable in an industrial environment due to its speed and large display.

PACE Control Modules

PACE utilises Interchangeable control modules (CM) that are easily installed and uninstalled into a PACE chassis.

The CM contains all the valves, manifolds and sensors for the unit along with the calibration data.

This unique approach, provides the following benefits when compared to other approaches available in the market.

- Valves and manifolds can be tuned for specific pressure ranges, resulting in market leading speed, stability and volume control.
- Chassis can remain compact. PACE5000 E is 2U high and PACE6000 E is 3U high. Both units are only 330 mm deep allowing space in behind for connections and accessories if units are rack mounted
- Only the Control Module needs to be recalibrated or maintained so the chassis can remain in place and can continue to be utilised.
- One chassis covers all pressure ranges, there is no need to have a different chassis for low or higher pressure ranges etc.
- Reduced opportunity for leaks as sensors are mounted directly into the manifold and valve assembly.

* for auto-ranging, both control modules have to be a range below 70 bar/1000 psi or both control modules have to be a range above 70 bar/1000 psi

Speed and control stability

Indicative performance:

- Control speed / response time (high speed):

  1.5 seconds *

- Control speed / response time (high accuracy):

  <= 3 seconds **

* Optimized performance into an external load of <=100ml, 20-50%FS step, 0.025%FS stability.

** External load of <=100ml, 20-50%FS step, 0.005%FS stability, add 2 seconds for 0.001%FS stability

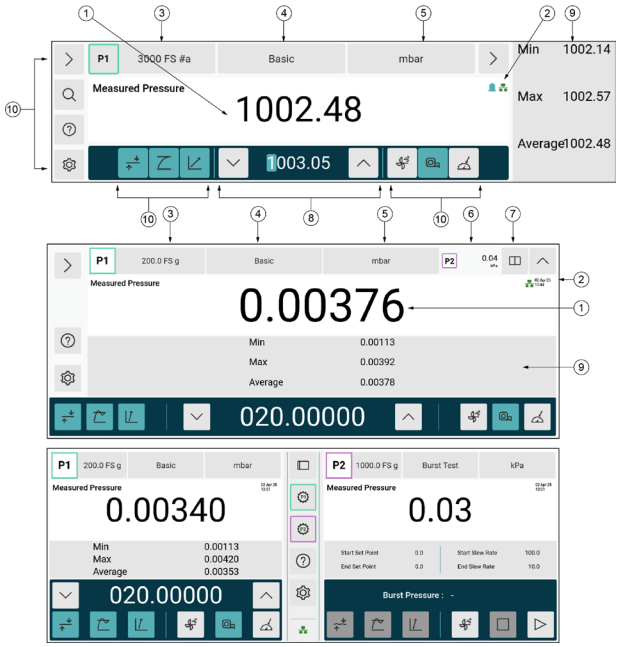
All performance figures include a 1 second stabilisation time.

- Druck's PACE pressure controllers in conjunction with the Control Modules use an advanced pressure control algorithm. The result is that PACE can stabilise quicker than any other controller on the market up to and including 0.001%FS stability, for large or small volumes.

Long-term measurement stability

As a high accuracy pressure sensor manufacture, Druck Ltd is in control of the whole development and manufacture of the sensors we build into our units which means we can control the specification and adherence to that spec. This ensures the customer can trust the performance of our sensor measurement through out the whole calibration period without need to complete time-consuming check calibrations or adjustments.

Intuitive useability



1. Pressure measurement of selected sensor in selected pressure measurement units
2. Enabled Function symbols
3. Measurement Range button
4. Task button
5. Measurement Units button
6. P2 (Pneumatic Contol Module 2) Pressure measurement (PACE6000 E only)
7. One and two channel screen select
8. Setpoint area
9. Status area
10. Icons

LXI™ – LAN eXtensions for Instruments

The PACE5000 E and PACE6000 E instruments include LXI standard communications through the ethernet connection and a local network.

This functionality enables quick and seamless integration into new or existing systems along with improved debugging, troubleshooting and remote software update capabilities.

4Sight2 - A complete calibration system

Druck 4Sight2 is the next generation calibration and asset management software that provides full visibility of all your assets, reference standards and resources on your plant.

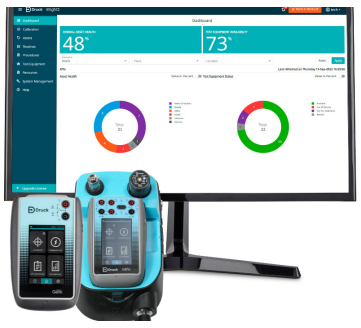
Fully integrated with PACE series controllers, 4Sight2 can be used to perform fully automated full loop calibration or test runs which can immensely improve your process.

4Sight2's uniquely designed real time calibration features interrogates PACE to achieve calibration set points as defined in the calibration procedure and intelligently collects readings avoiding any kind of manual intervention. This can be used for number of use cases:,

- Calibration of pressure instrumentation such as transmitters, transducers, switches etc
- Highest accuracy calibration of Druck instruments (automated), sensors as well as third party calibration equipment.
- End of line testing of pressure gauges.
- Leak test of pressure instruments.
- Accredited quality calibration using some of Druck's finest, best in class technology products such as CM3 and PACE Tallis.

Some of the other benefits of 4sight2 include:

- Standardisation of calibration process amongst multiple users, departments, and sites.
- Full visibility of all your assets and test equipment.
- Integration with Druck portable calibrator range for in field calibrations.
- Fully automated measurement uncertainty calculation for accredited calibration services.
- One click calibration certificate generation in a customisable format.
- Paperless calibration process.
- Audit ready at all times.



- Capture of full calibration history with trending feature to analyse drift patterns

4Sight2 Packages compatible with PACE Controller Series

Package	Description
4SIGHT2-STD	Standard license included up to 2000 tags, 5 user licenses, integration with portable calibrators, integration with PACE or Temperature calibrators, and most features as defined in the 4Sight2 datasheet.
4SIGHT2-ADV	Advanced license includes up to 5000 tags, 10 user licenses, integration with portable calibrators, PACE and Temperature calibrators and all features as defined in the 4Sight2 datasheet.

For more information refer to 4Sight2 webpage found here.

PACE5000 E/6000 E Options

Leak test

Leak test applies a test pressure(s) to an external system connected to the instrument to determine the magnitude of pressure variations due to leaks. This application sets the test pressure and a dwell time to eliminate potential adiabatic effects at the test pressure and the leak test time period. On completion, the display shows the start pressure, end pressure, pressure change and leak rate.

Burst test

Burst test is an application for the PACE series designed primarily for the testing of pressure rupture discs. The burst test option applies a controlled increase of pressure and accurately measures the exact point at which the device rupture or burst occurs.

Test program

The test program option provides a facility for creating, storing and executing numerous test procedures within the instrument itself. This is particularly useful for longer, more repetitive and laborious procedures requiring manual inputs for rapid prototyping, manufacturing and life cycle testing. Test programs can also be transferred to a PC using a mass storage device for further editing, and copied back from the mass storage device to the instrument.

Aeronautical option (PACE6000 E only, see PACE6000 E - ADC datasheet for further details)

55,000 ft and 650 kt or 75,000ft and 1000 kt options

Simultaneous control of calibrated airspeed and altitude with a "go to ground" function.

Indication and control available in pure aeronautical units:

Altitude – feet or meters
Air Speed – knots or km/hour, mph
Mach – mach number
Rate of climb – feet or meters/minute, second

Specifications

Pressure measurement	
CM0/CM1/CM2/CM3 Pressure ranges:	See section 7 for a list of pressure ranges available
Over range indication:	10% above mbar/bar full scale pressure range
Pressure Media:	Dry, oil free, and non-combustible gas maintained at a value of 10% above the maximum required outlet pressure, dry air or nitrogen recommended.
Display	
PACE5000 E	LCD: Color display with touchscreen. 216 mm x 54 mm (8.5" x 2.1")
PACE6000 E	LCD: Color display with touchscreen. 243 mm x 91 mm (9.6" x 3.6")
Comms update rate	20 times per second
Display update rate	2 times per second
Readout	±99999999
Pressure units	mbar, bar, Pa(N/m2), hPa, kPa, MPa, mmHg @ 0°C, cmHg @ 0°C, mHg @ 0°C,, inHg @ 0°C, mmH22O @ 4°C, cmH, torr, atm, psi, lb/ft2O @ 4°C, mH2, inH2O @ 4°C, inH2O @ 4°C, mmH2O @ 20°C, inH2O @ 20°C, cmH2O @ 60°F, ftH2O @20 °C, mH2O @ 4°C, ftH2O @ 20 °C, kg/m2O @ 20°C, 2, kg/cm ftH2O @ 60°F, user defined 1, user defined 2, user defined 3, user defined 4
Performance	
PACE CM0 standard precision	0.02% Rdg + 0.02% FS (25 mbar: 0.20% rdg + 0.20% FS, 70 mbar: 0.10% rdg + 0.10% FS, 200 mbar: 0.04% rdg + 0.04% FS) includes linearity, hysteresis, repeatability and temperature effects over calibrated temperature range, for gauge pressures and assumes steady state temperature and regular zeroing.
PACE CM0 controller stability	0.005% FS
PACE CM1 high precision	0.01% Rdg + 0.01% FS (25 mbar: 0.10% rdg + 0.10% FS, 70 mbar: 0.05% rdg + 0.05% FS, 200 mbar: 0.02% rdg + 0.02% FS) includes linearity, hysteresis, repeatability and temperature effects over calibrated temperature range, for gauge pressures and assumes steady state temperature and regular zeroing.
PACE CM1 controller stability	0.003% FS (25mbar range = 0.005% FS)
PACE CM2 premium precision	0.005% Rdg + 0.005% FS (25 mbar: 0.05% rdg + 0.05% FS, 70 mbar: 0.025% rdg + 0.025% FS, 200 mbar: 0.01% rdg + 0.01% FS) includes linearity, hysteresis, repeatability and temperature effects over calibrated temperature range, for gauge pressures and assumes steady state temperature and regular zeroing.
PACE CM2 – controller stability	0.001% FS (25mbar = 0.004% FS. 70 mbar = 0.003% FS)
PACE CM3 reference precision	0.001% FS for 2, 3.5 bar a includes non-linearity, hysteresis, repeatabilty and temperature effects over calibrated temperature range. 0.0015% FS for 8-211 bar a includes non-linearity, hysteresis, repeatabilty and temperature effects over calibrated temperature range.
PACE CM3 controller stability	0.001% of absolute range FS
PACE CM3 accuracy	Absolute ranges 2, 3.5 bar accuracy (2 Sigma) over calibrated temperature range 0.0004%Rdg + 0.0027% FS. 8-101 bar 0.0011% RDG + 0.0026 % FS* 136 Bar 0.0025% RDG + 0.0023 % FS* 173 Bar 0.0026% RDG + 0.0022 % FS* 211 Bar 0.0027% RDG + 0.0022 % FS* Includes measurement precision, measurement long-term stability (see below) and calibration equipment expanded uncertainty. Pseudo gauge range accuracy (3.5bara and below) will need to include the barometer uncertainty using the RSS (root sum of squares) method.

*To meet annual CM3 accuracy specification, zeroing against a barometric reference is recommended every 28 days. The long-term stability spec will be subject to the specification of the barometric reference used, quoted figures are for CM3-B.

Performance (cont.)	
PACE CM measurement long-term stability	CM0, CM1 and CM2 Ranges: 2 bar g to 210 bar g (30 psi g to 3000 psi g) 0.01% of reading per annum, 1 bar g 0.02% of reading per annum and 25 mbar g to 700 mbar g 0.03% of reading per annum, assumes regular zeroing. CM3 Ranges: 2, 3.5 bar a 0.0025% FS per annum absolute ranges. CM3 Ranges: 8-211 bar a 0.001% FS per 28 days* CM0-B, CM1-B, CM2-B, CM3-B and CM2-A: barometric reference sensor 0.06 mbar a or 0.00073 psi a per annum.
Negative gauge precision	Maximum error at any given pressure value is equal to maximum error at the equivalent positive pressure value (CM0, CM1 and CM2).
Pseudo range precision	Pseudo Absolute: gauge mode precision + barometric precision Pseudo gauge: absolute mode precision + barometric precision
PACE CM0-B precision-barometric reference	Precision for the optional barometric reference 0.10 mbar or 0.0015 psi. Includes non-linearity, hysteresis, repeatability and temperature effects over calibrated temperature range.
PACE CM1-B precision-barometric reference	Precision for the optional barometric reference 0.05 mbar or 0.00073 psi. Includes non-linearity, hysteresis, repeatability and temperature effects over calibrated temperature range.
PACE CM2-B precision-barometric reference	Precision for the optional barometric reference 0.025 mbar or 0.00036 psi. Includes nonlinearity, hysteresis, repeatability and temperature effects over calibrated temperature range.
PACE CM3-B precision-barometric reference	Precision for the optional barometric reference 0.02 mbar or 0.00029 psi. Includes non-linearity, hysteresis, repeatability and temperature effects over calibrated temperature range.
PACE CM3-B accuracy-barometric reference	Barometer accuracy (2 Sigma) = 0.06 mbar over the calibrated temperature range. Includes measurement precision, measurement long-term stability per annum and calibration equipment expanded uncertainty
Gas consumption	All supply gas is delivered to the system. No gas is used in measure mode, or when the instrument is turned off.
Electrical	
Power supply	Input range: 100-120/200-240 VAC, (50/60 Hz)
Communications	
Communication	USB-A, USB-C, USB Type B/USB TMC, ethernet (LXI conformant) and RS232 (optional), GPIB IEEE-488 (Optional), SCPI99 compliant, emulation (DPI520, DPI500, DPI510 & DPI515 depending on model and PACE 5000 and PACE 6000)
Environmetal	
Temperature	Operating 0°C to 55°C (32°F to 131°F) Calibrated 15°C to 45°C (59°F to 113°F) Storage -20°C to 70°C (-4°F to 158°F)
Humidity	5% RH to 95% RH non-condensing
Sealing	IP20 (EN60529), Indoor use only
Vibration	Compliant with Def. Stan. 66-31 8.4 Cat 3 and MIL-PRF-28800
Shock	Mechanical shock conforms to EN61010-1
Conformity	UL 611010-1 EMC EN61326-1, PED, ROHS & WEEE – CE marked
Physical	
PACE chassis – weight	PACE5000E 5.6 kg or 12.3 lbs, PACE6000E 7.2 kg or 15.9 lbs
PACE CM – weight	5 kg or 11 lbs
PACE CM – pressure connection	G 1/8 Female (1/8 NPT Female by adaptor for North America)
PACE 5000E – dimensions (WxHxD)	440 mm x 88 mm (2U) x 320 mm (17.3" x 3.47" x 12.6")
PACE 6000E – dimensions (WxHxD)	440 mm X 132 mm (3U) X 320 mm (17.3" x 5.2" x 12.6")

Ordering information

Please state the following (where applicable)

1. PACE chassis

- PACE5000E Single Pressure Controller Chassis
- PACE6000E Dual Pressure Controller Chassis

2. PACE chassis – options

The range of optional features includes:

- Leak test — Automatically measures leak rates in the desired units/minute or units/second
- Burst test — For testing the pressure rupture point
- GPIB option — Expansion card to enable GPIB communication
- Test Program — Write and Save numerous test programs
- Aeronautical (PACE6000 E only) — Allows for the test and calibration of aeronautical instruments
Aero 55,000 Ft / 650 knots
Aero 75,000 ft / 1000 knots

3. PACE chassis – mains lead

Choose one from this list:

- Mains lead IEC-UK plug
- Mains lead IEC-Japan plug
- Mains lead IEC-EU plug
- Mains lead IEC-USA plug
- Mains lead IEC-South Africa/India plug
- Mains lead IEC-China plug
- Mains lead IEC-Australia/New Zealand plug

4. Instrument Set Up

Please state area of use for instrument set up:

- Europe
- North America
- Japan
- Asia
- Rest of world
- Malaysia

5. Country of Use

Please state country of use

6. Country Marking

Supports specific product compliance labelling:

- Standard Compliance Marking
- South Korea

7. PACE control module – pressure range

- PACE5000E Single Pressure Controller Chassis
- PACE6000E Dual Pressure Controller Chassis

Pressure code	bar	psi	Pa
CM2, CM1, CM0			
008G	25 mbar g	0.35 psi g	2.5 kPa g
01G	70 mbar g	1 psi g	7.0 kPa g
02G	200 mbar g	3 psi g	20.0 kPa g
03G	350 mbar g	5 psi g	35.0 kPa g
04G	700 mbar g	10 psi g	70.0 kPa g
05G	1 bar g	15 psi g	100.0 kPa g
07G	2 bar g	30 psi g	200.0 kPa g
08G	3.5 bar g	50 psi g	350.0 kPa g
10G	7 bar g	100 psi g	700.0 kPa g
11G	10 bar g	150 psi g	1.0 MPa g
13G	20 bar g	300 psi g	2.0 MPa g
14G	35 bar g	500 psi g	3.5 MPa g
16G	70 bar g	1,000 psi g	7.0 MPa g
165G	100 bar g	1,500 psi g	10.0 MPa g
17G	135 bar g	2,000 psi g	13.5 MPa g
175G	172 bar g	2,500 psi g	17.2 MPa g
18G	210 bar g	3,000 psi g	21.0 MPa g
CM3			
07A	2 bar a	30 psi a	200.0 kPa a
08A	3.5 bar a	50 psi a	350.0 kPa a
10A	8 bar a	116 psi a	800 kPa a
11A	11 bar a	160 psi a	1.1 MPa a
13A	21 bar a	304 psi a	2.1 MPa a
14A	36 bar a	522 psi a	3.6 MPa a
16A	71 bar a	1,029 psi a	7.1 MPa a
17A	101 bar a	1,465 psi a	10.1 MPa a
172A	136 bar a	1,973 psi a	13.6 MPa a
175A	173 bar a	2,509 psi a	17.3 MPa a
18A	211 bar a	3,060 psi a	21.1 MPa a
-	1 bar pg	15 psi pg	100.0 kPa pg
-	2.5 bar pg	36 psi pg	250.0 kPa pg
-	7 bar pg	100 psi pg	700.0 kPa pg
-	10 bar pg	150 psi pg	1.0 MPa pg
-	20 bar pg	300 psi pg	2.0 MPa pg
-	35 bar pg	500 psi pg	3.5 MPa pg
-	70 bar pg	1,000 psi pg	7.0 MPa pg
-	100 bar pg	1,500 psi pg	10.0 MPa pg
-	135 bar pg	2,000 psi pg	13.5 MPa pg
	172 bar pg	2,500 psi pg	17.2 MPa pg
	210 bar pg	3,000 psi pg	21.0 MPa pg

8. PACE control module – precision

- PACE CM0 = standard
- PACE CM1 = high
- PACE CM2 = premium
- PACE CM3 = reference

9. PACE control module – barometric option

Provides absolute pressure option in addition to gauge pressure. In absolute mode adds barometric pressure to gauge pressure range. Pressure control in absolute range is not available for any CM0-B/CM1-B/CM2-B with a gauge range of 700 mbar (10 psi, 70 kPa) or below.

Provides gauge pressure option in addition to absolute pressure. In gauge mode, subtracts barametric pressure from absolute pressure range. Not available for pressure ranges less than 2 bar (30 psi, 200 kPa) absolute

10. Warranty terms

New product is supplied with an initial warranty of 12 months. For peace of mind, you can also extend coverage on your equipment beyond the initial period up to a total four-year term.

11. Physical accessories and related items

Please refer to the PACE Accessories and related items Catalog for full details

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BHCS39605A (03/2026)

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