

PPCH-G™

High Gas Pressure Controller/Calibrator



High Performance Pressure Control
to 100 MPa (15 000 psi)...

INTRODUCTION

PPCH-G™, is a pressure controller/calibrator for gas pressure operation from 1 to 100 MPa (150 to 15 000 psi). As with the rest of **DHI's** PPC family of pressure controllers, the emphasis is on high end performance, minimizing measurement uncertainty and maintaining precise control over a very wide pressure range... in a compact and rugged instrument.

Individually characterized, quartz reference pressure transducer (Q-RPT) modules increase precision and reduce measurement uncertainty. The AutoRange™ feature supports infinite ranging, automatically optimizing all aspects of operation for the exact desired range and taking pressure controller rangeability to a new level.

A unique pressure control system and gas booster accessory provide unlimited, on-demand pressure, very high control resolution and 10:1 pressure control turndown. Five different control modes are included for maximum versatility. Open architecture allows reference pressure measurement to be internal to or remote from the controller. If desired, the reference can be located at the test measurement point and independently removed for recalibration.

With all of this, PPCH-G opens new doors in automated high gas pressure calibration and test applications.



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| <ol style="list-style-type: none"> 1. Indication of pressure "Ready" (green) "Not Ready" (red) condition 2. Current pressure 3. Unit of measure 4. Measurement mode (absolute, gauge) 5. Active Q-RPT (up to four possible) 6. Current deviation from target control value 7. Control mode and status 8. Remote activity indicator | <ol style="list-style-type: none"> A. Select between saved, user defined and default range configurations. B. Select pressure unit of measure. C. Select measurement mode (absolute, gauge). D. Automatically optimize measurement, control and safety features for the exact pressure range and mode of operation. E. View and select active Q-RPT (from up to four in PPC/RPM system). | <ol style="list-style-type: none"> F. Set up and run calibration sequences automatically, with tolerance testing, based on DUT tolerance, range and measurement mode. G. Make automatic fluid head corrections for differences in height between PPCH-G and DUT. H. Run automated pressure cycling function. I. Run leak test function. J. Direct pressure control keys for slewing, jogging and venting pressure. |
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QUARTZ REFERENCE PRESSURE TRANSDUCER (Q-RPT) MODULES

PPCH-G's outstanding pressure measurement specifications are made possible by DHI's exclusive quartz reference pressure transducer (Q-RPT) modules.

Q-RPTs measure pressure by measuring the change in the natural oscillating frequency of a quartz crystal with pressure induced stress. To be qualified for use in a Q-RPT module, each transducer is individually evaluated and characterized using automated primary pressure standards. Only transducers exhibiting required levels of linearity, repeatability and stability are selected. A proprietary compensation model, derived from more than 15 years experience with thousands of quartz pressure transducers, is applied to optimize the metrological characteristics needed in a transfer standard.

PPCH-G can be delivered with a low cost utility sensor for applications in which the high precision and stability of a Q-RPT are not required.

Q-RPTs AVAILABLE FOR PPCH-G

Q-RPT DESIGNATION	SI VERSION MAXIMUM RANGE Absolute/Gauge [MPa]	US VERSION MAXIMUM RANGE Absolute/Gauge [psi]
A100M	100	15 000
A70M	70	10 000
A40M	40	6 000
A20M	20	3 000
A10M	10	1 500
A7M	7	1 000

INFINITE RANGING™ AND AUTO RANGE™

There's a lot more to covering a wide range of test devices with a single pressure controller than "% of reading" measurement uncertainty.

In addition to the necessary measurement uncertainty, PPCH-G offers the full pressure control and feature adaptability that are needed for true rangeability in test and calibration applications.

Infinite Ranging gives PPCH-G unprecedented versatility in adapting to a wide variety of devices to be tested. With the easy to use AutoRange function, a few simple key strokes or a single remote command string at the start of a test adapts every feature of the controller to optimize it for a specific range.

OPEN ARCHITECTURE

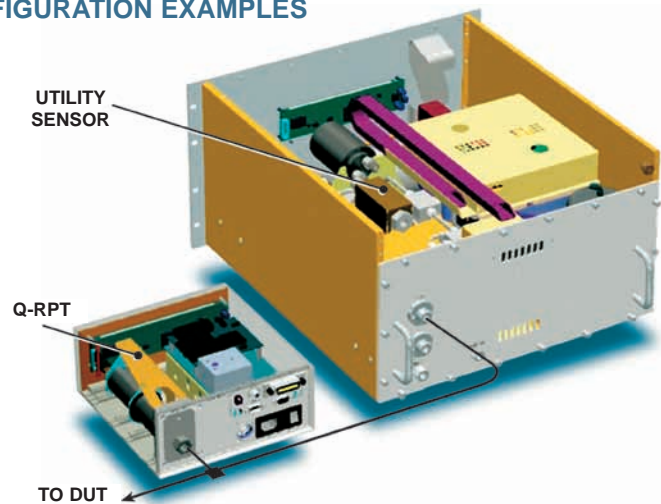
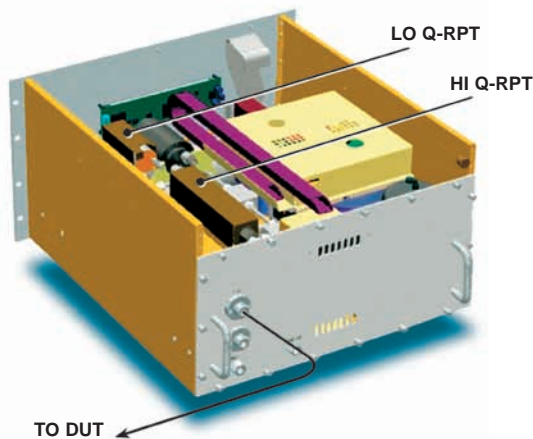
A PPCH-G controller can be configured with up to four Q-RPT modules. These can be internal or external to the PPCH-G controller. External Q-RPTs are in DHI RPM4™ Reference Pressure Monitors. The RPM4's Q-RPTs then become part of the PPCH-G system and are managed by PPCH-G. External Q-RPTs must be disconnected or protected by valves when PPCH-G is used at pressure greater than the external Q-RPT range.

Examples of possible PPCH-G system configurations include:

- A PPCH-G with one or two built-in Q-RPTs to act as a stand alone, "one box" controller/calibrator package.

- A PPCH-G with no internal Q-RPTs and an external Q-RPT to configure a system whose reference pressure measurement is remote from the controller. This configuration is ideal when it is advantageous for the reference to be removed from the system (e.g. for recalibration) while leaving the controller installed or to locate the reference measurement in closer proximity to the device or system under test.
- A PPCH-G with no built-in Q-RPTs to act as a low cost automated pressure setting and controlling device.
- A PPCH-G with a built-in Q-RPT to automate pressure control to a PG7202 piston gauge.

OPEN ARCHITECTURE PPCH-G SYSTEM CONFIGURATION EXAMPLES



FEATURES, FEATURES, FEATURES

PPCH-G includes all the features you expect in today's state of the art instruments and much more... pressure "ready/not ready" indicator with user adjustable criteria... intelligent AutoZero™ function... 16 SI and US pressure units... automatic fluid pressure head correction... on board, programmable calibration

sequences with DUT tolerance testing... remote [ENTER] footswitch for hands free test execution... valve drivers option for system design... automated leak testing routines... RS232 and IEEE-488 communications... FLASH memory for simple and free embedded software upgrades from www.dhainstruments.com.

ORDERING INFORMATION

For a PPCH-G with no internal Q-RPT

PPCH-G-nnnM

Where: **nnnM** Indicates the PPCH-G controller's designation (100M, 70M, 40M or 20M).

For a PPCH-G with one or two internal Q-RPTs

PPCH-G-nnnM AnnnMc1/AnnnMc2

Where: **nnnM** Indicates the PPCH-G controller's designation.
AnnnMc1 Indicates the Hi RPT designation.
c indicates class (s for Standard, **P** for Premium, **u** for utility sensor if there is no Hi Q-RPT).
AnnnMc2 Indicates the Lo Q-RPT designation. (A70M max).
c indicates class (s for Standard, **P** for Premium).
 Leave blank if there is no Lo Q-RPT.

OPTIONS

DESIGNATOR	DESCRIPTION
PPCH-G 04-02	SI units version
PPCH-G 05-01	CE mark
PPCH-G 06-01	Enclosure (for bench applications)
PPCH-G 07	Special calibration
PPCH-G 08-SP	Special fluid

ACCESSORIES

DESIGNATOR	PART NO.	DESCRIPTION
RPM4	see RPM4 brochure	Reference pressure monitor for external Q-RPTs
Footswitch	401886	Remote [ENTER] footswitch
RS232 Cable	100847	9 pin, 2 m for PPC3 COM1 or PPC3 to RPM4 connection
GB-H-152-100M	nnnnnn	Gas booster package, 152:1 for 100 MPa
GB-H-152-70M	nnnnnn	Gas booster package, 152:1 for 70 MPa

SPECIFICATIONS

GENERAL

Power Requirements	85 to 264 VAC, 50/60 Hz, 75 W max
Temperature Range	15 to 35 °C
Vibration	Meets MIL-T-28800D
Weight (Typical)	32 kg approx (70 lb)
Dimensions	30 cm H x 52 cm W x 50 cm D (12 in. x 20.5 in. x 20 in.) with enclosure, also 6U H rack mount
Communications Ports	RS232 (COM1, COM2), IEEE-488.2
Operating Modes	Gauge, absolute
Pressure Ranges	Atmosphere to 100 MPa (15 000 psi)
Operating Media	Nitrogen, air (others optional)
Drive Air Supply	500 to 800 kPa (75 to 120 psi)

Test Gas Supply

Greater than maximum pressure to be controlled by at least 5% of controller range, but not more than 15% greater than controller range, minimum 70% of controller range, ± 1 % stability. Flow adequate to maintain stable supply while slewing into test volume.

Pressure Connections

DRIVE AIR SUPPLY	1/8 in. NPT F
TEST GAS SUPPLY	DH500 (equivalent to AE F250C, HIP HF4)
TEST	DH500

Utility Sensor

Precision/Resolution ± 0.10 % span / 0.001 % span

Drivers

(8) 12V, 1 A max total output

CE Conformance

Available, must be specified

PRESSURE CONTROL

Control Modes

Dynamic (standard and high volume)	Sets target within hold limit and continuously adjusts pressure to remain at target value.
Static	Sets target within hold limit and stops control, allowing pressure to stabilize naturally.
Monotonic	Sets pressure to target and maintains very slow ramp in same direction as pressure increment.
Ramp	Sets and maintains user specified rate of change of pressure.

Piston Gauge Control

Automate piston gauge pressure control.

Control Precision

To ± 0.001 % of Q-RPT span (standard dynamic)

Control Volume

0 to 100 cc, 50 cc optimum (operates in larger volumes but pressure stabilizing time increases)

Slew rate

60 sec. 0 to full scale, 50 cc volume

Dynamic mode

Typical Time to Ready

90 to 150 sec.

Lowest Controllable

Pressure

0.7 MPa (100 psi)

MEASURED AND DELIVERED PRESSURE (Q-RPT)

Warm Up Time	30 minute temperature stabilization recommended from cold power up
Resolution	To 1 ppm, user adjustable
Predicted One Year Stability²	± 0.005 % of reading
Calibration	A2LA accredited calibration report included
Q-RPTs A14M to A100M	
Precision¹	Greater of ± 0.012% of reading or 0.0036% of Q-RPT span ⁵
Measurement Uncertainty³	Greater of ± 0.013 % of reading or 0.004% of Q-RPT span ⁵
Delivered Pressure Uncertainty (Dynamic Mode)⁴	Greater of ± 0.016% of reading or 0.005% of Q-RPT span ⁵

Q-RPTs A7M to A10M

Standard Class

Premium Class

Precision¹

Greater of ± 0.008% of reading or 0.0024% of Q-RPT span⁵

Greater of ± 0.005% of reading, 0.0015% of AutoRanged span or 0.0005% of Q-RPT span⁶

Measurement Uncertainty³

Greater of ± 0.010% of reading or 0.0030% of Q-RPT span⁵

Greater of ± 0.008% of reading, 0.0024% of AutoRanged span or 0.0007% of Q-RPT span⁶

Delivered Pressure Uncertainty (Dynamic Mode)⁴

Greater of ± 0.014% of reading or 0.004% of Q-RPT span⁵

Greater of ± 0.013% of reading, 0.014% of AutoRanged span or 0.003% of Q-RPT span⁶

1. Combined linearity, hysteresis and repeatability.

2. Predicted Q-RPT measurement stability limit (k=2) over one year assuming regular use of AutoZero function. AutoZero occurs automatically in gauge mode whenever vented, by comparison with barometric reference in absolute mode. Absolute mode predicted one year stability without AutoZ is ± (0.005 % Q-RPT span + 0.005 % of reading).

3. Maximum deviation of the Q-RPT indication from the true value of applied pressure including precision, predicted one year stability, temperature effect and calibration uncertainty, combined and expanded (k=2) following the ISO "Guide to the Expression of Uncertainty in Measurement."

Due to a policy of continuous improvement, all specifications contained in this document are subject to change without notice.

AutoRange, COMPASS, Infinite Ranging, PG7000, PG7302, PPCH-G and RPM4 are trademarks, registered and otherwise, of DH Instruments, a Fluke Company.

4. Maximum deviation of the PPCH-G controlled pressure from the true value including measurement uncertainty and standard dynamic mode control hold limit.

5. % of reading applies to 30 to 100 % of Q-RPT span. Under 30 % of Q-RPT span, uncertainty is a constant value obtained by multiplying the % of reading value by 30 % of Q-RPT span.

6. % of reading value times measured pressure from 100 to 30 % of AutoRanged span. Under 30% of AutoRanged span, % of reading value times 30% of AutoRanged span. If AutoRanged span is less than 30% of maximum Q-RPT span, % of reading values times measured pressure, or % of reading times 9% of Q-RPT span, whichever is greater.

Products described in this brochure are protected by US and international patents and patents pending.