

7250 Sys

Ruska Multi-Range Pressure Calibration System

Technical Data

Features

- Fully integrated multi-range pressure test and calibration systems
- Select either an 8 range or the 12 range system for maximum performance and coverage
- Single test port to connect device under test (DUT)
- Pressure ranges to 2 500 psi (170 bar)
- Internal vacuum pump for absolute mode and negative gauge mode operation. Optional internal gas booster for nitrogen source pressure efficiency
- High speed pressure control provides increased throughput
- Automatic range switching
- MET/CAL[®] driver available
- Languages: English, French, Chinese, German, Japanese, Spanish and Italian



The third-generation in multi-range pressure calibration systems

For over 35 years, Ruska, now under the name Fluke Calibration, has supplied multi-range pressure calibration systems. These systems provided maximum performance over a wide pressure range and relieved the customer of the need to utilize internal resources to configure a comprehensive pressure calibration system.

These systems consisted of multiple pressure controllers multiplexed to a single test port with automatic range switching and included ancillary components required for operation, such as vacuum pumps for sub atmospheric pressure control and gas boosters for high pressure systems.

The 7250 Sys represents a significant advancement in performance and capability coupled with a size reduction and cost saving design.

The 7250 Sys is based on Ruska's popular Series 7250 digital pressure controllers featuring our unique quartz sensor that provides unmatched precision and long term stability.

The 7250 Pressure Controllers also utilize digital control valve technology that provides fast response pressure control with zero overshoot allowing separate repeatability and hysteresis checks of the DUT.

Applications

The 7250 Sys multi-range pressure calibration system is a complete, turn-key systems ideally suited for the test and calibration of the following:

- Pressure sensors
- Pressure transmitters
- Pressure transducers
- Pressure switches
- Pressure gauges

Three different 7250 Sys configurations are available depending on performance and pressure range requirements:

- Eight ranges to 1 000 psi (70 bar)
- Eight ranges to 2 500 psi (170 bar)
- Twelve ranges to 2 500 psi (170 bar)

Although each of the above configurations includes multiple pressure ranges and controllers, the 7250 Sys has a single point of operation featuring a color, Active Matrix display. The 7250 Sys can also be operated via PC with the included IEEE-488 interface.

All supporting subsystems, such as a vacuum pump, gas pressure booster, pressure regulators and power distribution are integrated into a single bay cabinet with easy access doors, cooling fans, and casters.

Performance and flexibility

The 7250 Sys multi-range pressure calibration systems provide a fully integrated and automated calibration solution that can include either eight or 12 pressure ranges for maximum performance over a wide pressure range.

The eight range system for pressures to 1 000 psi (70 bar) provides a total 2 sigma uncertainty of 0.01 % of reading from 3 psi (0.2 bar) to 1 000 psi (70 bar) based on a one year calibration interval. From 0 to 3 psi (.2 bar) the total uncertainty is a fixed error of 0.0004 psi (0.028 mbar) per year. Total uncertainty includes precision (repeatability, linearity, hysteresis, and temperature effects), span stability over one year, the uncertainty from the calibration standard and the uncertainty from National Institute of Standards and Technology (NIST).

For pressures to 2 500 psi (170 bar) two configurations are available. In the 8 Range configuration, the total two sigma uncertainty is 0.01% of reading from 8 psi (0.5 bar) to 2 500 psi (170 bar). For pressures from 0 to 8 psi (0 to 0.5 bar), the total uncertainty is a fixed error of 0.001 psi



The 7250 Sys features a unique fused-quartz sensor. This rugged transducer offers unequalled precision and a stability of 0.0075% of reading per year.

(0.07 mbar).

For maximum pressure range coverage and performance, a 12-range system for pressures up to 2 500 psi (170 bar) is available. This system provides a total two sigma uncertainty of 0.01 % of reading from 0.5 psi (35 mbar) to 2 500 psi (170 bar). For pressures from 0 to 0.5 psi (0 to 35 mbar), the total uncertainty is a fixed error of 0.00005 psi (0.003 mbar).

Pressure control

The 7250 Sys controls pressure to the commanded set-point in 30 seconds, or less, without overshoot, allowing separate repeatability and hysteresis testing of the device under test.

The digital control valve technology utilized in the series 7250 Sys provides the following control stability:

8 range 7250Sys to 1 000 psi (70 bar)

- 0.0006 psi to 60 psi (0.04 mbar to 4 bar)
- 0.01 psi from 60 psi to 1 000 psi (0.7 mbar from 4 bar to 70 bar)

8 range 7250Sys to 2 500 psi (170 bar)

- 0.0015 psi to 150 psi (0.1 mbar to 10 bar)
- 0.025 psi from 150 to 2 500 psi (1.7 mbar from 10 bar to 170 bar)

12 range 7250Sys to 2 500 psi (170 bar)

- 0.0001 psi to 10 psi (0.007 mbar from 0.7 bar)
- 0.0015 psi from 10 to 150 psi (0.1 mbar from 0.7 bar to 10 bar)
- 0.025 psi from 150 to 2 500 psi (1.7 mbar from 10 to 170 bar)

The 7250 Sys also offers passive control mode that allows the operator to define a control band—once the set-point is within the control band the system will automatically turn off the controller. In a leak free, thermally stable environment, passive mode contributes no additional control noise providing optimum performance.

Each of the three available configurations above is capable of controlling pressure from -14.5 psig (-1 bar) to full scale (FS) in gauge mode, and from 0.2 psi (13.7 mbar) to FS in absolute mode into a load volume up to 1 000 cubic centimeters (60 cubic inches). Sub-atmospheric pressure control is provided by the internal vacuum pump that is equipped with an auto-vent valve to prevent contamination of the system in the event of power loss and a muffler for quiet operation.

Internal pressure regulation

The 7250 Sys requires a single pressure supply from a nitrogen or clean, dry air source. The supply can accommodate up to 3 000 psi (200 bar) since the 7250 Sys includes pressure regulators for each individual range in the system. For systems that include the optional gas booster, a shop air supply is required.

Master system controller

7250 Sys system activity is monitored and controlled by a single master system controller (MSC). The MSC allows the operator to enter a desired set-point pressure in up to 12 different pressures units and seven different languages. Internally the 7250 Sys will automatically control the pressure and change ranges both upscale and downscale to provide the highest performance pressure measurement and control to the DUT.

The MSC provides the operator with an Active Matrix color display, and user friendly menus. Multipoint test routines can be programmed into the MSC for high volume calibrations. The MSC also includes a jog/step mode function, useful for testing mechanical type devices. When the absolute mode is selected, or a negative gauge pressure commanded, the MSC automatically activates the internal vacuum pump to allow sub-atmospheric pressure control.

Alternatively, the 7250 Sys can be connected to a PC via the IEEE-488 interface. Syntax commands are based on the SCPI format and sample programs are included in the manual (optional MET/CAL driver is available).

Single test port and reference port

The 7250 Sys features a single test port to connect the DUT. All eight, or twelve ranges are automatically switched to the common system test port. The 7250 Sys also has a single reference port for the entire system. This can be left open to atmosphere, or for applications where the device under test is placed in a environmental chamber for combined pressure and temperature characterization, it can be connected to the chamber so that the DUT and 7250 Sys are referenced to the same ambient pressure. When the Vacuum Reference option is selected, a second vacuum pump evacuates the reference port for absolute mode operation.

Vacuum system

The 7250 Sys includes one internal vacuum pump to allow sub-atmospheric pressure control for testing negative gauge devices and absolute mode devices. An optional DUT absolute zeroing mode is available that will directly connect the vacuum pump to the test port for absolute mode zeroing of the DUT. The vacuum pump is mounted on vibration isolators to prevent vibrations from being transmitted to the system components. The vacuum pump is automatically activated from the master system controller when a negative gauge pressure is commanded, or when the system is used in absolute mode.

Gas booster

The 7250 Sys can include an optional Gas Booster mounted in the bottom of the cabinet on vibration isolators. This option is highly recommended for 7250 Sys configurations for pressures to 2 500 psi (170 bar). The gas booster will boost a standard nitrogen or clean, dry air bottle to the required pressure for the system, even when the bottle pressure drops to 500 psi (35 bar), insuring maximum usage and efficiency of the gas bottle supply. When this option is selected, the 7250 Sys requires a shop air supply at approximately 100 to 120 psi (7 to 8 bar).

Cabinet

The 7250 Sys is provided in a compact 483 millimeters (19 inches) single bay cabinet with casters for easy positioning. Cabinets are equipped with ventilation louvers and fans to prevent excessive heat buildup in the cabinet. Internal components are easily accessible through rear doors and removable side panels.



The 7250 Sys includes all items required for a turn-key, ready to use, pressure calibration system.

Specifications

General	
Electrical power	Specify 115 or 230 V ac, 50/60 Hz, 30 Amp
Temperature	Operating: 18 °C to 35 °C (64 °F to 95 °F) Storage: -20 °C to 70 °C (-4 °F to 158 °F)
Humidity	5 % to 95 % RH, non-condensing
Weight	8 range: < 115 kg (250 lb) 12 range: < 127 kg (280 lb)
Dimensions (H x W x D)	All configurations: 122 cm x 56 cm x 76 cm (48 in x 22 in x 30 in)
Pressure medium	System supply: nitrogen Gas booster: shop air
Display	TFT, VGA, active matrix, 162.5 mm (6.4 in) 640 x 480 resolution, 65,000 colors
Test port and reference Port	1/4 in NPT female
Shop air	For systems with gas booster: 1/4 in NPT female
Warm up time	2 to 3 hours; may be left on indefinitely
Pressure ranges (three available configurations)	
8 range 7250 Sys System for pressures to 1 000 psi (70 bar)	
8 range 7250 Sys System for pressures to 2 500 psi (170 bar)	
12 range 7250 Sys System for pressures to 2 500 psi (170 bar)	
Modes	
Gauge mode	
Negative gauge mode	
Absolute mode through barometric reference sensor (standard)	
Absolute mode through vacuum pump attached to the reference port (optional). Requires second vacuum pump that is mounted inside the cabinet. For systems that also include a gas booster, the booster must be placed outside the cabinet.	
Performance	
Precision	<p>8 range to 1 000 psi (70 bar): 0.006 % of reading from 3.75 psi to 1000 psi (260 mbar to 70 bar) 0.0002 psi (0.014 mbar) from 0 psi to 3.75 psi (0 mbar to 260 mbar)</p> <p>8 range to 2 500 psi (170 bar) 0.006 % of reading from 10 psi to 2 500 psi (0.7 bar to 170 bar) 0.0006 psi (0.04 mbar) from 0 psi to 10 psi (0 bar to 0.7 bar)</p> <p>12 range to 2 500 psi (170 bar) 0.006 % of reading from 0.65 psi to 2500 psi (45 mbar to 170 bar) 0.00004 psi (0.003 mbar) from 0 psi to 0.65 psi (1 mbar to 45 mbar)</p>
Stability	0.0075 % of reading per year
Control stability	See Pressure Control section on page 2
Barometric reference (standard)	0.002 psi (0.14 mbar) maximum error per year
Vacuum reference (optional)	10 mtorr maximum error per year. If selected, this option requires a second vacuum pump.
Control parameters	Volume: 80 c³ to 1000 c³ (5 in³ to 60 in³) Low control limit: 0.2 psia (13.8 mbar)
Calibration	
A calibration report with traceability to NIST is provided with the system. Fluke Calibration calibrates all 7250 Sys to 1 000 psi (70 bar) with the Model 2465 gas piston gauge and the Model 2470 gas piston gauge for ranges higher than 1 000 psi (70 bar). A NVLAP accredited calibration is available as an option.	

Total uncertainty	
8 range to 1 000 psi (70 bar)	<p>3 psi to 1 000 psi (205 mbar to 70 bar). 0.01 % of reading</p> <p>0 psi to 3 psi (0 mbar to 205 mbar): 0.0004 psi (0.027 mbar)</p>
8 range to 2 500 psi (170 bar)	<p>8 psi to 2 500 psi (0.5 bar to 170 bar). 0.01 % of reading</p> <p>0 psi to 8 psi (0 bar to 0.5 bar): 0.001 psi (0.07 mbar)</p>
12 range to 2 500 psi (170 bar)	<p>0.5 psi to 2500 psi (35 mbar to 170 bar). 0.01 % of reading</p> <p>0 psi to 0.5 psi (0 mbar to 35 mbar): 0.00005 psi (0.003 mbar)</p>
Total uncertainty is based on one year re-calibration interval.	
Expression of Total Uncertainty conforms with the recommendations of the ISO Guide to the Expression of Uncertainty in Measurement.	
Communications	
IEEE-488 included. Remote syntax is SCPI format.	
Ruska Series 7215 and 7010 emulation are standard.	
Languages	
The Series 7050 Sys is capable of displaying menus and functions in: English, French, Chinese, German, Japanese, Spanish and Italian	
Options	
<p>Gas booster drive air: 100 to 120 psi (7 to 8 bar) shop air minimum bottle (nitrogen) input of 500 psi (35 bar)</p> <p>Vacuum reference (requires second vacuum pump)</p> <p>DUT absolute zeroing mode</p> <p>MET/CAL driver</p>	
Precision	
Precision is defined as the two sigma, RSS of linearity, repeatability and hysteresis throughout the operating temperature range.	



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