

Hydraulic Pressure Tester

Model PT-3070

- Simple test set-up and operation
- Small footprint
- Tilting color touch-screen for data input
- Up to 100 programmable test sequences
- 0-1000 psi pressure range (0-2000 psi optional)
- Precise control of pressure, volume & flow rate
- Uses distilled water as pressure media
- Automatic system purge and fill
- Printer port and RS-232 communication port
- Capable of high flow rates, up to 1000 cc of continuous volume delivery
- Optional multi-port manifolds for simultaneous testing of 5 to 20 devices
- Interfaces with Compliance Test Fixture to measure balloon diameter during testing

GENERAL INFORMATION

Interface Associates' **Hydraulic Pressure Tester**, Model PT-3070 is a compact bench top system designed to test catheter tubing, fittings and elastomer balloons in a wide range of sizes. A variety of high-pressure tests can be performed requiring pressure cycles with a specific sequence, magnitude and number of repetitions. Test profiles are user programmable with several generic templates stored in the memory of the unit. The system is designed to allow for easy modifications to existing templates offering ultimate flexibility in designing your own test protocols. The functions such as program recall and storage, parameter selection and parameter numeric value input are accomplished through menu driven soft keys on the touch-screen. The system records measurements of pressure, volume, flow rate, time and balloon diameter.

OPERATION

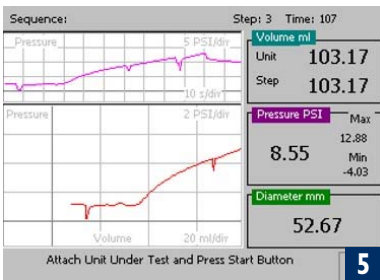
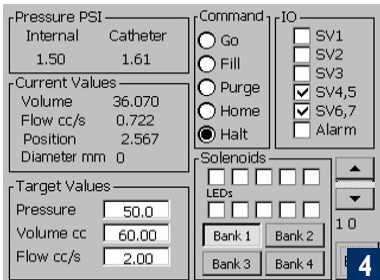
The PT-3070 is ideally suited for testing small plastic pressure retaining components such as welded or bonded plastic components and tubing assemblies that are typically encountered in many disposable medical devices, i.e. balloon catheters. Tubing, small valves, fittings, balloons, etc. can be tested for burst, leak, fatigue, pressure or volume compliance and flow resistance. The unit can measure and plot pressure and volume compliance of elastomeric balloons, measure inflation and deflation times of balloon catheters, such as PTCA and PTA, and determine stent deployment characteristic, etc.

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SYSTEM DESCRIPTION

The PT-3070 uses dual, double acting hydraulic cylinders powered by a robust linear actuator to develop desired test pressures or volumes. High accuracy pressure transducers, together with position encoders, ensure precise delivery of pressure media, i.e. distilled water, into the tested device. A bank of high-pressure solenoid valves controls both filling and discharge of the hydraulic cylinders. During the purge and fill cycle the machine automatically draws water from an external reservoir to fill the hydraulic cylinder. Due to their double-acting nature, the cylinders are capable of continuous delivery of up to 1,000 cc of water. This feature is especially useful when performing cycle life testing of multiple devices (up to 20 pieces) connected to multi-port manifolds.

The unit is housed in a sturdy metal enclosure with a sloping front panel (figure 1). A tilting color touch-screen serves both as data input during programming and as a numeric and graphic display during the test. Additional push-button switches on the front panel control the routine functions such as Start Test, Reset, and Main Power. All pressure, electrical and communication connections are on the rear panel.

The standard unit comes fully equipped with drivers and connectors to accommodate optional devices such as a printer; Balloon Compliance Test Fixture, Multi-port Manifold Module (figure 3), temperature controlled water bath and the Laser Measurement System* (figure 2).

* See additional information regarding the Laser Measurement System on the back page.

OPERATION

The test set-up and system operation is very simple. The operator is guided by instructions presented on the touch-screen display. By pressing the appropriate icons the unit performs system purge and fill. Several standard programs reside in the unit. Recalling a standard program, modifying it, and then storing it again as a new program can quickly create new test protocols. Password protection is provided to prevent unauthorized access. The functions such as program recall and storage, parameter selection, value input, and unit of measure are accessed through menu driven soft keys on the touch-screen. A sample control screen is shown in figure 4 and a sample data graph is shown in figure 5.

The unit offers ultimate flexibility in designing your own test protocols. The user can select from basic parameters such as time interval, pressure and volume and build individual program "steps". Each "step" has a so called "exit condition" that must be met before program moves to the next step. Individual steps can be added up to form a "group". Additionally, there can be a "loop function" performed on each "step" or "group" up to 99 times for each step or group. In this fashion a variety of test protocols can be devised such as ramp, staircase, staircase with zero pressure pause between steps and cycle or fatigue test.

MULTI-PORT MANIFOLD MODULE (optional)

The 5-port Manifold Module (figure 3) is a bench top system controlled by the PT-3070 to test either finished catheter balloons or semi-finished sub-assemblies. The module allows the operator to easily place the balloons in a temperature controlled water bath to measure compliance. The manifold swivels 90 degrees about the horizontal axis, so each port can be easily accessed. A set of collets is supplied to accommodate different sizes of tubing.

Each port is fitted with a miniature high-pressure solenoid valve. Therefore each individual port can be automatically isolated from the rest of the system during a test. In the event of a failure or burst of one or more devices, the test of the remaining devices continues unaffected. LED indicator lights above the port indicate status of the port as “active” or “isolated”. The test pressure level and number of test cycles for each port is electronically reported to the central unit for test report printout.

SAMPLE OF TEST REPORT DATA

Date: 5-07-2005 Time: 16:46:07
 Test Name: 2241-6_stR63C5
 Run Number: 63

Number of Steps 10
 Pressure (psi) Start: 10.00 Increment: 10.00
 Volume (ml) Start: 200.00
 Diameter (mm) Start: 0.00
 Pressurization Rate (ml/s): 1st: 2.00 2nd..+ : 0.20
 Pressurization Drop Alarm (psi): 5.00
 Settling: Time (s) 100.0, Flow Rate (ml/s) 0.10, Alarm (ml) 1.00
 Hold: Time (s) 1.0, Drop Alarm (psi) 10.00, Decay Alarm (psi/s) 2.00

UNIT5 Selected

Step	Time Sec	PRStrg psi	VOLtrg ml	Hld dP psi	Stl dV ml	Pk-Prs psi	Prs@Hld psi	Vol@Hld ml
1	450	10	200	0.14	0.061	9.83	9.77	4.78
2	458.2	20	200	0.3	0.046	19.84	19.7	5.32
3	464.8	30	200	0.5	0.056	29.83	29.69	5.68
4	470.6	40	200	0.72	0.055	39.8	39.59	5.95
5	478.2	50	200	0.53	0.077	49.81	49.66	6.19
6	487.8	60	200	0.47	0.085	59.84	59.61	6.42
7	495	70	200	0.45	0.066	69.84	69.66	6.6
8	504.6	80	200	0.53	0.089	79.84	79.64	6.8
9	512.8	90	200	0.41	0.083	89.91	89.83	6.97
10	522.6	100	200	0.59	0.106	99.83	99.59	7.16

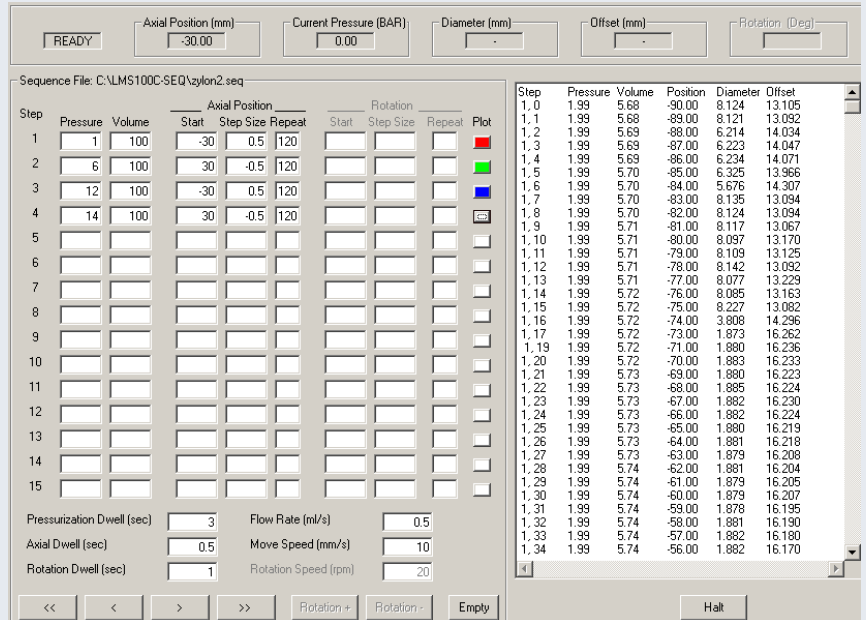
Test Finished

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SPECIFICATIONS

Dimensions: 10"W x 12.5" H x 18.5" D
Weight: 19.5 Kg (43.0 lbs)
Electrical Power: 100/110/220/240 VAC
 50 or 60 Hz, 1000 W
Air Supply: 100 psi (0.7 Mpa)
 dry filtered air
Output Pressure Range: 1.0 to 1000 psi
 (0.0068 - 13.6 Mpa)
 (2000 psi optional)
Output Volume Range: .002cc to 1000 cc
Output Flow Rate Range: 0.2 to 10cc / s
Pressure Accuracy: 1.0 psi (6.8 Pa)
Pressure Resolution: 0.1 psi (0.68 Pa)
Volume Accuracy: 0.02 cc
Volume Resolution: 0.001 cc
Flow Rate Accuracy: 0.06 cc / s

Example of Laser Measurement System in conjunction with the PT-3070



Example of Balloon Profile with the Laser Measurement System

