Uson 628

Operator's Manual

Uson

for good measure

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Preface

Please read this Operating Manual carefully before putting your 628 into service, especially all safety related **WARNINGS and CAUTIONS** throughout the manual.

About this manual

The purpose of this manual is to inform the operator how to connect, wire, operate, maintain, and troubleshoot the 628 Tester.

Intended Use

This tester is intended to be used in an indoor, industrial environment by suitably trained personnel.

Equipment Needed

- Master Part-Must be a known good part and be identical and of same material as production parts (for calibration).
- Leak Master (for calibration).

Document History

- **11-30 -2017:**Revision 1.0. Initial release.
- **03-01-2019:** Revision 2.0. Added Electronic Regulator, Second fill step, Program Linking option details (Software version 1.0.5).
- **03-08-2021:** Revision 3.0 General improvements and corrections (Software version 1.0.9).

1 Safety

1.1 Introduction

This section explains the warnings and cautions that should be observed before using, wiring, installing, or operating the Uson 628.

Safety information is covered at relevant points throughout the manual. Please read this manual in its entirety before installing/wiring or operating the instrument. Should any point remain unclear, contact your supplier for assistance before proceeding.

This tester is intended to be used in an industrial environment by suitably trained personnel.

1.1.1 Using this Manual

The instructions in this manual are intended to assist qualified personnel for correct installation, wiring, operating, adjusting, servicing, maintaining, and troubleshooting of this tester.

1.1.2 Safety Alert Symbols

WARNING: Informs users of potentially hazardous situation, such as personal injury or death and/or severe equipment damage, if instructions are not followed.

CAUTION: Informs user of potential hazards to equipment if instructions are not followed and may invalidate the warranty.

NOTE: Helps user perform task.

1.2 Safety Precautions (English)

Electrical and Pneumatic (or air pressure) hazards are two primary concerns when operating the Uson 628. Observe the following safety precautions before using this product or associated equipment.

WARNING: If the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

WARNING: Avoid Personal injury and/or Equipment Damage. Tested parts must be secured in place mechanically or be enclosed/covered to avoid personal injury or equipment damage. Securing tested parts with air couple devices only, is NOT sufficient. Loss of power or air pressure, or multiple reset/abort inputs while the vent step is running will immediately de-energize any couple/clamp valves

WARNING: This instrument is capable of supplying high-pressure air. Before commencing any component tests, ensure that the system is guarded to local health and safety standards.

WARNING: Always wear eye protection when working with pressurized air. Disconnect all pressure sources when working with internal components of Uson equipment:

WARNING: The component to be tested, and the air supply line to the Uson 628, must be free from water or liquid residue before testing; otherwise damage may be inflicted on the sensitive transducer within the instrument.

WARNING: Uson 628 operates on 24VDC from a power supply supplied by Uson, which must be connected to an earthed (grounded) power supply of 100-240VAC 50/60Hz.

WARNING:.The covers on the equipment should be removed only by personnel trained to avoid the risk of electric shock. The power supply to the equipment must be switched off and disconnected before removing any covers.

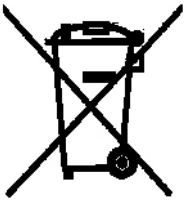
WARNING: Do not substitute the fuse rating. Always use the correctly rated fuse, failure to do so may be hazardous and can cause damage to the equipment.

WARNING: Do not make or break external connectors or connections while the Uson 628 is switched on.

1.3 WEEE Material Disposal

Uson is committed to meeting the requirements of the European Union (EU) Waste Electrical and Electronic Equipment (WEEE) Directive. Uson products that are within the scope of the Directive are labelled with a crossed-out "wheelie-bin" symbol, as required by the Directive. It indicates that the product was placed on the market after August 13, 2005 and that end users should segregate the product from other waste at end-of- life.

The detailed requirements vary considerably throughout the EU, and the Uson WEEE compliance approach varies among countries.



1.4 Abbreviations

Abbreviation	Definition
RTC	Real Time Clock
BCD	Binary Coded Decimal
LVD	Low Voltage Directive
EU	European Union
EMC	Electromagnetic Compatibility
RHOS	Restriction of Hazardous Substances
I/O	Input/Output
EOC	End of Cycle
DC	Direct Current
SC	Sealed Component.
REF	Reference
USB	Universal Serial Bus
PLC	Programmable Logic Controller
ISO	Isolated
FAT	File Allocation Table
ADC	Analogue to Digital Convertor

EU Declaration of Conformity

Uson

1. **Product model: Uson 628**

2. **Name and address of the manufacturer or his authorised representative:**

   Uson L.P.
   8640 North Eldridge Parkway
   Houston, Texas 77041, USA
   281- 671-2000
   ServiceUS@uson.com

3. **This declaration of comformity is issued under the sole responsibility of the manufacturer.**

4. **Object of the declaration:**

   Equipment: Air Leak Tester
   Brand name: Uson
   Model/type Uson 628

5. **The object of the declaration described above is in comformity with the relevant Union harmonization Legislation:**

   Electromagnetic Compatibility Directive (EMC) 2004/108/EC (EN 61326-1:2013)
   Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU
   Low Voltage Directive (LVD) 2006/95/EC

6. **References to the relevant harmonised standards used or references to the other technical specifications in relation to product which conformity is declared:**

   LVD: Exempt – +24VDC Product (Power supply shipped with unit is CE marked)

   EMC: IEC 61000-4-2: (2009)
   IEC 61000-4-3: (2006) + A1(2007) + A2(2010)
   IEC 61000-4-4: (2012)
   IEC 61000-4-5:(2014)
   IEC 61000-4-6:(2014)
   IEC 61000-4-8:(2009)
   IEC 61000-4-11:(2010)
   EN 55011 Emission Class A (2009)+A1(2010) (Radiated and Conducted Emissions)

   RoHS: EN 50581:2012:2012

7. **Signed for and behalf of:**

   Uson L.P. Houston, Texas: **Date of Issue:** 7 Sept 2017

   David O. Oliveaux, President

Document Control # : 690025A

Uson

产品模型 (Product): Uson 628

关于符合中国《电子信息产品污染控制管理办法》的声明
Management Methods on Control of Pollution from Electronic Information Products
(China RoHS declaration)

产品中有毒有害物质的名称及含量

部件名称 (Parts)	有毒有害物质或元素 (Hazardous Substance)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
机箱子组件 Chassis subassembly	○	○	○	○	○	○
电源 Power Supply	○	○	○	○	○	○
印刷板组件 Printed Board Assemblies (PBA)	○	○	○	○	○	○
LCD 显示 LCD Display	○	○	○	○	○	○
金属部件 Metal Parts	○	○	○	○	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006标准规定的 限量要求以下。
○：Indicates that this hazardous substance contained in all homogeneous materials of this part is below the limit requirement in SJ/T 11363-2006.
×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准 规定的限量要求。
×：Indicates that this hazardous substance contained in at least one of the homogeneous materials of this part is above the limit requirement in SJ/T 11363-2006.
对销售之日的所售产品,本表显示我公司供应链的电子信息产品可能包含这些物质。注 意：在所售产品中可能会也可能不会含有所有所列的部件
This table shows where these substances may be found in the supply chain of our electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product.

2 Introduction

2.1 Uson 628 Overview

The Uson 628 is a differential pressure decay tester that is easily configurable to test a wide range of components using the Differential Pressure Decay method. The tester uses the highly sensitive and reliable Uson differential pressure transducer to measure leak rate within a test component.

For normal operation, the operator simply connects the component to the tester's test port and then presses Start. The Tester determines the leak rate within a test component by pressurizing the component and measuring any pressure variation between the component and a reference volume, using a differential pressure transducer. A pass or reject result is indicated on the front panel LEDs and the leak measurement is displayed on the front panel display.

The programs can be configured from the front panel using seven tactile keys, making it simple to operate. The programs are stored, to enable tests to be selected and run by an operator without knowledge of the programming procedure.

Features:

- Simple menus
- Differential pressure drop measurement
- Pressure or Vacuum versions available
- Manual or Electric Pressure Regulation.
- 30 programs
- Statistics can be displayed or printed
- Date and time facilities
- Program copy
- Data transfer by USB memory device

Applications

The testers can be used in almost any leak testing application, some typical examples are:

Typical Applications	
Water Pumps	Medical Tube Sets
Heat Exchangers	Bottle Tests
Fuel Pumps	Blood Bags / Ostomy Pouches
Steering Racks	Domestic Appliances
Hydraulic Components	Packaging
Valves	Castings
Combustion Chambers	Pressure Switches

2.2 Specifications

Model	Uson 628
Description:	Differential Pressure Decay Tester
Regulator	Manual or Electronic

Differential Sensor

Sensor Type: Capacitive differential pressure sensor

Resolution: 0.0001 psi, 0.01 mbar, 1 Pa.

Range: 0 to 0.3psi, 0 to 20mbar, 0 to 2000 Pa.
Accuracy: ±1% of full scale range

Gauge Sensor

Sensor Type: Solid State Sensor

Range:
0 to -14.5 psi, 0 to -1.00 bar, 0 to -100 kPa
0 to 15 psi, 0 to 1 bar, 0 to 100 kPa
0 to 60 psi, 0 to 4 bar, 0 to 400 kPa
0 to 150 psi, 0 to 10 bar, 0 to 1 MPa
0 to 225 psi, 0 to 15 bar, 0 to 15 MPa

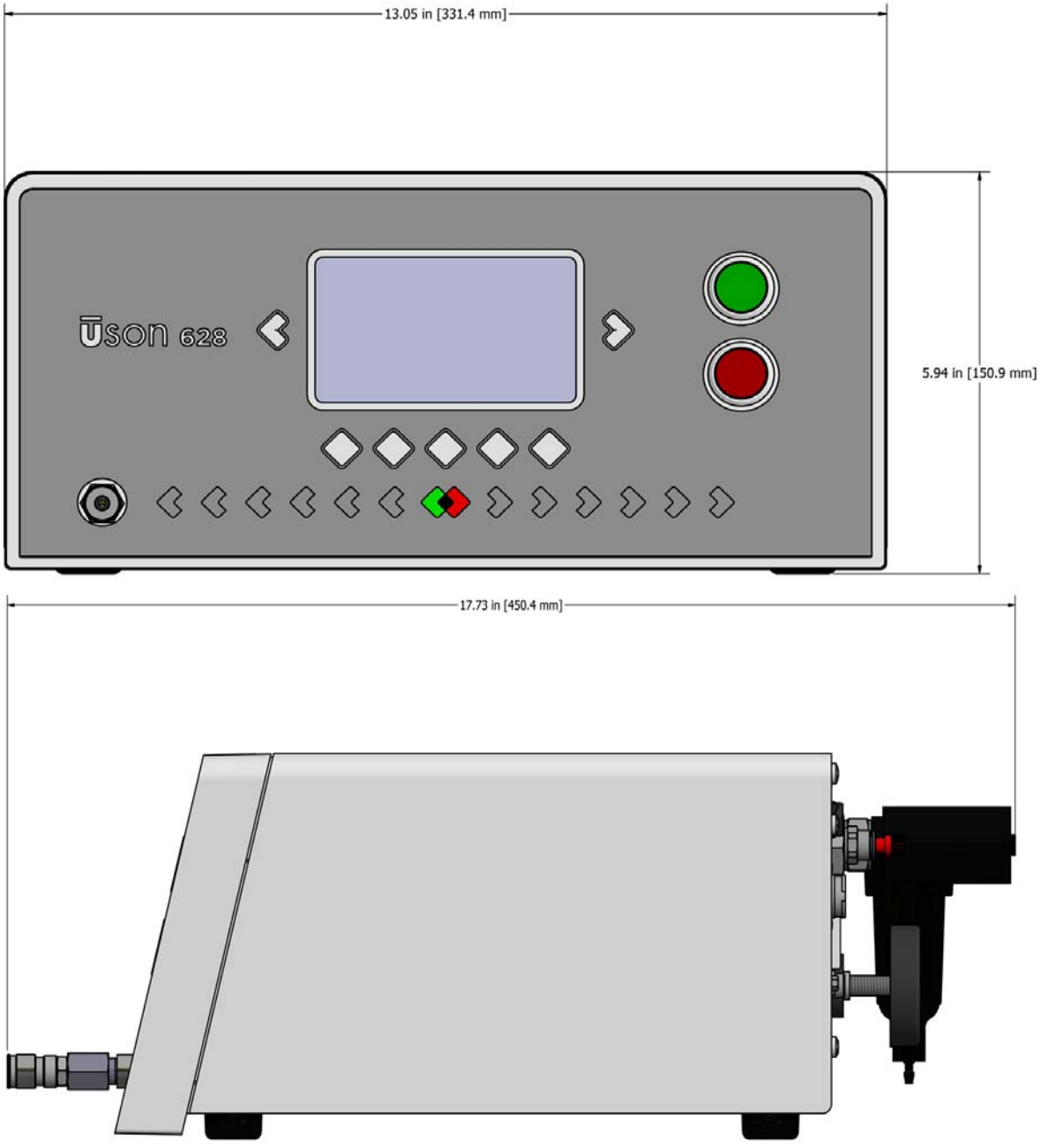
Accuracy: ±1% of Gauge pressure range

Step times:	0.0 to 5000.0 s
Measure time:	0.1 to 5000.0 s
Reject Level:	Adjustable down to 0.5% of range.
Statistics:	Pass, Reject, Abort, and Total Counters. Min, Max, Av.Pass, Av.Reject values
Programs:	30 test programs.
Dimensions:	(HWD) 150.9mm x 331.4 mm x 450.4 mm (5.94” x 13.05” x 17.73”)
Weight:	10kg / 22 lb.
Interfaces	RS232, USB, PLC I/O Control
Pressure Units	psig, bar, mbar, Pa, kPa, kg/cm², mmH2O, cmH20, inH2O, mmHg, cmHg inHg
Operating Temperature:	5°C to 40°C (41°F to 104°F)

Input Power Requirement:	24 Volt DC 1.5A, 36W
Fuse Rating:	T5.0A/250V, 20mm Glass Fuse
Pneumatic Supply:	Clean, dry air, 5 to 16 bar. Particulate matter <25 microns Dew point 17 ^{o}C, Oil mist <0.1mg/m3
Couple Port	Output pressure 5 bar ±0.5 bar.
Serial Port:	Baud rate; 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Parity; none, odd, even Data Bits; 7, 8 Control; none, RTS/CTS

USON reserves the right to change the specification without notice.

Figure 2–1: 628 Overall Dimensions



2.3 Front Panel Overview

2.3.1 Front Panel

Figure 2–2 shows the Uson 628's front panel controls/connections, while *Table 2–1* describes their functions.

Figure 2–2: Uson 628 Front Panel Overview

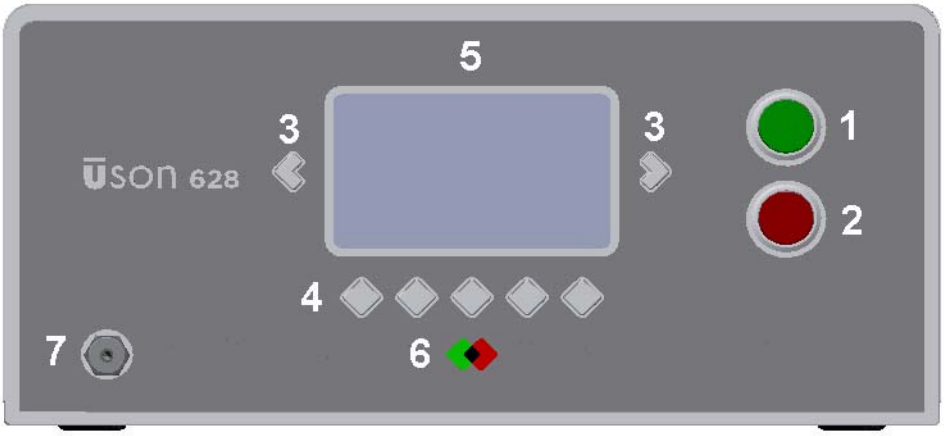


Table 2–1: Uson 628 Front Panel Descriptions

Item#	Connection/Control	Description
1	**Start Button**	Starts a test cycle or updates the selected value when editing parameters.
2	**Abort Button**	Resets or aborts a test cycle or reverts the selected value when editing parameters.
3	**Left/Right Keys**	Selects the next or previous displayed parameter.
4	**Function Keys**	Functions available for the displayed menu or parameter.
5	**Display**	A character Liquid Crystal Display (LCD) that displays the tester's state, function, mode, and parameter settings.
6	**Result Indicator**	Test cycle pass and reject indicators, On or Off.
7	**Calibration Port**	Used to connect a standard leak or calibration instrument to the test circuit for calibration.

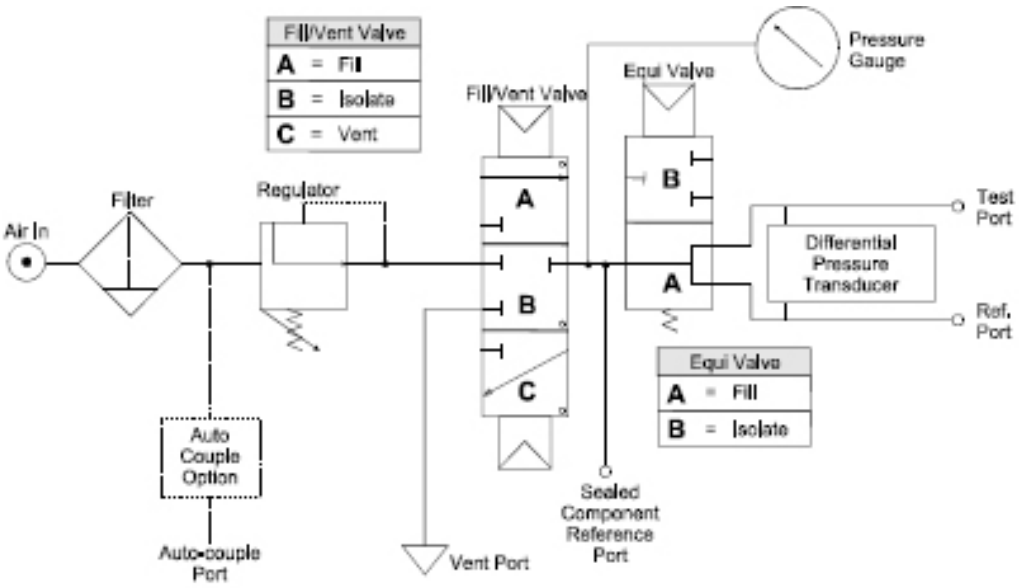
2.4 Pneumatic Configuration

The Uson 628 employs two pneumatically controlled valves to supply compressed air (or other gas) for leak testing a component.

The valves operate in a programmed sequence, to pressurize a test component and a reference component or chamber. The test and reference components are then isolated from each other and a differential transducer is used to monitor the pressure difference between the two ports.

A leak in the test component results in a pressure change, which is used to decide whether a leak in the test component is within a specified tolerance.

Figure 2–3: Pneumatic Configuration



2.4.1 Component Operation

Filter: A coalescing filter is fitted to protect the internal pneumatic components by reducing the oil content to 0.01 PPM and removing 0.01 µm particles from the inlet air supply.

Regulator: A pressure regulator is used to set the required test pressure.

Fill/Vent Valve: The Fill/Vent Valve connects the test component, via the Equalization Valve, in the open state, to either atmosphere, via the vent port, or to the regulator to charge the test component to the test pressure, or isolates the pressure within the test component.

Equalization Valve: The Equalization Valve, in the closed state, isolates the Test and Reference ports and holds the pressure within the test component during the Measure step. In the open state, the test component is connected to the Fill/Vent Valve.

Differential Pressure Transducer: The Differential Pressure Transducer measures the pressure difference between the test and reference ports during the Measure step and is used to indicate the leakage of the component connected to the test port.

Couple Valve: The couple valve is used to provide the pneumatic signal for a coupling device, which, when selected, is activated for the duration of the test cycle.

Pressure Gauge: The Pressure Gauge Transducer measures the test pressure within the component and is used to check that the test pressure is within the pre-set tolerance.

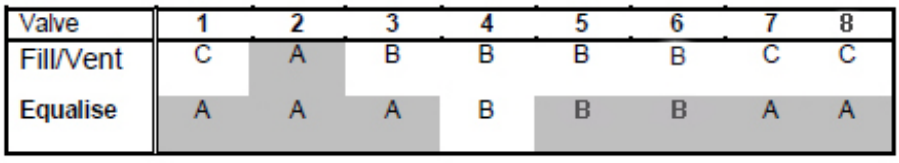
2.4.2 Leak Test Cycle

A leak test cycle consists of the following steps, which are controlled by the parameters of the selected program:

ID	Test Step	Description
1	**Couple**	Pressurizes the couple port on the rear panel and can be used to activate external devices (e.g., optional auto-coupler). The Couple phase time must be set to allow the external device to operate prior to the test component being Pressurized. The Couple output is maintained for the duration of the test. If a Couple Phase is set, an equal Uncouple time is set after the test phase.
2	**Auto Zero**	Vents the sensors to atmosphere and updates zero.
3	**Fill and Fill 2**	The Fill/Vent Valve changes to position A to pressurize the test component to the preset test pressure.
4	**Stabilize**	The Fill/Vent Valve changes to position B to isolate the test component from the test pressure and allows the pressure within the test component to Stabilize for a preprogrammed time.
5	**Equal**	A fixed 0.3 s delay to allow the equalization valve to change to position B to isolate the test and reference port.
6	**Measure**	During this phase, the instrument compares the pressures at the test and reference ports. The test fails if the pressure drop between the two ports is outside a programmed tolerance. The test result is indicated on the display, the result outputs and information is logged when enabled.
7	**Vent***	The Fill/Vent Valve changes to position C and the Equalization Valve changes to position A. The test pressure is vented and the display returns to Ready.
8	**Uncouple**	The external couple device is released.

***Note:** At the start of the vent phase, if the Couple output is enabled, a safety check is performed to check that the minimum safe pressure level is reached before releasing the output.

Figure 2–4: Valve Timing



3
Installation/Wiring

3.1 Installation

3.1.1 Unpacking

The standard tester is supplied with the following components. If any component is missing please contact your supplier:

- User manual
- Power Supply Unit
- Calibration Certificate

3.1.2 Location

- Locate the tester as near as possible to the test component in order to keep the internal volume to a minimum.
- The tester's operating temperature range is 5°C to 40°C (41°F to 104°F), with a humidity range of 0 to 90% non-condensing. To avoid temperature variations, install the tester away from heaters and draughts. Failure to do so may affect repeatability of the readings.
- Insulating the connecting test pipe work is recommended.
- Place the tester on a horizontal support that is free from vibration, and where there is free access to the front panel controls and rear panel connectors.

3.2 Wiring/Connections

WARNING: Adhere to all warnings outlined in Section 1, Safety.

WARNING:
1) Uson 628 operates on 24VDC from a power supply which must be connected to an earthed (grounded) power supply of 100-240VAC 50/60Hz.
2) The covers on the equipment should be removed/replaced only by personnel trained to avoid the risk of electric shock.
3) Do not plug the Uson 628's into an electrical power supply until all installation, wiring, servicing/adjusting, wiring, etc. procedures have been completed; and all enclosures are in place.

WARNING:
1) Always use the correctly rated fuse. Do not substitute the fuse type or rating.
2)Do not make or break external connectors or connections while the Uson 628 is switched on.

WARNING: When using a pneumatic couple device with the Uson 628, take care to ensure that both the couple and the component are adequately restrained.

3.2.1 Rear Panel

Figure 3–1 shows the Uson 628 back panel component layout, *Table 3–1* describes the electrical components' functions, *Table 3–2* describes the pneumatic components' functions.

Figure 3–1: .Uson 628 Rear Panel Overview

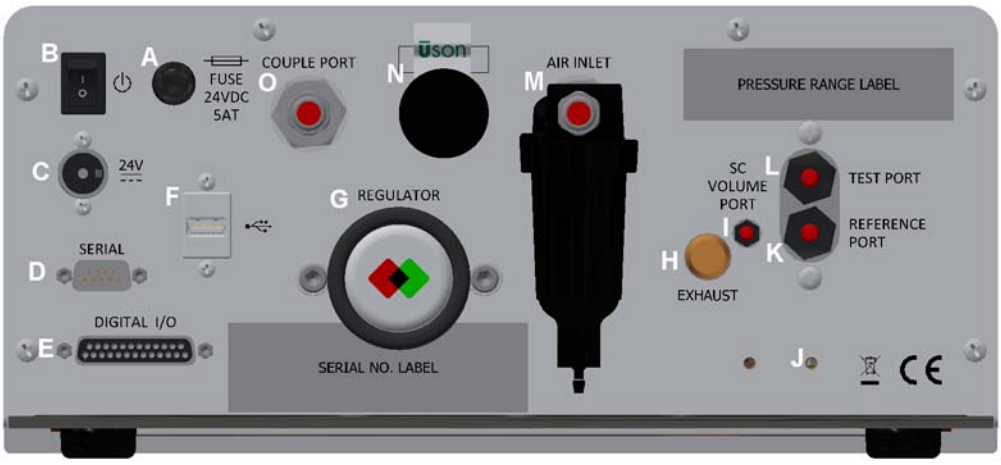


Table 3–1: Description of Rear Panel Electrical Connections

Item	Connection/Control	Description
A	**Fuse**	The main inlet fuse T5.0A/250V, 20mm, glass.
B	**On/Off Switch:**	Used to switch the tester On/Off.
C	**Power Supply Connector**	24V DC inlet power connection.
D	**Serial Port**	9-pin male, D type connector for connection to an optional serial printer or other external serial data collection device.
E	**I/O Control**	25-pin female D type connector for connecting to the optional remote unit, or any other external device requiring access to the Program selection, Start and Reset inputs, and/or the Pass, Reject, End of cycle, and Alarm outputs.
F	**USB 2.0 Host**	Used for logging test results, Exporting/Importing Data, and Firmware update. Note: FAT 32 formatted devices only.

Table 3–2: Description of Rear Panel Pneumatic Connections

Item	Connection/Control	Description
G	**Regulator**	Controls the test pressure for manual regulated versions.
H	**Vent Port**	Vents test air.
I	**SC Port**	Usually left blank.
J	**External Valve Mounting Point:**	For use with External valve option kit 620090.
K	**Reference Port**	Usually left blank.
L	**Test Port**	Connects to the component to be tested.
M	**Air inlet port and filter**	The compressed air supply entering the instrument must be clean and dry, a high-quality filter/regulator kit is recommended to improve quality.
N	**Pneumatic Option Port**	This port is used for the following pneumatic options: 1. External Vent Valve pilot port. 2. Vacuum venturi exhaust port. 3. Vacuum Inlet port for optional external vacuum supply.
O	**Couple Port**	This provides a controlled pilot air supply at 5 bar (72 PSI) to seal a pneumatic coupling to the test component. It incorporates a safety interlock, which holds the pressure in the event of a power failure. The couple port pressure is maintained until the end of the test cycle.

3.2.2 Power Supply

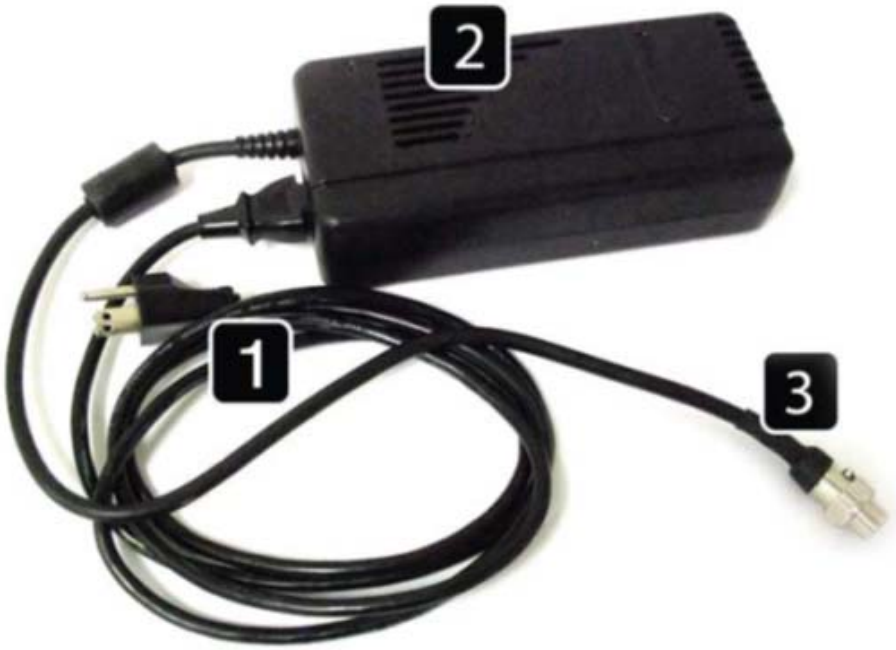
WARNING: The tester operates on 24VDC from a power supply that must be connected to an earthed (grounded) power supply of 100-240VAC 50/60Hz.

WARNING: Turn off the AC mains supply and the tester's power switch (on the rear panel) before connecting the power supply (PSU).

WARNING: The power lead plug is the disconnect device; it must be accessible in an emergency.

- The Uson 628 is powered by an external 24V DC power supply **(2)** supplied with a mains cable **(1)** appropriate for the country of use.
- The PSU AC mains inlet connector must be connected to the AC supply using an appropriate power lead.
- The nominal power supply requirement is 90 - 260V, 50/60Hz, 3.2A max.
- The power lead must be less than 3m (118")
- The PSU DC outlet connector **(3)** must be connected to connector C on the Tester's rear panel. See *Figure 3–1* & See *Figure 3–2*.

Figure 3–2: Power Supply



3.2.3 Power Supply Specifications

Input

- Voltage: 100 to 240V AC
- Current: 3.2A Max
- Frequency: 47 to 63 Hz.

Output

- Voltage: 24V DC.
- Current 5.4A max
- Power 70 W

General

- Weight: 0.4 Kg / 0.8 lb net
- Dimensions (D) x (W) x (H): 190 x 85 x 50 mm /7.5 x 3.4 x 2.0 in

3.2.4 Connections

The mains inlet socket is an IEC320-C14.

The DC outlet is a 5 way circular connector for connecting directly to the tester.

The pin connections are:

Pin	Connection
1,2,3	0V DC
4,5	+24V DC
Shield	Ground

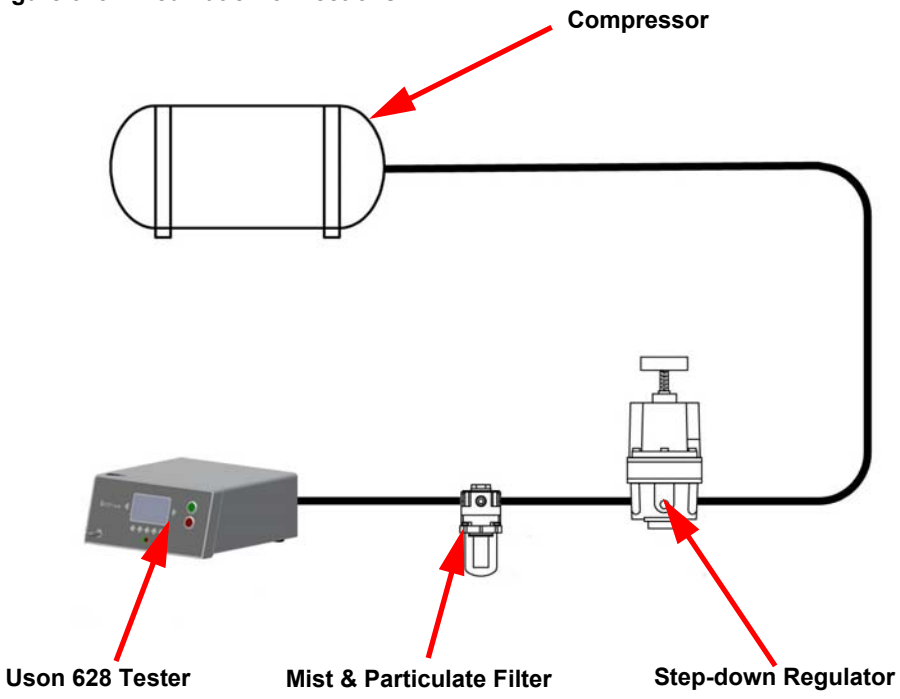
3.2.5 Pneumatic Connections

WARNING: To avoid damaging the transducer, before testing, ensure the component to be tested, and the air supply line to the Uson 628, are free from water or liquid residue. The use of an external dump valve or an in-line filter is recommended for contaminated components.

WARNING: DO NOT omit the exhaust fitting connection. DO NOT run exhaust to the interior of the enclosure as this could injure personnel and damage the tester.

- The test component, air supply, and vacuum supply (if required) should be connected to the appropriate ports using the tubing provided.
- The owner is responsible for step-down pressure regulation if the available supply pressure exceeds the tester's input limit.
- The air supply to the tester must be clean, dry, and free from contamination; it's recommended that an external filter/regulator should be fitted to improve the quality of the air supply to the tester. See *Figure 3–3*.
- The air inlet pressure must be within these minimum and maximum limits: **Minimum:**6 bar (80 PSI) or 1.5 bar (20 PSI) above the test pressure, whichever is the greater; **Maximum:** 17 bar (255 PSI).
- The pressure regulation knob and spindle must be fitted to the regulator body. See *Figure 3–1*. (Manual version only.)

Figure 3–3: Pneumatic Connections



3.2.6 Serial port connection

Port “D", on the rear panel (see *Figure 3–1*), provides a serial data output for use with external devices. The default Communication’s Protocol is 9600 baud, 1 start bit, 8 data bits, 1 stop bit, and No parity. *Figure 3–3* shows the serial interconnections between the tester and a serial printer using 9 and 25-way D Type connectors and to a PC using a 9-way connector.

The output format is controlled by the serial parameter in the set up menu.

Table 3–3: Serial Port Interconnections

Tester Port D Male 9-way, D Type	Printer Female 25-way, D Type	Printer Male 9-way, D Type	PC Male 9-way, D Type
1 Not connected			
3 TxD	3 RxD	2 RxD	2 RxD
2 RxD			3 TxD
4 Not connected			
5 GND	7 GND	5 GND	5 GND
6 Not connected			
7 RTS			8 CTS
8 CTS	20 DTR	4 DTR	7 RTS
9 Not connected			

3.2.7 I/O Connector E

The I/O control connector is a 25-pin female D type connector for connecting to the optional remote unit, or any other external device requiring access to the Program selection, Start and Reset inputs, and/or the Pass, Reject, End of cycle, Ready, and Alarm outputs.

The I/O connector is designed to interface with the optional 690210 Remote control unit and provides access to the following functions:

- Program selection.
- Start & Reset control.
- Pass & Reject outputs.
- Ready, Alarm, & End of cycle outputs.

In many cases, the I/O Control functions are sufficient for additional control of both manual and automatic test rigs. thereby reducing the need for a PLC.

See *Table 3–4*.

Table 3–4: I/O Port Descriptions

Pin	I/O Function	Pin	I/O Function	Pin	I/O Function
1	OV ISO Return	9	OV ISO Return	17	Reset Input
2	+ Reject	10	Prog E Input	18	Prog F Input
3	- Reject	11	Prog A Input	20	Ready
4	Pass Output	13	24v Isolated Supply	21	0V Isolated Return
6	Prog D Input	14	OV ISO Return	22	End Of Cycle
7	Prog C Input	15	Switch Enable	23	End Of Cycle
8	Prog B Input	16	Start Input	24	Alarm
				25	Alarm

3.2.8 Isolated Power Supply

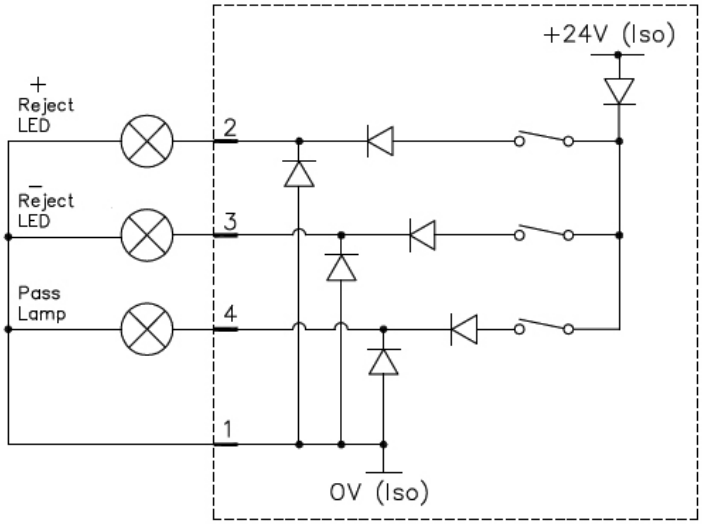
The interface is powered by an internal isolated 24V DC to DC converter and is rated at 5 Watts continuous use, or 8 Watts for a 50% duty cycle. This supply can be used to power an external device like a lamp or a relay.

3.2.9 Result & Ready Outputs

The Pass, Reject Max, Reject Min, and Ready outputs are provided as 24V DC outputs to drive the lamps of the remote unit. The outputs mimic the operation of the Tester's front panel indicators. *Figure 3–4* shows the circuit for the Remote Unit. The Ready Output indicates when the tester is ready to perform a test cycle.

The maximum contact rating is 24V at 50mA per output and a minimum current of 1mA.

Figure 3–4: Remote Unit Circuit



Notes:

All diodes for protection.

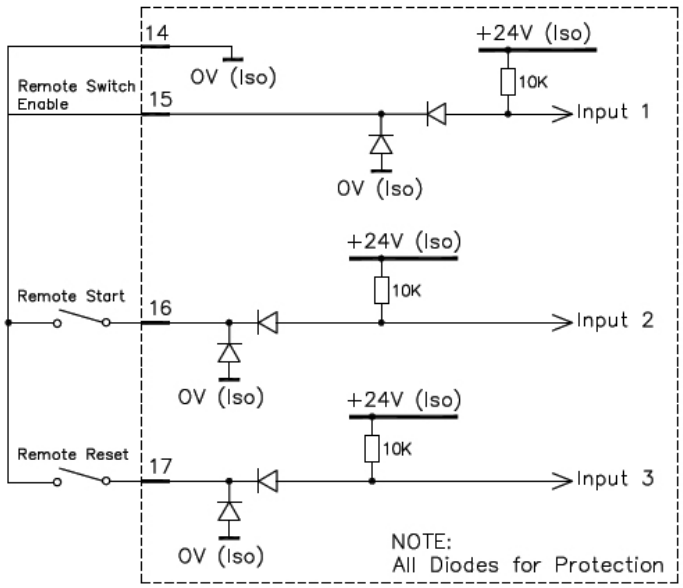
(Iso) = Isolated voltage source from main PSU.

3.2.10 Start/Reset/Enable Inputs

The remote control inputs allows the user to remotely control the operation (refer to the Setup start method for further details.) The Start input is negative edge triggered. The pulse should be held low for at least 500ms. Nominal input sink rating at 24VDC is 10mA per input.

Figure 3–5 shows the input circuit for Start & Reset inputs.

Figure 3–5: Start/Reset Input Circuit



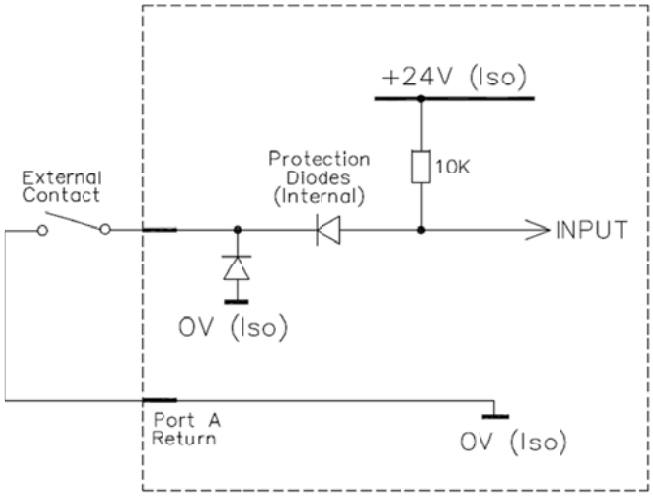
Notes:
All diodes for protection.

3.2.11 Program Selection

The Remote Program Selection option allows the user to remotely control the selection of individual programs.

Each input controls a 24V relay as shown in *Figure 3–6*.

Figure 3–6: Program Selection Inputs



Binary Input Coding

The inputs are binary weighted where contact closure =1. *Table 3–5* shows example binary codes for program selection. Nominal current sink rating at 24V DC is 10 mA per input.

Table 3–5: Binary Encoding for Program Selection

Program	E.10:2^4	E.6:2^3	E.7:2^2	E.8:2^1	E.11:2^0
Invalid	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
Input	E	D	C	B	A

BCD Input Coding

The inputs are BCD weighted where contact closure =1. *Table 3–6* shows example codes for program selection.

Table 3–6: Program Selection for BDC Encoding

	BCD Tens		BCD Units			
Program	**E.18:2^1**	**E.10:2^0**	**E.6:2^3**	**E.7:2^2**	**E.8:2^1**	**E.11:2^0**
Invalid	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
8	0	0	1	0	0	0
10	0	1	0	0	0	0
15	0	1	0	1	0	1
30	1	1	0	0	0	0
Input	F	E	D	C	B	A

3.2.12 Alarm/ End-of-Cycle Outputs

These outputs are provided as volt free relay contacts. *Figure 3–7* shows the output circuit. Maximum contact rating is 24V at 50mA per output and a minimum current of 10mA is required.

The Alarm Relay closed contact indicates a system fault or an error, including power loss. An Alarm is maintained until a Reset is performed to clear the error.

The end of cycle relay closes momentarily, typical duration of 500 ms at the end of a test cycle to indicate the test has completed and results outputs have been updated.

Figure 3–7: Alarm & End-of-Cycle Outputs

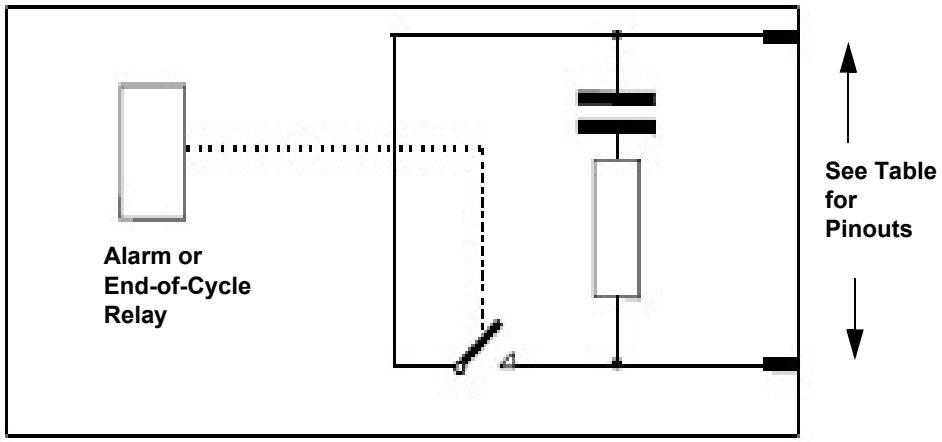


Figure 3–8: Output Timing Diagram - Single Test Program

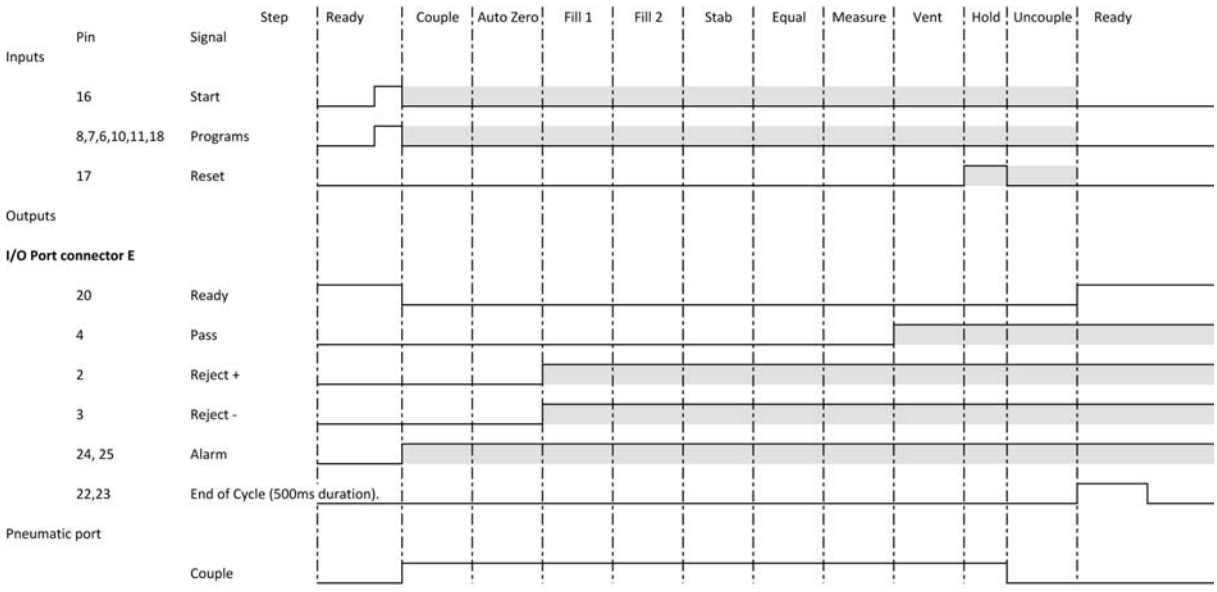


Fig x - Signal Timing Diagram: Single program test cycle

Note: 1 Indicates possible state changes during the test cycle.
2 Remote start and program selections must cleared before the test cycle has been completed.
3 Minimum Input duration 50mS.

Figure 3–9: Output Timing Diagram- Linked Programs

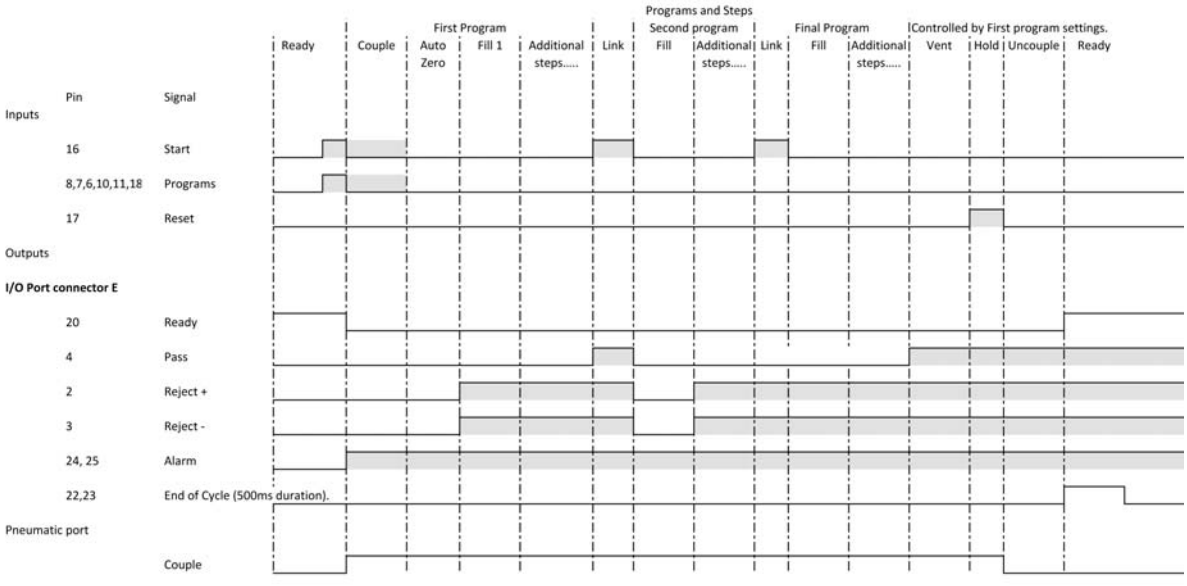


Fig x - Signal Timing Diagram: Single program test cycle

Notes: 1 Indicates possible state changes during the test cycle.
2 Remote start and program selections must cleared before the test cycle has been completed.
3 Minimum Input duration 50mS.

4
Getting Started

4.1 Introduction

Effective operation of the Uson 628 tester depends on programmers' and operators' proficiency in five areas:

- Understanding pressure and flow in the test environment
- Understanding Uson 628's components and capabilities
- Test program development and optimization
- Program Mode menu screens and options
- Run Mode menu screens and options

WARNING: Avoid personal injury/death/severe equipment damage. Only qualified engineers and technicians are to install, wire, setup, and commission the Uson 628.

4.2 Turning the Tester On/Off

WARNING: Adhere to all warnings outlined in Section 1, Safety.

CAUTION: Before switching the tester ON, make sure the power supply is located in a position where it will be open to air flow and stable.

- After all I/O, power, and pneumatic connections are complete, the tester is ready to be powered on. See *Figure 3–1*.
- After power is applied to the tester, the tester performs a boot-up sequence, then opens up in the Run Mode Home screen. This start-up process completes in less than one minute.

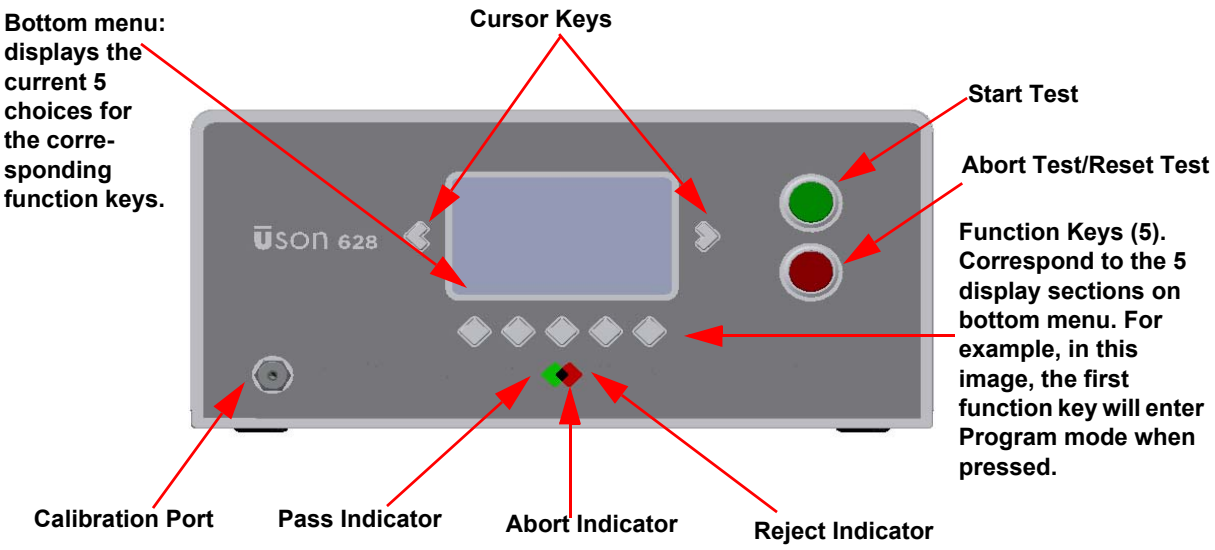
To Turn Tester On

1. Turn the AC power to the PSU **On**.
2. Turn the Tester power switch **On** (located on the rear panel of the tester), the Run Mode Main Screen displays, as shown:

4.3 Menu Navigation

4.3.1 Front Panel Controls

Figure 4–1: Uson 628 Front Panel



4.3.2 Key Pad

The Uson 628 key pad functions are described in *Table 4–1*.

Table 4–1: Key Pad Description

Item#	Connection/Control	Description
1	**Start Button**	Starts a test cycle or updates the selected value when editing parameters.
2	**Abort Button**	Resets or aborts a test cycle or reverts the selected value when editing parameters.
3	**Left/Right Keys**	Selects the next or previous displayed parameter.
4	**Function Keys**	Functions available for the displayed menu or parameter.
5	**Display**	A character Liquid Crystal Display (LCD) that displays the tester's state, function, mode, and parameter settings.
6	**Result Indicator**	Test cycle pass and reject indicators, On or Off.
7	**Calibration Port**	Used to connect a standard leak or calibration instrument to the test circuit for calibration.

4.3.3 Menu Toolbars

The Uson 628 has the following modes of operation:

Run Mode: Allows the user to perform a test.

Program Mode: Allows the user to configure the instrument and to set the operating parameters for a test.

See Charts 1-1 to 1-3 for the menu visual hierarchy.

4.3.4 Data

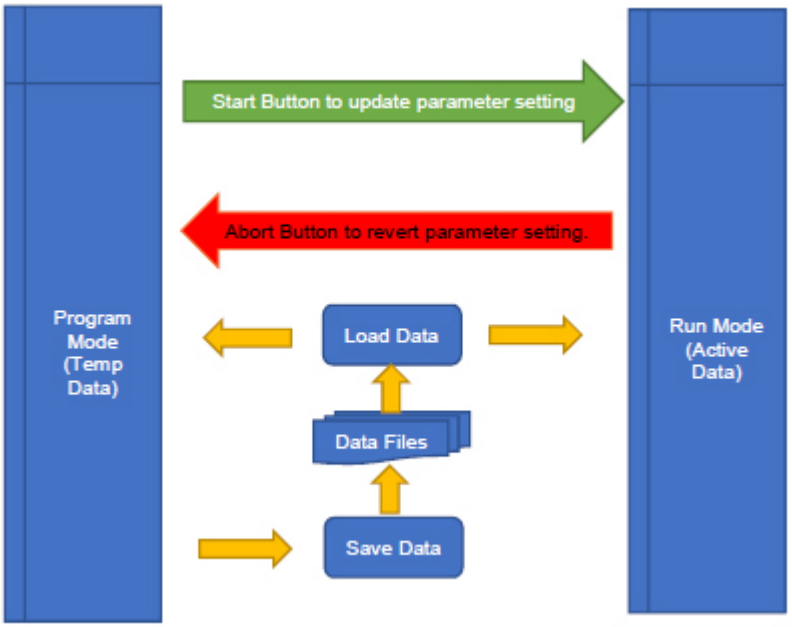
The diagram below shows the data flow for loading and saving data to memory.

Program and Run mode have separate copies of parameters called temp and active data respectively.

The parameters are loaded into both data areas on power up (note only one program is held in memory and currently defaults to program 1).

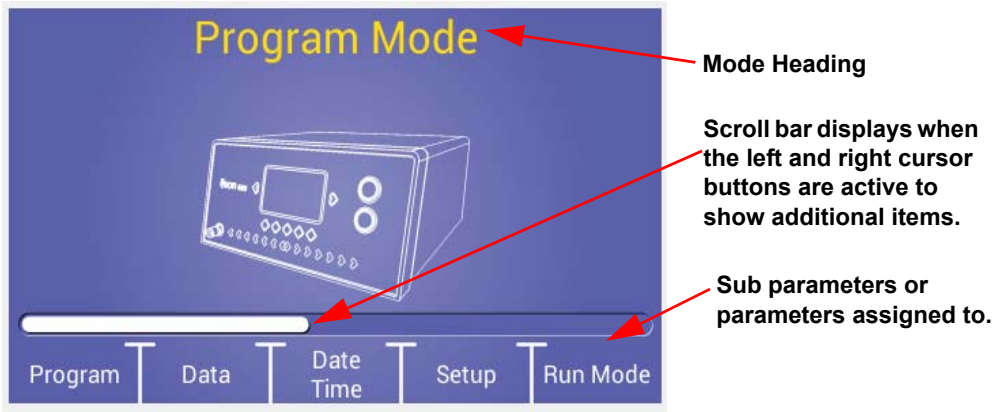
The program data is updated when changing the program selection (i.e., via the front panel, program mode, or remote, depending upon setup selection).

In program mode, all changes are applied to temp data. The Start (green) and Abort (red) buttons update the active data or reverts the temp data back to the active data settings. All changes are automatically saved to the file system on selecting Run Mode.



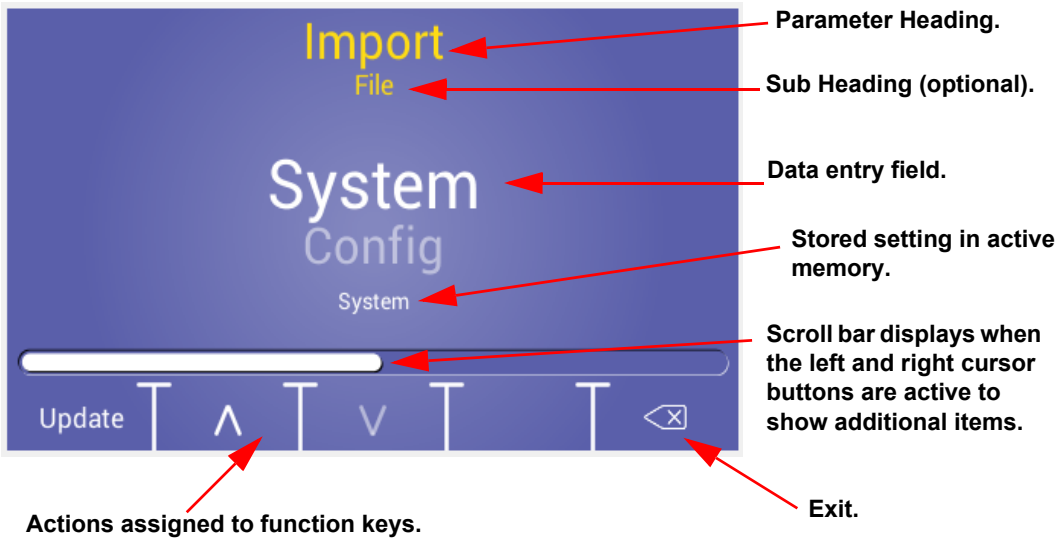
4.3.5 Menu Selection

The general menu navigation layout and selection is shown below:



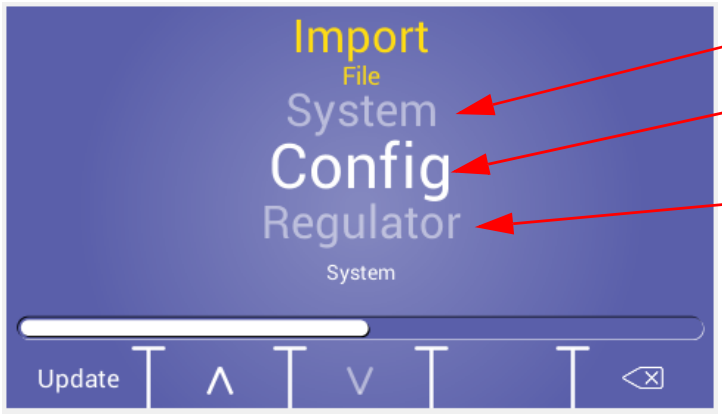
4.3.6 Parameter Entry Screen

The general layout for data entry is shown below:



Selection List Entry

The picture below shows a typical entry screen for predefined list of options:



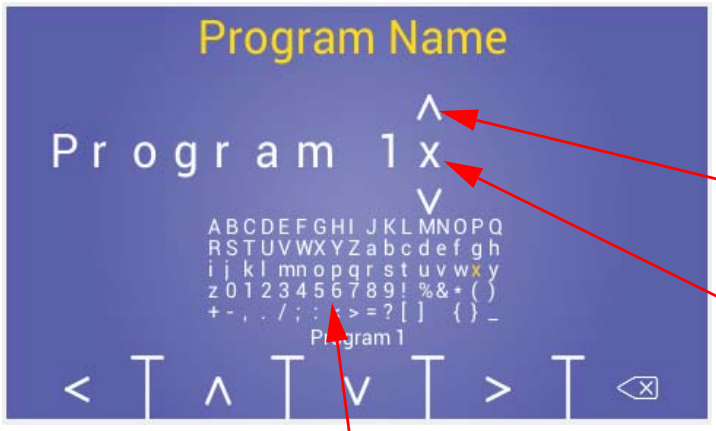
Next selection by down function key.

Current selection.

Next selection by up function key.

Text Entry

The picture below shows a typical entry screen for text parameters:



Use the <> keys to select next or previous position and to enter character selection.

Cursor position selected by <> cursor keys.

Current entry.

Change value using function keys.

Use the function keys to navigate the character menu.

Numeric Entry

The picture below shows the screen layout for numeric entry:

Cursor position selected by <> function keys.

Current entry displayed fixed format and units depending on parameter.

Change value using up/ down function keys.

Logs Review

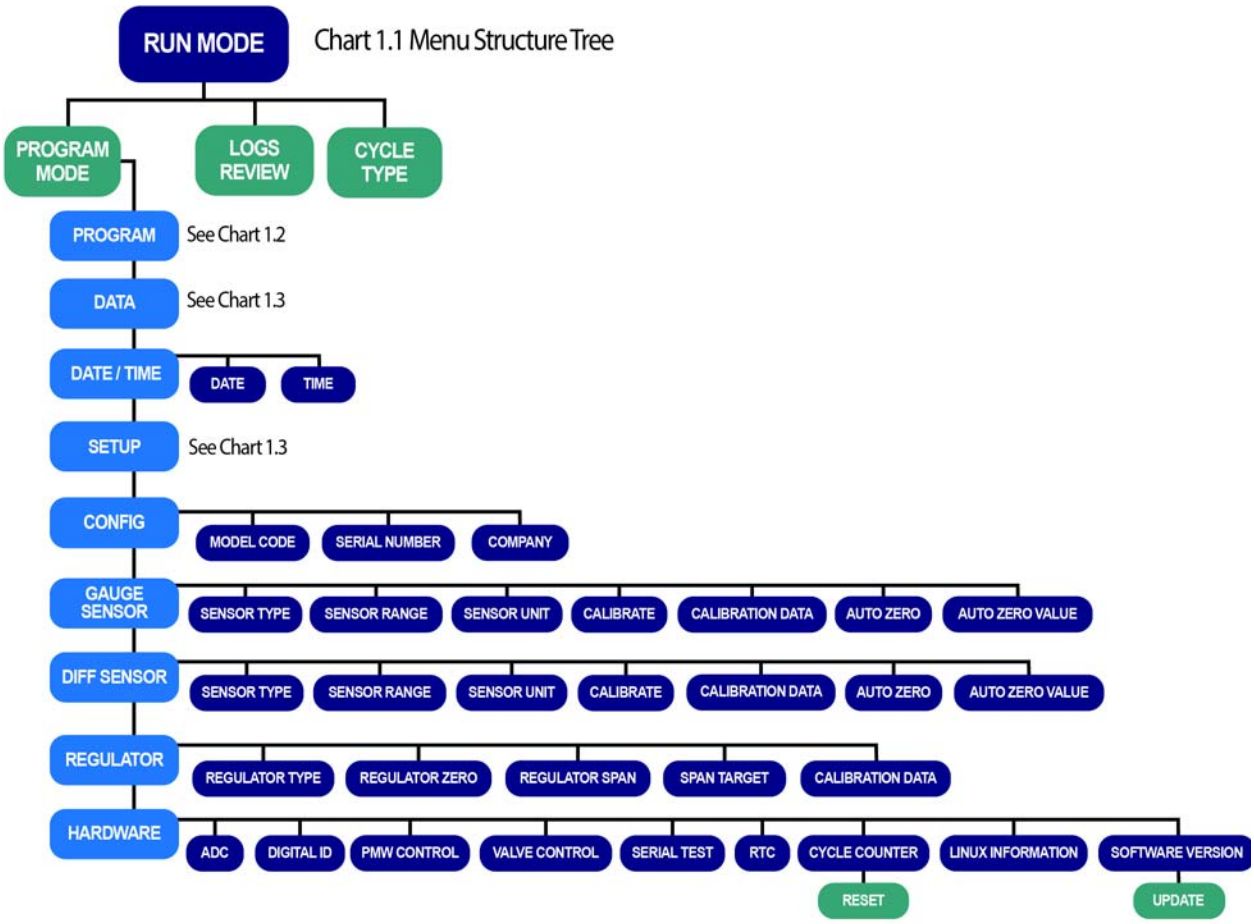
The picture below shows the screen layout for log review:

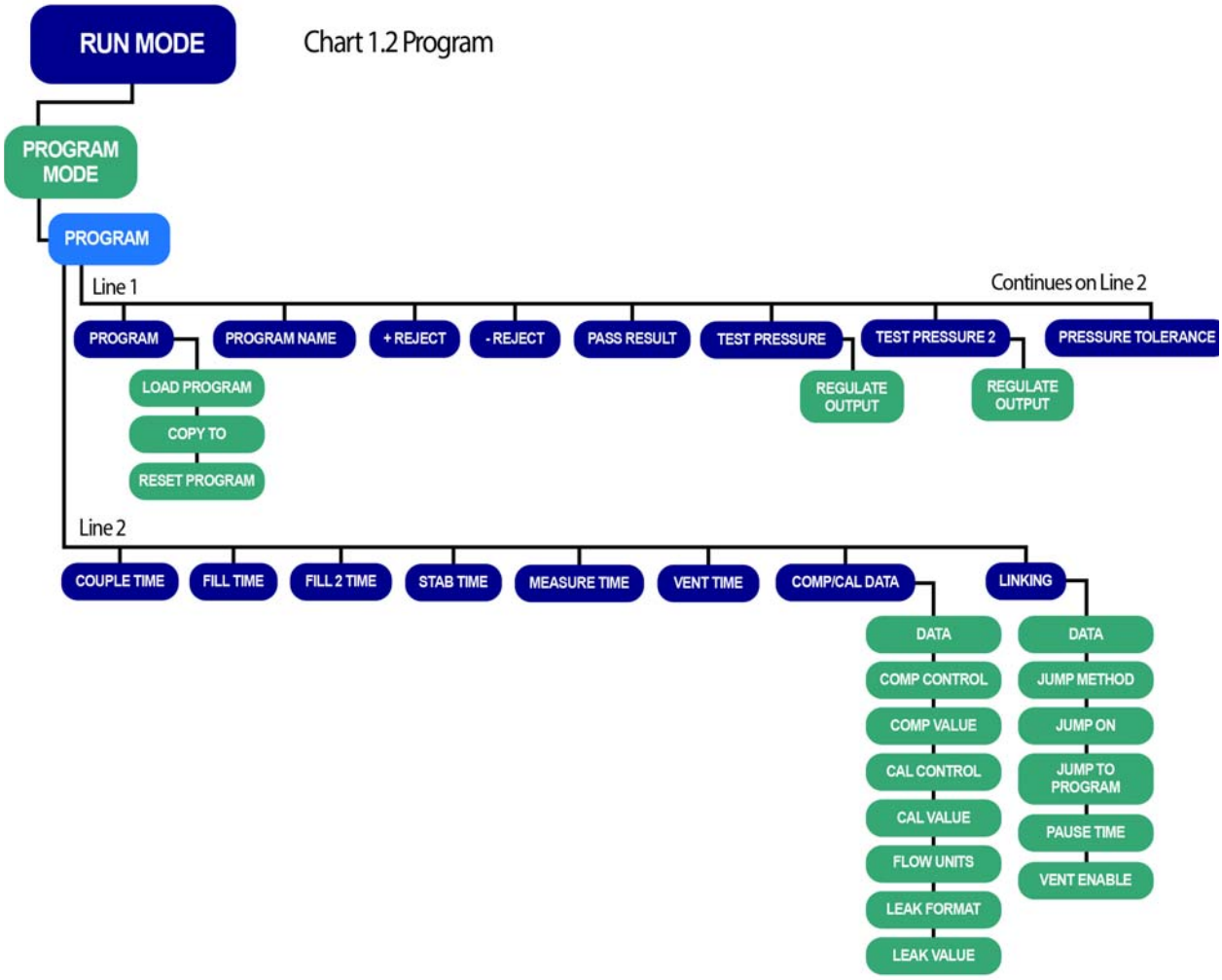
Fill step - gauge pressure sensor reading.

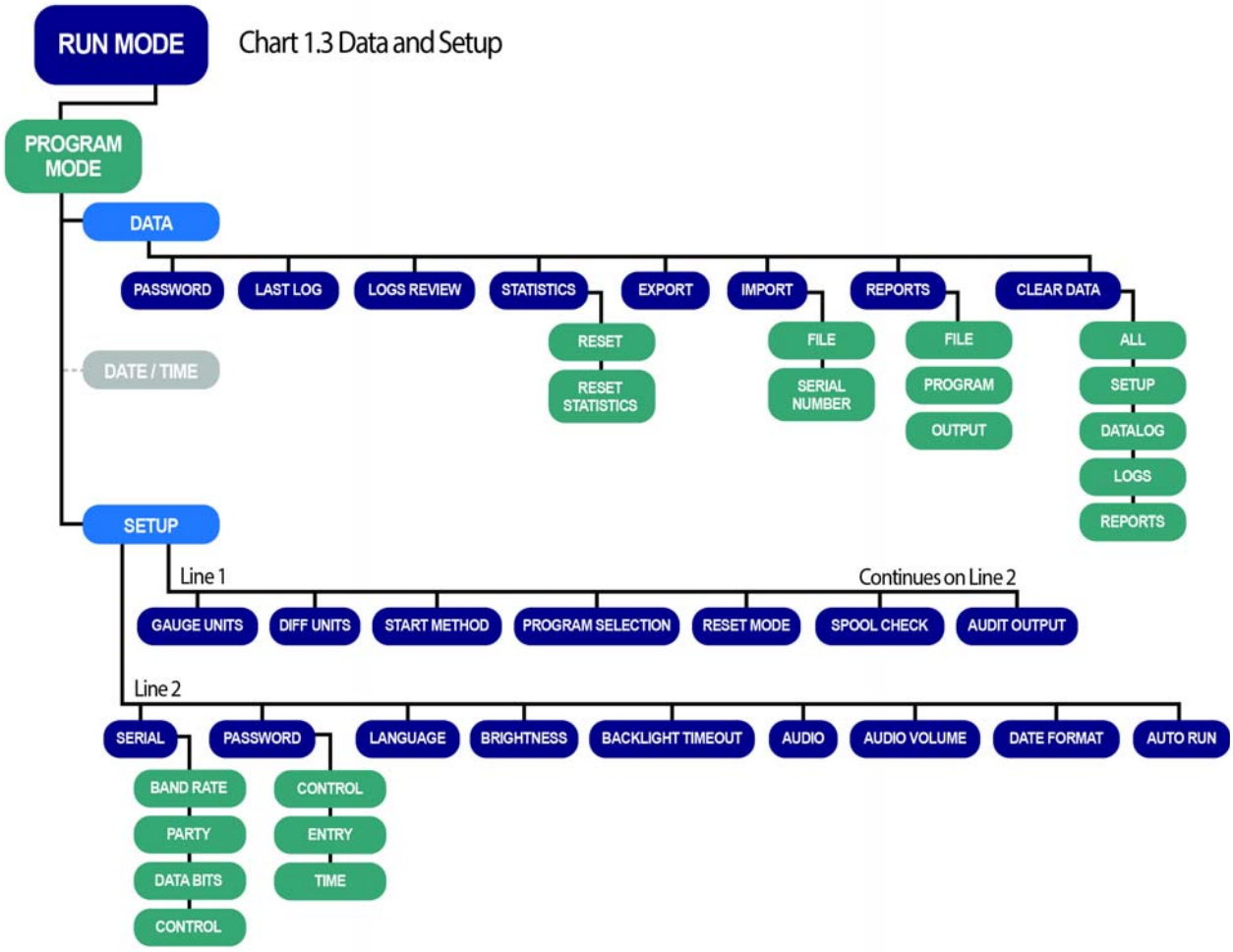
Stab step - gauge pressure sensor reading.

Equal step - differential sensor reading.

Measure step - differential sensor reading.


RUN MODE
Chart 1.1 Menu Structure Tree
PROGRAM MODE
LOGS REVIEW
CYCLE TYPE
PROGRAM
See Chart 1.2
DATA
See Chart 1.3
DATE / TIME
DATE
TIME
SETUP
See Chart 1.3
CONFIG
MODEL CODE
SERIAL NUMBER
COMPANY
GAUGE SENSOR
SENSOR TYPE
SENSOR RANGE
SENSOR UNIT
CALIBRATE
CALIBRATION DATA
AUTO ZERO
AUTO ZERO VALUE
DIFF SENSOR
SENSOR TYPE
SENSOR RANGE
SENSOR UNIT
CALIBRATE
CALIBRATION DATA
AUTO ZERO
AUTO ZERO VALUE
REGULATOR
REGULATOR TYPE
REGULATOR ZERO
REGULATOR SPAN
SPAN TARGET
CALIBRATION DATA
HARDWARE
ADC
DIGITAL ID
PMW CONTROL
VALVE CONTROL
SERIAL TEST
RTC
CYCLE COUNTER
LINUX INFORMATION
SOFTWARE VERSION
RESET
UPDATE


RUN MODE
Chart 1.2 Program
PROGRAM MODE
PROGRAM
Line 1
Continues on Line 2
PROGRAM
PROGRAM NAME
+ REJECT
- REJECT
PASS RESULT
TEST PRESSURE
TEST PRESSURE 2
PRESSURE TOLERANCE
LOAD PROGRAM
COPY TO
RESET PROGRAM
REGULATE OUTPUT
REGULATE OUTPUT
Line 2
COUPLE TIME
FILL TIME
FILL 2 TIME
STAB TIME
MEASURE TIME
VENT TIME
COMP/CAL DATA
LINKING
DATA
COMP CONTROL
COMP VALUE
CAL CONTROL
CAL VALUE
FLOW UNITS
LEAK FORMAT
LEAK VALUE
DATA
JUMP METHOD
JUMP ON
JUMP TO PROGRAM
PAUSE TIME
VENT ENABLE


RUN MODE
Chart 1.3 Data and Setup
PROGRAM MODE
DATA
PASSWORD
LAST LOG
LOGS REVIEW
STATISTICS
EXPORT
IMPORT
REPORTS
CLEAR DATA
RESET
RESET STATISTICS
FILE
SERIAL NUMBER
FILE
PROGRAM
OUTPUT
ALL
SETUP
DATALOG
LOGS
REPORTS
DATE / TIME
SETUP
Line 1
Continues on Line 2
GAUGE UNITS
DIFF UNITS
START METHOD
PROGRAM SELECTION
RESET MODE
SPOOL CHECK
AUDIT OUTPUT
Line 2
SERIAL
PASSWORD
LANGUAGE
BRIGHTNESS
BACKLIGHT TIMEOUT
AUDIO
AUDIO VOLUME
DATE FORMAT
AUTO RUN
BAND RATE
PARTY
DATA BITS
CONTROL
CONTROL
ENTRY
TIME

4.4 Password Overview

The 628 supports a password scheme to control access to the menu options and parameters when enabled. *Table 4–2* lists the access levels available and the display background color indicates the level *selected.* *Table 4–3* shows the password setup menu parameters.

Table 4–2: Password schemes.

Level	Description	Background Color
Disabled	This level is selected when the password option is disabled. All non-protected and User protected menu items are accessible.	**Blue**
None	This level is selected when the password option is enabled and no login has been performed. Only non-protected menu items can be performed or modified.	**Blue**
User	This level is selected when the password option is enabled and the operator logs in using the user defined password. All non-protected and User protected menu items are accessible.	**Grey**

Table 4–3: Password Setup Menu Parameters

Parameter	Description
Control	The options are No (default) to disable and Yes to enable the password option.
Entry	To set a unique password for the tester, minimum 1 character.
Timeout	This parameter defines the elapsed time allowed with no user activity before being logged out. The range is 0 to 60 minutes, default setting is 10 minutes.

4.5 Setting a Password

Perform the following to enable password protection:

1. Select **Program Mode Setup Password** Menu.
2. Set Control to **On** and press the **Start** Button to enter selection.
3. Press **Scroll right key** to select **Password entry screen.**

Use <> keys to select next or previous position and to enter character selection.

Use Function keys to navigate the character field.

4. Press **Start** button to enable password entry.
5. Using the **key buttons** enter the **password**.
6. Press **Start** Button to disable password entry. (Note: Pressing the Abort button will log you out and you will need to login to proceed with further changes.)
7. **Scroll right** to enter **required time out**.
8. **Exit menus** and return to **Run mode** to save settings.

4.5.1 Password entry

Perform the following to access protected parameters:

1. Select the **Program Mode Data** or **Setup Password Menu**.
2. Enter the **password.** (**Note:** The default password is 16 "_" characters.)

Use <> keys to select next or previous position and to enter character selection.

Use Function keys to navigate the character field.

3. Press the **Start button** to validate the password and the display background color will change when accepted.
4. Press the **Abort** button to logout.

4.5.2 Forgot Password

Contact Uson to obtain a temporary password when the password has been forgotten. The temporary password must be entered within 3 days. **Note:** Check the tester has the correct date and time set before entering the temporary password.

4.6 Menu Item Access Control

The table below lists the access control for the menu items when the Password option is enabled:

Menu	Menu Item	Access control.
Run Mode	Program Mode	None.
	Program Selection	Password
	Logs Review	None
	Cycle Type	Password
Program Mode	Program	None
	Data	None
	Date Time	None
	Setup	None
	Config	None
	Gauge sensor	None
	Diff Sensor	None
	Regulator	None
	Hardware	None
	Run mode	None
Program	Program	Password
	Program Name	Password
	+ Reject Level	Password
	- Reject Level.	Password
	Pass Result	Password
	Test Pressure	Password
	Pressure Tolerance	Password
	Couple Time	Password
	Auto zero	Password
	Fill Time	Password
	Stab Time	Password
	Measure Time	Password
	Vent Time	Password
Comp Cal Data	Data	None.
	Comp Control	Password
	Comp Value	Password
	Cal Control	Password
	Cal Value	Password
	Flow units	Password
	Leak format	Password
	Leak Value	Password
Linking	Data	None
	Jump Method	Password
	Jump On	Password
	Jump To Program	Password
	Pause Time	Password
Data	Password	None

	Last Log	None
	Logs Review	None
	Statistics	Password
	Export	None
	Import	Password
	Reports	None
	Clear Data	Password
Date Time	Year	None
	Month	None
	Day	None
	Hours	None
	Minutes	None
Setup	Gauge Units	Password
	Diff Units	Password
	Start Method	Password
	Program Selection	Password
	Reset Mode	Password
	Spool Check	Password
	Audit Output	Password
	Serial Port	Password
	Password	Password
	Language	Password
	Brightness	Password
	Backlight Timeout	Password
	Audio	Password
	Audio Volume	Password
	Date format	Password
Config	Model code	Read Only
	Serial Number	Read Only
	Company Name	Read Only
Gauge Sensor	Sensor Type	Read Only
	Sensor Range	Read Only
	Sensor unit	Password
	Calibrate	Read Only
	Calibration Data	Read Only
	Auto Zero Control	Password
	Auto Zero Value	Password
Diff sensor	Sensor Type	Read Only
	Sensor Range	Read Only
	Sensor unit	Password
	Calibrate	Read Only
	Calibration Data	Read Only
	Auto Zero Control	Password
	Auto Zero Value	Password
Regulator	Type	Read Only
	Range	Read Only
	Zero	Read Only

	Span	Read Only
	Target	Read Only
	Calibration Date	Read Only
Hardware	ADC	Read Only
	Digital I/O	Read Only
	PWM Control	Read Only
	Valve Control	Read Only
	Serial Test	Read Only
	RTC	Protected
	Cycle Counter	Protected
	Linux Information	Protected
	Software Version	Password

5
Program Mode

5.1 Introduction

Program Mode is accessed via the Uson 628 front display and is where you access the test programs and configuration parameters.

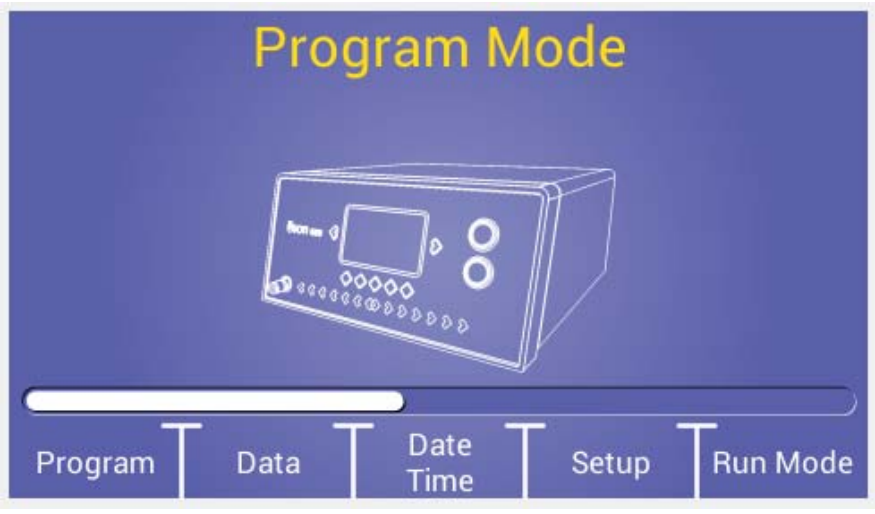
Once all test setup information has been completed, the system will need to be put into Run Mode to save programming and to initiate tests.

5.2 Entering Program Mode

Perform the following steps to enter program mode:

1. Use the **Left/Right arrow** keys to select the **Program Mode** prompt.
2. Press the **Menu** key.
3. A password prompt displays (if the setup password parameter is enabled).
4. Enter the **password** and press the **Start key** to continue. (Note: An invalid password will return you to the Program Mode prompt.)
5. The Program mode menu of the Program mode toolbar displays, as shown in *Figure 5–1*.

Figure 5–1: Program Mode Main Menu



5.3 Program Categories

The program parameters are sub-divided into individual menus to provide ease of access. See *Table 5–1* for the submenus under the Program menu bar.

Table 5–1: Menu Item Descriptions - Program

Program: Menu Item	Description
Program	Test settings for selected program.
Data	General Options.
Date Time	Clock Settings.
Setup	Global Settings.
Config	Tester configuration details.
Gauge Sensor	Sensor configuration details, including calibration option.
Diff Sensor	Sensor configuration details, including calibration option.
Regulator	Regulator setup.
Hardware	General options to check operation.
Run Mode	Selects Run mode.

5.3.1 Program Menu (submenus)

The Program menu allows the user to set the standard parameters required to perform a leak test. These parameters cannot be modified when the password option is enabled. The menu parameters are:

Program Menu Parameters	
Parameter	**Description**
Program	**The options are:** **Load:** Loads an alternative program. **Copy to**: Copies the loaded program to another program. **Reset Program:** Sets the parameters to default values.
Name	This parameter allows the user to set a name for the program consisting of up to 15 characters. The name defaults to Program X where X is the program number.
+ Reject Level	This parameter sets the level of leak that the test component is to be tested against.The programming limits and the default value are dependent upon pressure units, differential measuring range and comp/cal options.
- Reject Level	This parameter sets the level of leak that the reference component is to be tested against.The programming limits and the default value are dependent upon pressure units, differential measuring range and comp/cal options.
Pass Result	Sets the pass criteria in-conjunction with the reject levels. The options are: **Above Reject Max**, **Below Reject Min** and **InBand** (default).
Test Pressure	This parameter defines the test pressure for the Fill 1 step. The Test Pressure should be set to a value that complies with the test specification of the test component. The programming limits and the default value are dependent upon pressure units selected and the pressure range of the unit. **To set the manual regulator output:** 1. Turn the pressure regulator knob fully **counter clockwise**. 2. Use the **left/right arrow keys** to select **regulator output.** 3. Select **On function key** to display **regulator output setting**. 4. Turn the pressure regulator knob **clockwise** until the required test pressure is achieved. 5. If required select, the **Update function** key to set the Test Pressure parameter to the displayed regulated pressure. 6. Select the **Off function** key to cancel regulator function.

Program Menu Parameters	
Parameter	**Description**
Test Pressure 2	This parameter defines the test pressure for the Fill 2step. The Test Pressure should be set to a value that complies with the test specification of the test component. The programming limits and the default value are dependent upon pressure units selected and the pressure range of the unit. **To set the manual regulator output:** 1. Turn the pressure regulator knob fully **counter clockwise**. 2. Use the **left/right arrow keys** to select **regulator output.** 3. Select **On function key** to display **regulator output setting**. 4. Turn the pressure regulator knob **clockwise** until the required test pressure is achieved. 5. If required select, the **Update function** key to set the Test Pressure parameter to the displayed regulated pressure. 6. Select the **Off function** key to cancel regulator function.
Pressure Tolerance	This parameter defines the tolerance that the test pressure must be within during the test cycle. If the pressure at the test component exceeds the instrument upper limit, i.e. " Test Pressure + Pressure Tolerance", an over pressure error is detected and displayed. If the pressure at the test component drops below the instrument lower limit, i.e. " Test Pressure - Pressure Tolerance", a gross leak is detected and the test cycle terminates. The programming limits and the default value are dependent upon the pressure units selected and the pressure range of the unit.
Auto Zero	This parameter sets the time period to allow sensors to be vented to atmosphere and the final reading is then used as the new zero value (reference point) for the current test. The programming range is **0.0 to 5000.0 seconds** and the default value is 0 seconds. Setting 0.0 time or disabling the individual sensor's auto zero parameter will disable the zero update.
Couple Time	This parameter sets the time period to allow for any output functions controlled by the pneumatic couple output to operate before pressurizing the component. The programming range is **0.0 to 5000.0 seconds** and the default value is 0.0. If this parameter is set to 0.0 seconds, no valve or phase actions are performed.
Fill Time	This parameter sets the time period to pressurize the test component to the set test pressure. The programming **range is 0.0 to 5000.0** seconds and the default value is 0 seconds. If this parameter is set to 0 seconds, no valve or phase actions are performed.

Program Menu Parameters	
Parameter	**Description**
Fill 2 Time	This parameter sets the time period to pressurize the test component to the set test pressure. The programming **range is 0.0 to 5000.0** seconds and the default value is 0 seconds. If this parameter is set to 0 seconds, no valve or phase actions are performed.
Stabilize Time	This parameter sets the time period to allow the pressure to stabilize before a leak rate measurement is performed. The programming range is **0.3 to 5000.0** seconds and the default value is 0.3 seconds.
Test Time	This parameter the time period over which the leak rate is determined. The programming range is **0.0 to 5000.0** seconds and the default value is 1.0 seconds.
Vent Time	This parameter sets the time period during which the test component is vented to atmosphere. The programming range is **0.0 to 5000.0 seconds** and the default value is 0.0 seconds. Note: Vent time will automatically be extended until pressure is vented below 1 psi.
Comp/Cal Data	Submenu used to modify the measure setup result value.
Linking	Submenu used to setup links to additional programs to be performed.

5.3.2 Comp/Cal Menu

The Comp/Cal menu allows the user to set the standard parameters required to perform a leak test. These parameters cannot be modified when the password option is enabled. The menu parameters are:

Comp/Cal Menu Parameters	
Parameter	**Description**
Comp Control	Enables/Disables comp correction being applied to the test result value.
Comp Value	The pressure drop reading set by the Comp Test for a leak tight master part or can be manually entered by the user. The Format and range is dependent upon the differential sensor range and unit selections.
Cal Control	Enables/Disables the Cal conversion to leak rate being applied to the test result value.
Cal Value	The pressure drop reading set by the Cal Test for the Leak master and master part or can be manually set entered by the user. The Format and range is dependent upon the differential sensor range and unit selections.
Flow units	Specifies the units for the leak rate value.
Leak format	Specifies the format for the leak rate value.
Leak Value	Specifies the value used to perform the leak rate calibration for the Cal test.

5.3.3 Linking Menu

The Linking menu allows the user to link test results based on test results and settings. The parameters are:

Linking Menu Parameters	
Parameter	**Description**
Jump Method	Specifies the type of jump to be performed: **Disabled**: No jump performed. **Immediately:** Starts next program. **Wait for start:** Starts next program after receiving start input signal. **Pause delay:** Starts next program after a specified delay.
Jump On	Specifies when a jump is performed based on the test result: Pass, Fail, Pass or Fail.
Jump to Program	Specifies the next program to be performed.
Pause Time	Specifies the delay time required before starting the next test. The programming range is 000 to 1000.0 s.
Vent Enabled	Specifies if a vent step is performed between linked programs. The default is enabled to perform a vent step.

5.3.4 Data Menu

The data menu parameters are:

Data Menu Parameters	
Parameter	**Description**
Password	Password entry screen.
Last Log	Displays last test result information.
Logs Review	Displays previous test result information.
Statistics	Displays statistic information for the selected program. The reset options are password protected when enabled. The options are: **Reset:** Clears selected program counters. **Reset Statistics:** Clears all program counters. **Note:** Process Capability (CPK) formula.The upper and lower process capability Cpu and Cpl formula with Upper Specification Limit (USL) and Lower Specification Limit (LSL) is: C_{pl} = (Process Mean – LSL)/(3*Standard Deviation) C_{pu} = (USL – Process Mean)/(3*Standard Deviation) The Cpk is the smallest value of the Cpl or Cpu denoted: C_{pk}= Min (C_{pl}, C_{pu}).
Export	Exports information to USB as a backup or for transferring to another tester.The data is saved to location \uson\628\<serial number>\data. **Options:** System (all settings), Config (tester config), Diff sensor, gauge sensor, statistics, datalog, setup, individual program or programs. **Update:** Saves selected option to USB,
Import	Imports information from USB to restore setting or from another tester. The options are: **File:** Selects the data to be imported. **Serial Number:** Specifies the tester serial number data to be imported. **Update:** Reads selected data. This option is password protected when enabled.
Reports	Outputs the settings in a text format to Serial port, or USB. The options are: **Data:** Selects report data to be created. **Program:** Selects program number for the Program or Statistics reports. **Output:** Selects the destination. **Update:** Outputs selected date. The USB option saves the data to location \uson\628\< serial number> \Reports.
Clear Data	This option allows the following information to be cleared and set to the defaults setting: All, Setup, Datalog, Logs, Reports. This option is password protected when enabled.

5.3.5 Date Time Menu

The date time parameters are:

Data Time Menu Parameters	
Parameter	**Description**
Year	Calendar year setting.
Month	Calendar month setting.
Day	Calendar day setting.
Hours	Clock hour setting.
Minutes	Clock minutes setting.
Note: The Time and Date will only be maintained for a limited duration (typically 14 days) when the tester is turned off.	

5.3.6 Set Up Menu

This menu allows the user to set-up or to alter the tester's global operational settings.These parameters cannot be modified when the password option is enabled. The Set up menu parameters are:

Set up Menu Parameters	
Parameter	**Description**
Gauge Units	This parameter defines the pressure units for gauge sensor related pressure parameters. Options include: **bar, PSI, kPa** and the default is **PSI**.
Diff Units	This parameter defines the pressure units for differential pressure related pressure parameters. Options include: **bar, PSI, kPa** and the default is **PSI**.
Start Method	This parameter defines the method of starting and aborting a test cycle in Run Mode.The options are: **Front:** Front Panel Buttons, default setting. **Remote:** Control selected by remote inputs. **Remote Enable:** This start method is selected by the remote enable input: An open input enables front panel start button, a closed input enables remote start input. For additional input information, see***"Rear Panel" on page 3-2*.**
Program Selection	This parameter defines how the test program is selected in Run Mode.The options available are: **Run Mode:** The front panel Up/ Down function keys, default setting. **Remote: Remote binary and Remote BCD** are via the remote I/O interface. For encoding, see Section **See** ***"Program Selection" on page 3-10*** **Program Mode:** Pre-selected in Program Mode to prevent user(s) from selecting other programs.

Set up Menu Parameters	
Parameter	**Description**
Reset Mode	This parameter defines the tester's response to a test result. The options available are: **None:** No acknowledgement is required. **Hold on Reject:** The operator must acknowledge a reject result has been detected by pressing the Abort button to continue testing. **Hold on Pass:** The operator must acknowledge a Pass result has been detected by pressing the Abort button to continue testing. **Inf.Fill:** A reject condition selects the Infinite Fill step to allow the operator to search for leak or leaks in the rejected component. **Test:** Automatically restarts the test cycle. Note cycle will stop if an error, reject or reset condition occurs.
Spool Check	This parameter enables/disables equal value spool position check.
Audit Output	This parameter defines the destination for the destination for the result audit log: The options available are: **Off:** Disabled (default). **Serial:** To external device (i.e. printer) connected to Serial port. **USB:** To file on external USB memory device connected USB host port. **File:** To file in internal memory which can be accessed using the Export option. **Notes:** 1. Files are created daily with the name: Resultsyyyymmdd.log. 2. The USB option saves data to \uson\628\<serial number>\audit
Serial	This option allows the serial port communication parameters to be changed. Default Parameters are: **Baud rate:** 9600. **Parity:** None. **Data bits:** 8. **Control:** None.
Password	This option controls the password protection for parameters: **Control:** The options are Off (default) to disable and On to enable the password option. **Entry:** To set unique password for the tester. **Timeout:** This parameter defines the elapsed time allowed with no user activity before being logged out.
Language	This parameter selects the language in which the messages are displayed. The options are: **English, Chinese Spanish.**
Brightness	This parameter controls the display brightness level. The option range is from **0 to100%** and the default setting is **50%**.
Backlight Timeout	This parameter defines the duration the back light remains on after no input activity.The option range is from **0 (disabled) to 60 minutes** and the default setting is **0.**
Audio	This parameter controls the audio output. The options are: **Off** (default) or **On.**

Set up Menu Parameters	
Parameter	**Description**
Audio Volume	This parameter controls the audio level. The setting range is: **0 to 100%** and the default setting is **50%**
Date format	This parameter defines the date format. The options are: **DD/MM/YYYY (default) or MM/DD/YYYY or YYYY/MM/DD.**
Auto Run	This parameter specifies the number of test cycles to be automatically repeated. The setting range is 0 to 200. Default setting is 0.

5.3.7 Config Menu

This menu displays the tester configuration entered by manufacturing and cannot be modified.

Config Menu Parameters	
Parameter	**Description**
Model Code	Specifies sales order smart code in the Format 628-abc-defg.
Serial Number	Specifies serial number in the format 000000-000U8.
Company Name	Specifies the company name.

5.3.8 Gauge Sensor

This menu displays the gauge sensor configuration. The menus are:

Gauge Sensor Menu Parameters	
Parameter	**Description**
Sensor Type *	Set to gauge pressure.
Sensor Range*	Defines the measure range.
Sensor Unit	Defines the measurement unit.
Calibrate *	Function to perform zero and span calibration.
Calibration Data	Displays the current calibration data: Last calibration date and time Adc Zero Count reading, defaults to 0. Adc Span Count for target pressure, defaults to value based on range selection. Target value, defaults to sensor range.
Auto Zero Control	Enables/Disables autozero function. Default is off.
Auto Zero Value	Zero offset value in counts.

* Set by manufacturing and cannot be modified.

5.3.9 Differential Sensor

This menu displays the differential sensor configuration. The menus are:

Differential Sensor Menu Parameters	
Parameter	**Description**
Sensor Type*	Set to Differential.
Sensor Unit	Defines the measurement unit.
Calibrate *	Function to perform zero and span calibration.
Calibration Data	Displays the current calibration data: Last calibration date and time Adc Zero Count reading, defaults to 0. Adc Span Count for target pressure, defaults to value based on range selection. Target value, defaults to sensor range.
Auto Zero Control	Enables/Disables autozero function. Defaults to off.
Auto Zero Value	Zero offset value in counts.

* Set by manufacturing and cannot be modified.

5.3.10 Regulator Menu

This menu displays the Regulator menu parameters. The menus are:

Regulator Menu Parameters	
Parameter	**Description**
Type*	Manual or electronic.
Range*	Pressure range.
Zero	DAC counts for calibration zero reading defaults to 0.
Span	DAC counts for calibration target pressure, defaults to value based on range selection.
Target	Calibration Target value, defaults to gauge sensor range.
Calibration Date	Last calibration date and time

* Set by manufacturing and cannot be modified.

5.3.11 Hardware Menu

General functions to check hardware operation and should only be used by Uson personnel: The menus are:

Hardware Menu Parameters	
Parameter	**Description**
ADC*	Displays adc readings.
Digital I/O*	Displays input states and allows individual outputs to turned on and off.
PWM Control*	Allows regulator control output to be set.
Valve Control*	Allows individual pneumatic valve outputs to turned on and off.
Serial Test*	Reads and writes data to the serial port.
RTC*	Displays current RTC settings.
Cycle Counter*	Displays the total number of test cycles started.
Linux Information	Displays current kernel version.
Software Version	Displays current installed software version and update option.

* For Uson Personnel Only.

6
Run Mode

6.1 Overview

This section describes the options available in Run mode.

The Tester displays the main Run mode main screen (as shown below) after completing power on initialization or when exiting program mode.

6.1.1 Operations

The following operations are available when tester is ready:

Program Mode: used to setup tests and general parameters.

Up or Down Function keys: used to select a program if the setup program selection parameter is set to the Front Panel.

Logs Review: displays previous test results.

Cycle Type: used to select the cycle: Normal, Cal, or Comp.

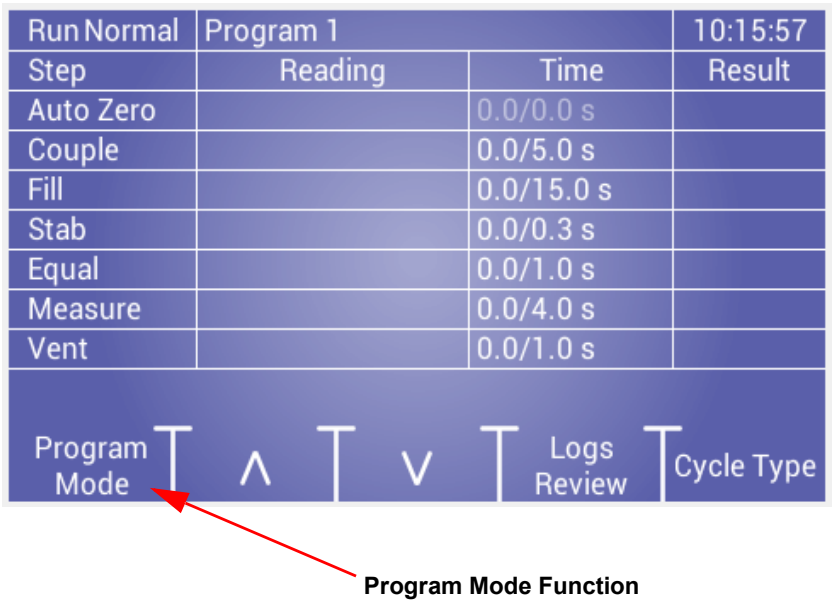
Start button: used to initiate a test when Setup Start Method parameter is set to the Front Panel.

7
How To

7.1 Program Basic Test Parameters

7.1.1 Preliminary Tasks

1. To begin setting up test parameters, you will need to get the unit up and running by connecting the air and electrical supplies (refer to Safety, Installation/Wiring, and Getting Started sections earlier in this document).
2. Switch the Tester **On**.
3. When the Run mode screen displays, select the **Program Mode** function, as shown below.



7.1.2 Set Pressure Units

To setup the Pressure Units:

1. Once in **Program Mode**, select the **Setup** menu.
2. Select the **Gauge Units** option.
3. Select **Pressure unit** required.

4. Press **Start** button to enter value and select **Exit** to return to Setup menu.
5. Select **Diff units** option.
6. Set the required pressure units.
7. Press **Start** button to enter value and select **Exit** to return to Setup menu.
8. Select **Exit** to return to program mode menu.

7.1.3 Set Test Program Details

1. Select **Program Menu**.
2. Select **Program option** and set required program.
3. Press **Start** Button to enter selection and select exit.
4. Select the **individual option**s and enter the following values:

If the leak test conditions are not known for the component, the following figures may be used as a guideline for setting the test parameters:

Parameter	Setting
+Reject	1.99 mbar.
-Reject	- 1.99 mbar.
Test Pressure	Set to specification.
Test Pres. Tol.	Set to approximately 10% of Test Pressure.
Fill Time	Set to 10 seconds.
Stab. Time	Set to 10 seconds.
Measure Time	1 second.
Vent Time	Set to Off.

5. The Fill, Stabilize and Measure times need to be optimized for the component and test pressure setting.
6. Select **Exit** to return to program menu.
7. Select **Run Mode** option.

7.2 Perform a Test

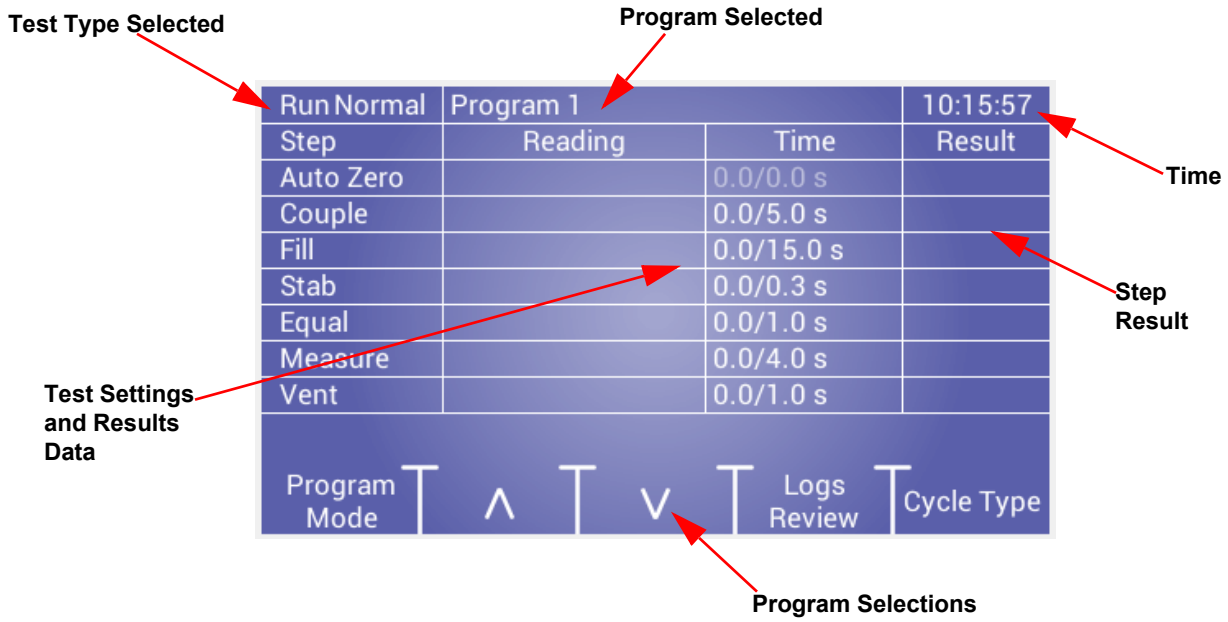
WARNING: This instrument is capable of supplying high-pressure air. Before testing, ensure that the system is guarded to local health and safety standards.

WARNING: Before testing, make sure to follow all Safety warnings/ cautions in the Safety section and throughout the manual.

WARNING: The following testing instructions are to be followed only after your tester is appropriately and safely up and running. See Sections 1-6.

CAUTION: The component to be tested, and the air supply line to the Tester, must be free from water or liquid residue before testing. In Differential Testers, failure to comply may result in damage being inflicted on the sensitive transducer within the instrument.

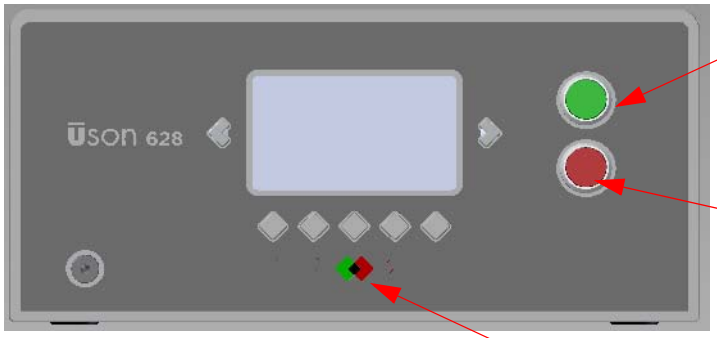
1. Make sure the tester is in **Run Mode**. The display will show the Test step time information and the current program selection, as shown below:



2. Press the **Up/Down Arrow** keys to select the required test program.
3. Connect the test component to the **Test Port** using the tubing provided or suitable hard-nylon tube. Do not over tighten couplings. It is recommended to

tighten couplings by hand and then an additional 1/2 to 1 turn with a spanner. Ensure that the Reference Port is blanked off.

4. Press the green **Start** button on the front panel to begin the test. The display will show the selected program number and the test status during the test cycle.



Green Start Button

Red Abort & Reset Button

Green/Red LEDs

Green = Pass

Red = Reject. Press Red Reset Button before starting next test.

5. The test cycle may terminate early displaying a dialogue window with an abort or fail error message relating to an event encountered during the test cycle. To clear the dialogue window, press the **abort** button or the **remote abort input** (when enabled) to continue new tests. Additional information and troubleshooting for each message is listed in *Table 7–1*. If an error persists, please contact Uson support for further information.

Table 7–1: Test Cycle Error/Abort Messages - Troubleshooting

Message	Solution
Air Supply Error	A low inlet supply pressure was detected, check the air supply pressure is higher than minimum pressure required by the tester. Refer to user manual or rear panel label for minimum pressure required.
Audit output error	Audit logging is enabled but the selected output device is not connected or ready. Check the selected device (i.e., USB or serial port) is connected.
Differential Over Range	The Differential sensor over ranged during the equal step due to a gross leak condition on the test port. This may occur occasionally for gross leaking components not rejected during the stabilize step. If the problem persists, check the program minimum limit (i.e., Test Pressures – Pressure Tolerance) is not too low, the stabilization time, and that the test port and test part connections are secure and leak tight.
Differential Under Range	The Differential sensor under ranged during the equal step due to a gross leak condition on the ref port. Check the ref port connection is secure and leak tight.

Message	Solution
Differential Zero	The Differential sensor zero reading check performed by the auto zero step was not within the expected limits. Check the test part is fully vented and consider increasing the vent time or delay between tests if repeat testing parts. If the error persists contact Uson support for further information.
Equal Valve Error	The test cycle was aborted due to the equal valve not being in the correct position at the start of the test cycle or measure step invalidating the test. Repeat test and if the error persists contact Uson support.
Gauge Zero	Gauge sensor zero reading check performed by the auto zero step was not within the expected limits. Check the test part is fully vented and consider increasing the vent time or delay between tests if repeat testing parts. If the error persists contact Uson support for further information.
Gross	The test component was rejected during the stab step as the pressure need did not meet the minimum limit (i.e. Test Pressures - Pressure Tolerance) requirement; this may occur occasionally for gross leaking components. If the problem persists, check the following: Test port and Test part connections are secure and leak tight; the Pressure Regulator, Test Pressures and Tolerance are set to the required settings; the Fill Time is sufficient to achieve the required test pressure.
Invalid Test Cycle	An invalid test cycle type was selected for the test program selected. Select **Run Mode Cycle** option and check **Normal** is selected. Note Comp and Cal options are only valid when the program options are enabled.
Max Limit	The test part was rejected as the leak exceeded the measure step +Reject limit. If this is a persistent problem check the test port and test part connections are secure and leak tight, the +reject limit and the measure step time are correct, and the test setup using a known leak tight component reports pass conditions.
Min Limit	The test part was rejected as the leak did not exceed the measure step -Reject limit. If this is a persistent problem check the ref port connection is secure and leak tight, the -reject limit and the measure step time are correct, and the test setup using a known leak tight component reports pass conditions.
Operator	The test cycle was aborted by the operator using the front panel abort button or remote abort input when enabled.
Over Pressure	The test pressure exceed the selected program's maximum pressure limit (i.e. Test Pressures + Pressure Tolerance) during the test cycle. Check the Pressure regulator, Test Pressures are set to the required settings.
Program Number Error	An invalid program number was selected for the test cycle and must be 1 to 30. Check the program number and name displayed is valid, for remote selections check the remote input connections and the setup Program selection method is set the required coding format (i.e. BCD or Binary) refer to user manual for more information.
Valve Error	A problem with the pneumatic control valves was detected during the test cycle invalidating the test. Repeat test and if the error persists contact Uson support.

6. When the test cycle has successfully finished, the Green and Red LEDs indicate a Pass or Reject respectively. If a reject condition displays (Red LED), press the **Reset** button before starting the next test.

The Setup menu parameter Reset Mode parameter controls the operation of the Tester on reject condition.

7.2.1 Test Results

Test results are displayed or indicated on the front panel display under the column "Result" and the front panel lamps. Possible test results are as follows:

Result	Description
Gross	Indicates that a leak has been detected that is larger than the instrument can measure. A Gross leak is displayed as the maximum leak rate value.
Reject	Indicates that a leak has been detected that is larger than the reject limit set by the user.
Pass	Indicates that the component under test has passed the test cycle.

The measure step and final result leak values for pressure and vacuum tests are displayed as positive values.

7.2.2 Lamp Outputs

The following table describes the lamp outputs for the corresponding result:

Lamp	NORMAL TEST CYCLE RESULT					
	Pass	Reject Max	Reject Min	Gross (Test)	Gross (Stab)	Over Press
Pass	ON	OFF	OFF	OFF	OFF	OFF
Reject Max	OFF	ON	OFF	ON	ON	ON
Reject Min	OFF	OFF	ON	OFF	ON	ON

7.2.3 Audit Results Output

To log results at the end of each test, select **Program Mode > Setup > Audit Output** option and set the required output destination to Serial, USB or File (i.e., internal memory which can exported at a later date).

The USB and File options log results to a file created daily with the naming convention ResultsYYYYMMDD.log (i.e. Results20170703.log). The USB option creates the file on the USB in location \uson\Uson 628\<Serial Number>\Audit. The export option will save the file to location \uson\Uson 628\<Serial Number>\Logs.

The results format is:

- <Cycle number> <Tester serial number> <date> <Time> <Fill step Pressure> <Stab step pressure>
- <Gauge sensor pressure unit> <Equal Step Differential Reading> <Differential sensor pressure unit>
- < Result value> < Result unit> < Result > <Result Reason>

Examples:

0126 000000-000U8 1 13.09.2017 11:00:30 3000 2996 mmHg 00.46 mBar -000.04 sccm Pass

0127 000000-000U8 1 13.09.2017 11:03:22 2999 2999 mmHg 00.00 mBar 000.00 sccm Abort Operator

0128 000000-000U8 1 13.09.2017 11:12:34 0000 0000 mmHg 00.00 mBar 000.00 sccm Abort Air Supply Error

0129 000000-000U8 1 13.09.2017 11:13:26 3005 2820 mmHg 03.44 mBar 002.00 sccm Fail Max Limit

7.3 Optimize a Program

After an initial test, you can adjust the following parameters to achieve optimum performance.

7.3.1 Fill Time

- Ideally the fill time should be set so that, for a good component, no pressure variation occurs during the stabilization phase; generally, a small variation is acceptable.
- The fill time should be set to a period that is only long enough to ensure that the test component is filled and holds the correct pressure.
- If the fill time is too short, the test pressure displayed during the stabilization phase will either be lower than the set pressure, or will reduce during the stabilization phase as the pressure equalizes within the component.

7.3.2 Stabilize Time

- The Stabilize time is the time that the instrument allows in order to achieve pressure and temperature equilibrium in the test component before a reliable leak test can be performed.
- Generally, increase the Stabilize time to reduce the leak rate measurement or improve the repeatability of measurement.
- If the Stabilize time is too short, temperature effects or component expansion may cause erroneous results during the test phase.

7.3.3 Measure Time

- The measure time should be set to give good discrimination between leak tight parts and parts that only just fail the test criteria. For most applications, this discrimination can be as little as 0.05 mbar, however for gauge R &R compatibility and demanding applications, the test system should have a resolution of at least 5% of the specified tolerance.
- Use the following to calculate the measure time from a chosen decay limit (reject level):

$$Measure\ Time_{(Sec)} = \frac{Reject\ Level_{(mbar)}}{Leak\ Rate_{(cc/sec)}} x \frac{Test\ Volume_{(cc)}}{Atmospheric\ Pressure_{(mbar)}}$$

7.3.4 Reject Level

If the Tester configuration has not been modified by the user, the configuration parameters will be set to their default values. These values are the minimum settings available. It is probable that a minimum setting of the Reject Level will cause the Tester to reject all test components.

- In order to set a realistic Reject Level, the maximum admissible leak rate of the test component must be determined. This can be obtained from component specifications, trials, comparisons with previous test components or any other reliable source of information.
- Once the maximum admissible leak rate is known, the Reject Level (RL) can be calculated using the following equation:

$$RL\ (mbar/s) = \text{Max. Admissible Leak Rate } (cm^3/s) \times \frac{\text{Atmospheric Pressure (mbar)}}{\text{Volume } (cm^3)}$$

Where the Volume = Test component, connecting pipe work and internal volume within the Tester (Internal volume: = 10 cm^3).

Example:

Component volume	=	530cm^3
Connecting pipework volume	=	30cm^3
628 volume	=	10cm^3
Total Test Volume	=	570cm^3

LEAK RATE SPECIFICATION = 4 cm^3/min at 1BAR.

Calculation:

$$RL = LR \times \frac{1000}{V} = \frac{4}{60} \times \frac{1000}{570}$$

$$= 0.12 \text{ mbar/s}$$

7.4 Program Linking

The test requirements for many components require more than one test to be performed at different test conditions e.g. test pressure, port selection, etc which can be automated using Program Linking.

Program Linking allows individual programs to be uniquely configured to perform a predetermined sequence of tests instead of manually selecting the individual programs required.

The Linking criteria below specifies the type of jump to be performed dependent upon the test result:

- Disabled, no jump is performed.
- Immediately, jumps to the next selected program.
- Wait for signal, waits for a start input before jumping to the next selected program.
- Pause Delay, jumps to the next selected program after the set period.

7.4.1 Program Linking Features

- A test sequence will continue on a "Pass" result by default but can be modified by setting the "Link Jump On" parameter to continue on a "Reject" or "Pass or Reject" result.
- A test sequence may require a manual operation to be performed before continuing the sequence. This can be configured by setting the “Linking Jump On” parameter to “Wait for Signal” to pause until a start input is received.
- The result outputs are cleared on starting the next program in a sequence and a short delay can be set using the “Linking Pause Time parameter to allow the result to be observed by the user or by an external PLC control system.
- A test sequence will vent between programs by default but can be disabled by setting the "Link Vent" parameter to "Off" to reduce test cycle time.
- The couple output, is controlled by the first program in the linked sequence when enabled and remains on for the duration of the sequence. The couple output settings on the following linked programs are ignored.
- The Auto zero step is only performed by the first program in the Linked series when enabled.
- The statistics for each program in the sequence are updated independently.
- The Ready output remains off for the duration of the sequence.
- The "End of Cycle" output only occurs at the end of the sequence.
- A sequence will be terminated on an Abort input or when an error or fault condition is reported.

- The Run Mode display will display a Link step when the “Linking Jump On” parameter is set to “Wait for Signal” displaying the Hold state as shown below or “Pause Delay” displaying the elapsed time.

7.5 Fast Fill

A Fast Fill (or Prefill) operation can be performed for testers fitted with an electronic pressure regulator when testing large volume or flexible components to reduce cycle time. This is achieved by setting Fill 1 step parameters to pressurize the test part to typically 10 to 20% above the test pressure for a predetermined duration and Fill 2 step parameters to achieve the required final test pressure.

Notes:

1. The upper pressure tolerance during Fill 1 and 2 steps will be set to the highest level of test pressure 1 or 2 plus the pressure tolerance.

2. The lower pressure limit is checked at the end of each step based on the set step test pressure – pressure tolerance.

8

Leak Calibration (Comp/Cal)

8.1 Overview

Leak Calibration, also known as Comp /Cal, is the process by which the tester is 'taught' to accept a non-leaking part and reject a leaking part.

The Tester is supplied fully calibrated to measure pressure changes due to leaks. However, in many cases, the user will require the tester to display leak rate readings directly in flow rate units and be able to set reject limits accordingly.

Leak calibration is a two-step process: the first step is Compensation (Comp), the second is Calibration (Cal).

- **Compensation (Comp):** A test is run with a non-leaking master part installed. This is done to establish and record the small pressure decay characteristics of the non-leaking part and the pneumatic system. In effect, the Comp test compensates for system conditions that may appear to be leaks but are not.
- **Calibration (Cal):** A test is run with a non-leaking master part installed and a calibrated Leak Master added to the circuit. This is done to quantify the pressure loss with a known leak rate. This pressure loss is the equated to the leak rate in sccm. In effect, the cal test calibrates the tester to know what a leak looks like.

If you make any changes to the parameters of the test after performing a Comp/Cal, the Comp/Cal becomes invalid. A Comp/Cal will be required if you make changes to parameters in tests that require Comp/Cal, including the volume of the test component. Each program needs to be calibrated individually.

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The relationship between pressure drop and flow rate is dependent upon the volume of the test component.

The pressure drop/flowrate relationship is given by:

$$\text{Flowrate (cm}^3\text{/s)} = \frac{\text{Rate of Pressure Drop (mbar/s) * Volume (cm}^3\text{)}}{\text{Atmospheric Pressure (mbar)}}$$

Flowrate:	Volumetric flow rate through the leak at atmospheric pressure.
Rate of Pressure Drop:	The total pressure change per second measured by the tester.
Volume:	Total volume including test component, pipe work and internal tester volume (cm³)
Atmospheric Pressure:	Nominally 1013 mbar.

Note: The units used throughout this expression must be consistent i.e. all pressures in psi, bar, etc; all volumes in cm3, ml, etc. and times in minutes or seconds

Example:

A test is performed, using a 628 instrument, at 4 bar on a component with a volume of 530 cm³ giving a pressure drop of 0.12 mbar/s. The equivalent flowrate is derived as follows:

Total Volume:	Component volume	= 530 cm³
	Connecting pipe work volume	= 30 cm³
	628 volume	= 10 cm³
	Total Test Volume	= 570 cm³

$$\text{(Flowrate (cm}^3\text{/s)} = \frac{0.12 \text{ mbar/s} \times 570 \text{ cm}^3}{1013 \text{ (mbar)}}$$

$$= 0.067 \text{ cm}^3\text{/s}$$

In cm³/min the flow rate is:

$$\text{Flowrate (cm}^3\text{/min)} = 0.067 \times 60$$

$$= 4.03 \text{ cm}^3\text{/min}$$

The Tester has a calibration facility to derive the flowrate from the pressure drop.

This function performs a comp and cal test on a master part (i.e. known leak tight component. The comp test determines the offset reading due to background leakage within the system.

The cal test determines the ratio between pressure drop and flowrate units for given leak master and master part.

The tester uses the comp and cal values to display the flowrate units in the following way:

Flowrate = Leak master value * (Pressure Drop - Comp) / Cal

8.2 Performing a Leak Rate Calibration

To perform a calibration a suitable standard leak or flow device is required that is traceable to National Standards. It is advisable to have 2 standard leaks of a given value to allow one to be sent for calibration while the other remains in use. Before starting any calibration procedure, the user must have set and optimized the test parameters to achieve good discrimination between acceptable and leaking components, (refer to Section 7.0). This should be carried out in standard pressure decay units and the results from these tests are used to assist in the calibration procedure.

Changing some of the Calibrate Menu parameters affects associated Reject Level settings.Care should be taken to ensure that correct Reject Levels are set after a Calibrate Menu parameter is changed.

8.2.1 Calibration Test Program Setup

1. Select **Program Mode**.
2. Select **Program**.
3. Select **Comp Cal Data** option and enter the following values:

   Comp Control: On

   Cal Control: On

   Flow Units: Select the leak master flow units.

   Leak Format: Select the required format.

   Leak Value: Enter the leak master flow value.
4. Select **Run Mode.**

Comp Test

1. Select **Cycle Type**.
2. Select **Comp** and press **Start** button to enter value.
3. Select **Run mode** to exit menu.
4. Connect a known good component to the test port.
5. Ensure leak master is removed from calibration port.
6. Press **Start button** to perform the Comp test cycle.

Any previous calibration data is cleared when the Start button is pressed. A pass output indicates the test was successfully completed and Cal test can be performed. An Abort or Reject result indicates an invalid test which must be investigated and resolved before continuing.

7. Select **Cycle Type**.
8. Select **Save t**o save new Comp value.
9. Select next required cycle type and press **Start** to enter value.
10. Select **Run mode**.

Cal Test

1. Select **Cycle Type**.
2. Select **Cal** and press **Start** button to enter value.
3. Select **Run mode** to exit menu.
4. Connect a known good component to the test port.
5. Connect the leak master to the calibration port, or insert the flow orifice into the test line using a"tee", and ensure that the orifice is blanked off.
6. Press **Start** button to perform the Cal test cycle.

Any previous calibration data is cleared when the Start button is pressed. A pass output indicates the test was successfully completed and Cal test can be performed. An Abort or Reject result indicates an invalid test which must be investigated and resolved before continuing.

7. Select **Cycle Type.**
8. Select **Normal** and press **Start** button to enter value.
9. Select **Save** option to save new comp/cal values.
10. Select **Run** mode.
11. Perform normal cycles with and without leak master to verify calibration.

9 Maintenance

For suspected leaks, see “Functional Check” in this section.

If a problem persists, call Uson’s Service Manager at (1) (281)- 671-2000 between the hours of 8 a.m. and 5 p.m., USA Central time. The Service Manager will assign a tracking number, evaluate the situation, and schedule service resources as required.

9.1 Routine Maintenance

To keep the testers in good working order, adhere to the following routine maintenance schedule:

9.1.1 Daily

- Check the function and operation of the instrument.

9.1.2 Weekly

- Check rear filter for traces of oil or water.
- Check pipes to test and reference ports for signs of chaffing.

9.2 Cleaning

Power off the instrument and disconnect from the power supply.

The outer case may be cleaned periodically with a damp cloth or using a proprietary cleaner. Avoid paper based cleaning materials as these may cause scratches on the surface. When the case is clean, rub over the entire surface evenly with a dry clean cloth to remove any residual moisture.

The keypad and display window may be cleaned to remove finger marks with a small quantity of an Isopropanol based cleaning fluid, (isopropyl alcohol) on a clean soft cloth. Avoid paper based cleaning materials as these may scratch the gloss display window. Gently apply the cloth to the surface of the key pad and display window. Do not rub or apply any pressure. Do not under any circumstances immerse or overwhelm with cleaning fluid. Follow any precautions supplied with the cleaning fluid.

Leave the instrument to dry before re-connecting to the power supply.

9.3 Preventive Maintenance

The instrument should be serviced and calibrated regularly by an authorized service engineer. As service intervals depend on the usage of the equipment, refer to the supplier for advice of servicing frequency. It is suggested that this should be performed at least once a year.

9.4 Fuse Replacement

There is a power fuse fitted in the on the rear panel of the tester, the fuse is type T5.0A/250V, 20mm, glass.

To replace the fuse:

1. Ensure the tester is switched off and disconnected from the mains power supply.
2. Unscrew the cover of the fuse holder on the rear panel.
3. Remove the fuse and discard.
4. Fit a new fuse of the same type and rating into the fuse holder.
5. Screw the fuse holder back into position.

Note: It is recommended that the reason why the fuse has blown is established and rectified before power is re-applied.

9.5 Functional Check

9.5.1 Introduction

This check should be repeated as often as appropriate, at the start of a shift, on change of component, etc.

This procedure entails two tests: the first is to check the system integrity for leak tightness, and the second is to ensure that the system reports a reject condition for a known leaking component.

9.5.2 Leak Tightness Test

1. Set up the system for a normal test run. The system must be complete with all the usual pipe work. Install a test component that is known to be leak tight. Clamp and seal the component in the usual way. Run the system through one test cycle and note the resultant reading.
2. Ideally, the system should be leak tight and give a near zero reading for good components. Any large leaks should be located and repaired.
3. In practice, the technique used may indicate a leak. If so, check that the effect is consistent from one leak tight component to another.

9.5.3 Leak Comparison Test

This test requires the use of a standard, calibrated leak, which must be fitted to the normal pipe work of the installation.

Standard leaks should be manufactured to a specific requirement of gas type, pressure and leak rate with a certificate of traceability to national standards. Suitable leaks can be made to order, and are available through your supplier.

Standard leaks must be checked at least once a year either, against a suitable flow meter, or by returning it to the supplier. A Standard leak should be treated as a calibrated instrument.

1. Following on the Leak Tightness test, install a known, standard leak on the normal test installation.
2. Run the system through one test cycle and note the resultant reading.

- The difference between the two readings should be the same as the standard leak.
- If the readings do not match, the volume or temperature of the system may have changed since the last flow rate calibration and need to be investigated. A re-calibration of the system will be required to compensate for any changes.
- If the Reject Level is set to coincide with the standard leak used, the result of the Comparison Test should have been signalled by the instrument as a failed component.

9.6 Software Update

Contact Uson Support to receive new software updates. Once you receive your software update, copy the files (install.sh and 628) to a USB memory device in folder \uson\628 (note: uson must be in lower case letters).

NOTE: Only USB devices formatted with FAT32 are supported.

To install the new software, perform the following:

1. Complete **login** when password option is enabled.
2. Insert the USB memory device into the USB port and wait for the activity light on the device to stop flashing.
3. Select **Program Mode**, **Hardware**, and **Software Version** menu.
4. Select the **Update** option, USB Device, to install new software version.
5. Once the update completes, return to **Run Mode**.
6. Power cycle the tester to finish the software update.

10
Spares/Accessories

10.1 Spares

Spares can be ordered from your sales office or through support (281-671-2222). When ordering spares, please quote the description and part number of the item required.

The right is reserved to supply alternative items with equal or improved performance to those quoted in this parts list. The following list of spare parts are available, if no tester is defined, the item is common to all types:

Item	Part No
Differential Transducer (0 to 20mBar/ 0-3 psi)	Q620055
Gauge Transducer (0 to 1Bar/15 psi) or Vacuum	045852.DP
Gauge Transducer (0 to 4Bar/60 psi)	045145.DP
Gauge Transducer (0 to 10Bar/150 psi)	045848.DP
Gauge Transducer (0 to 15Bar/225 psi)	045846.DP
Differential Pressure PCB	Q160005
Main PCB Assy.	628200
I/O Power Supply	640235
Solenoid, Manifold	690157
Combination Valve	Q620047
Pilot Regulator	Q7/1351
Filter Coupling	Q102026
Inlet Filter Assembly	Q7/1349
Manual Vacuum	067052
Manual Pressure (1 Bar/15 psi)	067030
Manual Pressure (4 Bar/60 psi)	067034
Manual Pressure (10 Bar/150 psi)	067035
Manual Pressure (15 Bar/225 psi)	067036

Electronic Vacuum	039760
Electronic Pressure (1 Bar/15 psi)	039761
Electronic Pressure (4 Bar/60 psi)	039762
Electronic Pressure (10 Bar/150 psi)	039763
Electronic Pressure (15 Bar/225 psi)	039758
Display	690121
Membrane Switch Panel	690112
22mm Red Push Button Assembly (Front Panel)	640090
22mm Green Push Button Assembly (Front Panel)	640091
Rocker switch	7/4087
5/3 Nylon Tube (Per meter)	Q3/1079
6/4 Nylon Tube (Per meter)	Q7/344
Rubber Foot	Q7/3868
6/4 Blanking Cap	Q7/330
5/3 Blanking Cap	Q7/1341
T5.0A/250V Fuse (external)	018223

10.2 Accessories

The following is a list of accessories that are available.

Item	Part No
Printer Kit	650201
Remote Start/Reset Pendant.	690210
SP712 Printer Ribbon	Q7/4600
SP712 Paper Roll	Q7/3791
Q6 I/O Adapter Cable	69020
Vacuum Oil-less Pump (UK)	690211
Vacuum Oil-less Pump (USA)	690212
Vacuum Oil-less Pump (EU)	690213

11
Appendix A -Sample Reports

11.1 Sample Reports

The following are sample reports for: Configuration, Differential Sensor, Gauge Sensor, Program 1, Regulator, Setup, Statistics 1.

```
----------------------------------------
                Config
----------------------------------------
Date                             8.09.2020
Time                               3:30:42
Serial Number                  000000-000S
----------------------------------------
Model Code                   U628-000-0001
Serial Number                  000000-000S
Company                            Uson LP
Software Version                   1.0.8.0
----------------------------------------
                  628
----------------------------------------
```

```
----------------------------------------
          Differential Sensor
----------------------------------------
Date                             8.09.2020
Time                               3:30:39
Serial Number                  000000-000S
----------------------------------------
Sensor Type          Differential Pressure
Sensor Range                      20 mBar
Sensor Unit                          mBar
ADC Zero                          72319
ADC Span                     4291366017
Span Target                   20.00 mBar
Calibration Date               5.03.2019
----------------------------------------
                  628
----------------------------------------
```

Gauge Sensor	
Date	8.09.2020
Time	3:30:37
Serial Number	000000-000S
Sensor Type	Gauge pressure
Sensor Range	15 PSI
Sensor Unit	PSI
ADC Zero	4294920367
ADC Span	3821925
Span Target	15.00 PSI
Calibration Date	27.06.2019

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Program 1	
Date	8.09.2020
Time	3:45:43
Serial Number	000000-000S
Program Name	Program 1
+ Reject	1.00 mBar
- Reject	-1.00 mBar
Pass Result	In Band
Test Pressure	0.00 PSI
Test Pressure2	0.00 PSI
Pressure Tolerance	1.00 PSI
Couple Time	0.0 s
Azero Time	0.1 s
Fill Time	5000.0 s
Fill Time2	0.0 s
Stab Time	1.0 s
Measure Time	1.0 s
Vent Time	1.0 s
Comp Control	On
Comp Value	0.00 mBar
Cal Control	Off
Cal Value	0.00 mBar
Flow Units	mls
Leak Format	###.##
Leak Value	0.00 mls
Jump Method	Disabled
Jump On	Pass
Jump To Program	01: Program 1
Pause Time	0.0 s
Vent Enabled	On

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Regulator	
Date	8.09.2020
Time	3:30:40
Serial Number	000000-000S
Regulator Type	Electronic
Regulator Zero	0
Regulator Span	10000
Span Target	15.00 PSI

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Setup	
Date	8.09.2020
Time	3:29:43
Serial Number	000000-000S
Gauge Units	PSI
Diff Units	mBar
Start Method	Front
Program Selection	Run Mode
Reset Mode	None
Spool Check	Off
Audit Output	USB
Baud Rate	9600
Parity	None
Data	8
Control	None
Control	Off
Time	10
Language	English
Brightness	50
Backlight Timeout	0
Audio	Off
Audio Volume	50
Date Format	DD/MM/YYYY

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Statistics 1	
Date	8.09.2020
Time	3:29:45
Serial Number	000000-000S
Pass Count	6
Reject Count	0
Abort Count	18
Test Count	24
Minimum	-0.01 mBar
Maximum	0.00 mBar
Average Pass	0.00 mBar
Average Reject	0.00 mBar
Pass CPK	99.99

628

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V

W