Operating Manual

Tracer Gas Filler

Sensistor ILS500 F/FHP

Catalog No.
590-580, 590-581
Type No. ILS.210.307
From software version
4.00.00

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1 About this manual

The purpose of this manual is to:

- Describe the working principles of the ILS500 F/FHP and its different parts
- Show examples of different types of test stations
- Teach the reader how to set up the ILS500 F/FHP for different test purposes

Document history

Revision	Date	Remark
a	10-2014	First edition
b	10-2021	Second edition

Warnings

⚠ DANGER

Imminent hazard resulting in death or serious injuries

⚠ WARNING

Hazardous situation resulting in potential death or serious injuries

⚠ CAUTION

Hazardous situation resulting in minor injuries

NOTICE

Hazardous situation resulting in damage to property or the environment

1.1 Target groups

These operating instructions are intended for the owner and for technically qualified personnel with experience in leak detection technology and integration of leak detection devices in leak detection systems. In addition, the installation and use of the device require knowledge of electronic interfaces.

2 Safety

2.1 Duties of the operator

- Read, observe, and follow the information in this manual and in the work instructions provided by the owner. This concerns in particular the safety and warning instructions.
- Always observe the complete operating instructions for all work.
- If you have any questions about operation or maintenance that are not answered in this manual, contact customer service.

2.2 Intended use

The ILS500 F and ILS500 FHP tracer gas fillers are used to fill test objects with tracer gas in a safe and controlled manner in conjunction with the leak detectors.

Improper use

- Use in radioactive areas
- Use of accessories or spare parts, which are not included in this instruction manual
- Use outside the technical specifications, see Technical Data [▶ 16]
- Aspiration of liquids into the device
- Operation without exhaust line on gas detection system
- Using the device in potentially explosive atmospheres
- Using the device with detectable defects or defective power switch

2.3 Owner requirements

The following notes are for companies or any person who is responsible for the safety and effective use of the product by the user, employees or third parties.

Safety-conscious operation

- Operate the device only if it is in perfect technical condition and has no damage.
- Only operate the device properly in accordance with this instruction manual, in a safety and risk conscious manner.
- Adhere to the following regulations and observe their compliance:
  - Intended use
  - Universally valid safety and accident prevention regulations
  - International, national and local standards and guidelines

  - Additional device-related provisions and regulations
- Only use original parts or parts approved by the manufacturer.
- Keep this instruction manual available on site.

Personnel qualifications

- Only instructed personnel should be permitted to work with and on the device. The instructed personnel must have received training on the device.
- Make sure that authorized personnel have read and understood the instruction manual and all other applicable documents.

2.4 Dangers

- The ILS 500 F/FHP must never be introduced to pressures higher than that approved for the object to be tested and never beyond the ILS 500 F/FHP specification.
- Be sure to have a pressure relief valve in case of accidental tracer gas pressure increase.
- When dealing with high pressures, a blast protection is needed between the test ports and the test object.
- When dealing with test objects that cannot stand high pressure increase, make sure to mount a flow control valve on the test ports.
- Make sure not to confound compressed air and tracer gas.
- INFICON can not take any responsibility for the consequences arising from inappropriate use of certain test pressures.

Failure to observe the following precautions could result in serious personal injury:

- Tracer Gases can be flammable or asphyxiating. Use only ready-made Tracer Gas mixtures.
- Since the tracer gas mix contains no oxygen, releasing large amounts of the gas in a confined space may lead to asphyxiation.
- Compressed gases contain a great deal of stored energy. Always carefully secure gas bottles before connecting a pressure regulator. Never transport gas bottles with a pressure regulator fitted.
- Pressurizing objects at too high pressures can lead to the object bursting. This in turn can result in serious injury or even death. Never pressurize objects that have not previously been burst-tested or have otherwise been approved for the test pressure you intend to use.
- The ILS 500 F/FHP has no internal emergency stop circuit. The ILS 500 F/FHP is prepared for integration into an external emergency stop circuit.

- Check that all relevant legislation and safety standards are complied with before putting the ILS 500 F/FHP into service. See further information under Setup [▷ 30].

Failure to observe the following precautions could result in damage to the equipment:

- If the tracer gas filler suffers external damage, it must be checked and repaired by a service organization authorized by INFICON.
- Always switch power off before connecting or disconnecting any cable.
- Before connecting the tracer gas, confirm that the connectors or test object is designed for operating at the test pressure to be used.

3 Description

The Sensistor ILS500 F/FHP is a stand alone tracer gas filler with all necessary functions integrated in one very compact housing. The purpose of the ILS500 F/FHP is to make it possible to set up a fully automatic leak test system quickly, to a low cost.

The ILS500 F/FHP can also be combined with both hydrogen and helium INFICON leak detectors.

All functions are accessible and programmable using a touch panel. The test sequence is controlled by an integrated controller.

To make operation easier, a mouse or a keyboard can be connected to the USB port.

3.1 Intended Use

ILS500 F/FHP is designed for indoor use only.

ILS500 F/FHP is manually controlled using the START and STOP buttons and the menu system of the touch panel. The screen also shows the steps of the test sequence graphically and in plain text.

3.2 Available Configurations

Configuration	Purpose
Sensistor ILS500 F	For common tracer gas leak detection
Sensistor ILS500 FHP	High Pressure (HP) When a higher tracer gas pressure is needed.

The actual configuration is shown on the display during start-up and in the menu when clicking **Setup >> Info**.

3.3 Front View

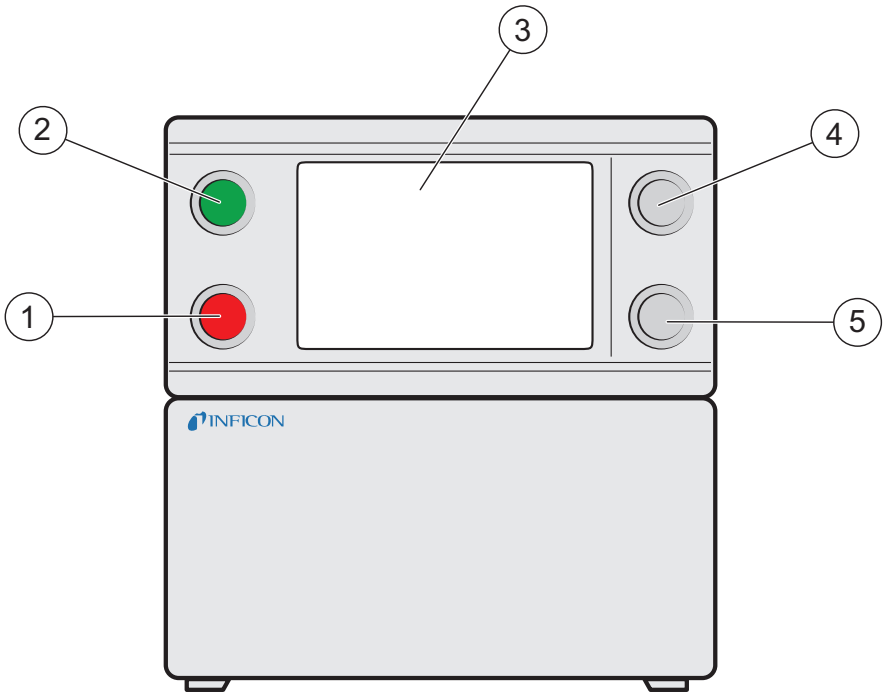


Fig. 1: ILS500 F/FHP Front View

1	Red lamp
2	Green lamp
3	ILS500 F/FHP Touch panel
4	START button
5	STOP button

3.4 Rear View (Electrical)

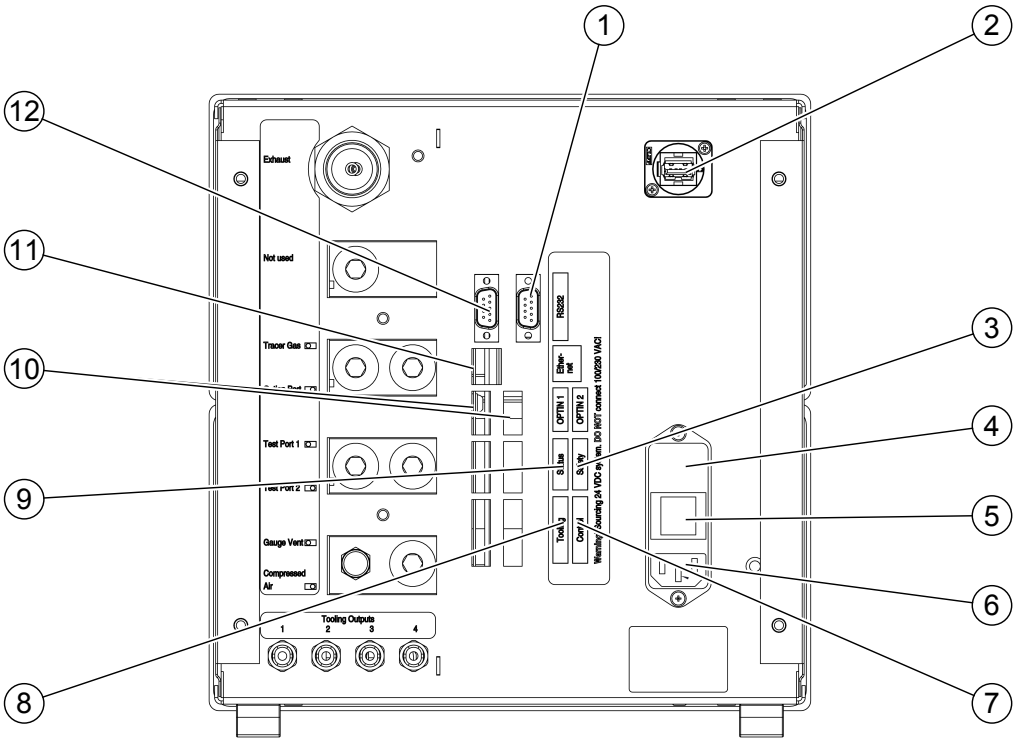


Fig. 2: Rear View (Electrical)

1	(not used)	2	USB Port
3	Safety Interface	4	Fuses
5	Power Switch	6	Power Input
7	Control Output	8	Tooling Interface
9	Status Output	10	Inputs 1 and 2 (optional)
11	Ethernet	12	RS232

For more information, refer to Technical Data [▶ 16].

3.5 Configuring Ports and Interfaces (Electrical)

Port/Interface	Connect
Safety Interface	Emergency Stop Circuit
Power Input	Power Cable
Control Output	Optional External Valves
Tooling Interface	External sensors for tooling control
Status Output	Light Tower etc.
Input 1 (optional)	Analogue Input (not supported by std software)
	Digital Input (not supported by std software)
Input 2	Active Holder for Hand Probe

Port/Interface	Connect
	(if ISH2000 Leak Detector is connected).
Ethernet	Ethernet (remote view and control of touch panel)
RS232	Serial Printer
	Logging Device (e.g. PC).
	Remote Control (START, STOP etc.).
USB	The USB port can be used to connect a mouse, an external keyboard, or a flash drive (for download and upload of recipes or to save screen dumps).

3.6 Rear View (Pneumatical)

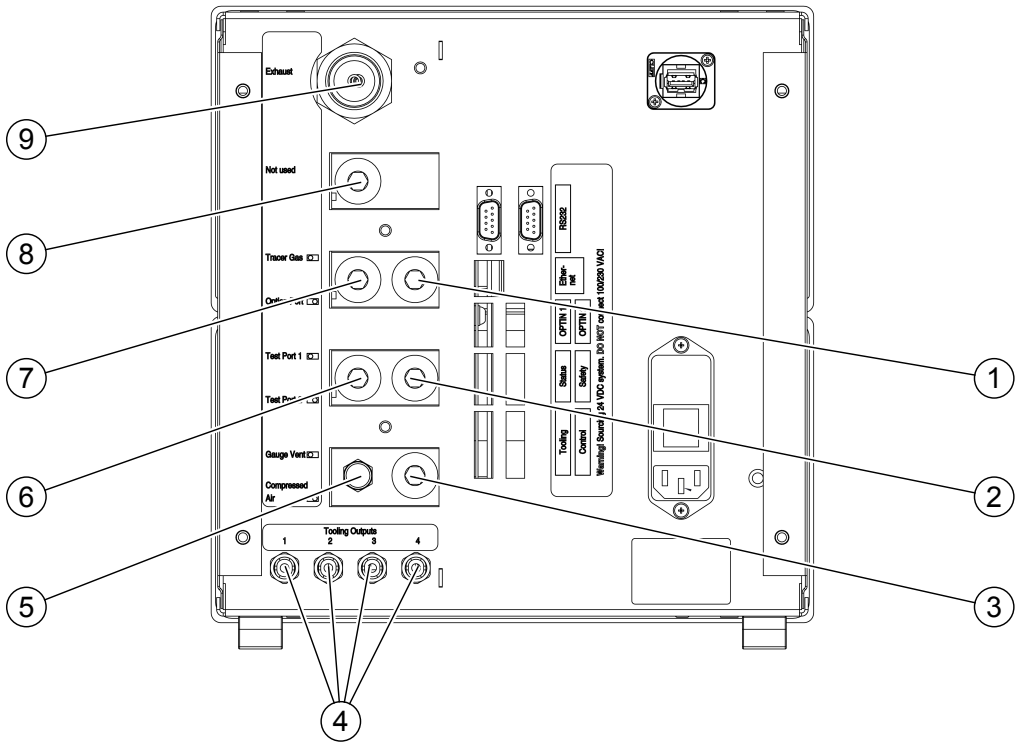


Fig. 3: Rear View (Pneumatical)

1	Optional Port	2	Test Port 2
3	Compressed Air Input	4	Tooling Valve Outputs 1-4
5	Vacuum Gauge Vent	6	Test Port 1
7	Tracer Gas Input	8	Plugged Port
9	Exhaust		

NOTICE

► Do not remove the plug from the plugged port in pos. 8.

3.7 Configuring Ports and Interfaces (Pneumatical)

Port/Interface	Port Thread
Exhaust	Barb Fitting: ID 25 mm (1 in.)
Tracer Gas Input	BSP 3/8" (NPT 3/8" adaptor included)
Test Port 1	BSP 3/8" (NPT 3/8" adaptor included)
Test Port 2	BSP 3/8" (NPT 3/8" adaptor included)
Compressed Air Input	BSP 3/8" (NPT 3/8" adaptor included)
Tooling Valve Outputs 1-4	Hose Connectors: OD 4 mm (0.16 in.)

3.8 Labels

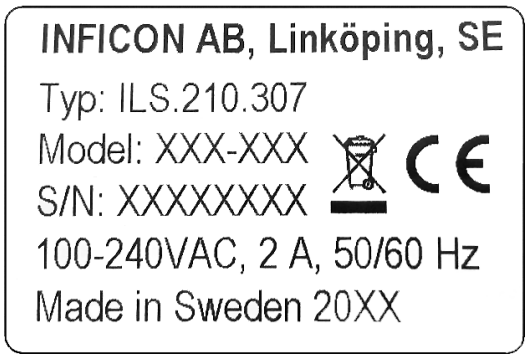


Fig. 4: Device Label

Fig. 5: Tooling Label

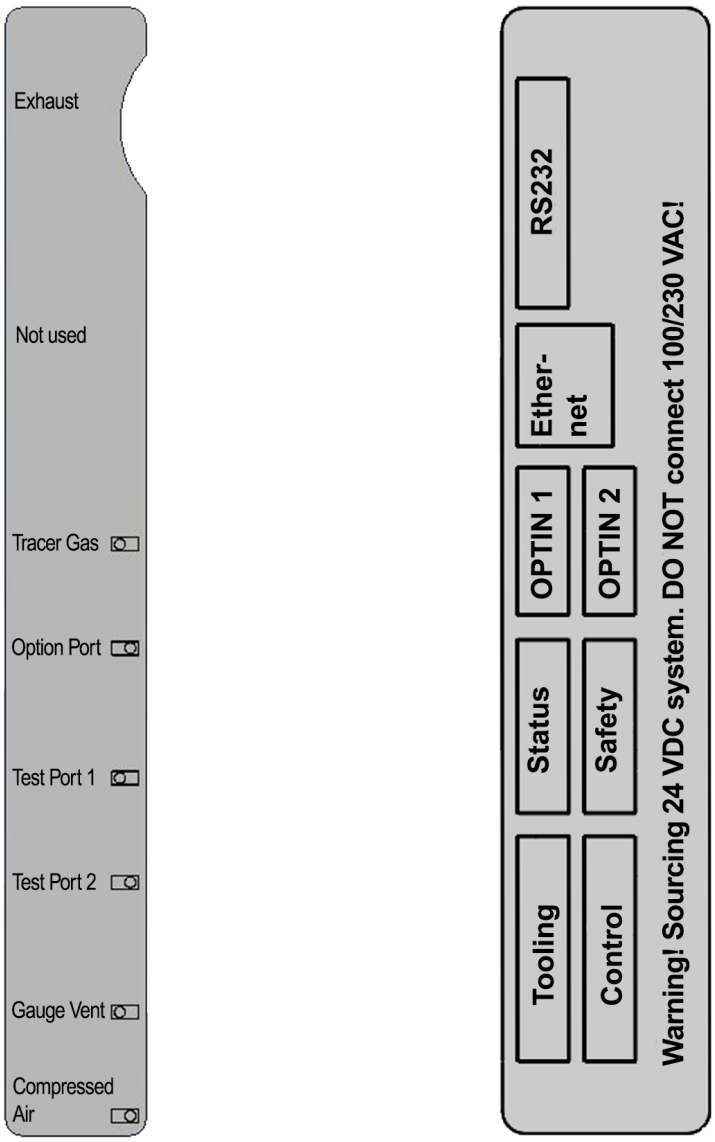
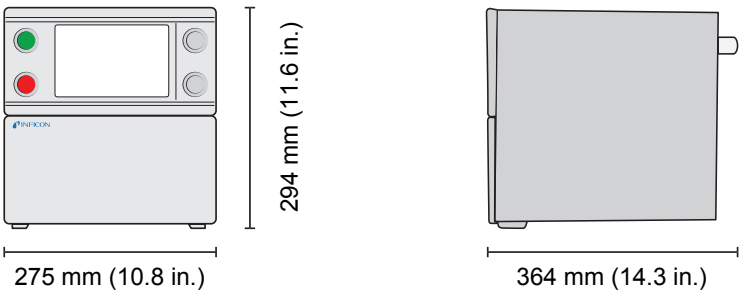


Fig. 6: Pneumatical label (left) and electrical label (right)

3.9 Technical Data



3.9.1 Electrical Specifications

Electrical Supply	
Mains Voltage	Single Phase

Electrical Supply	
	110-240VAC 50/60 Hz
Current	1.0 A at 100 VAC 0.45 A at 230 VAC
Power Rating	120 W max 33 W typical average
Inrush Current	Max 40 A
Mains Connector	IEC/EN 60320-1/C14
Recommended Fuse Rating	2 A slow 6.3 x 32 mm, 0.2 x 1.3 in. (2 needed)

3.9.2 Pneumatic Specifications

Compressed Air Supply		
Pressure	Std Model	0.35–0.7 MPag (3.5–7.0 barg) (50–100 psig) Reduced vacuum capacity below: 0.5 MPag (5.0 barg) (70 psig)
	HP model	0.5–0.7 MPag (5.0–7.0 barg) (70–100 psig)
Peak Consumption at 6 barg (87 psig)		240 l/min (508 SCFH)
Quality		Oil free and filtered to 5 µm
Dew point		Max 10°C (50°F)

Tracer Gas Supply		
Composition		Inert non-condensing gas
Pressure	Std Model	0.005–1.0 MPag (0.05–10.0 barg) (0.72–145 psig)
	HP model	0.02–3.0 MPag (0.2–30.0 barg) (3–435 psig)

Tracer Gas Supply		
Quality		Industrial grade purity (>95% purity)

Exhaust	
Capacity in Exhaust Duct	Min 30 m^3/h (1000 SCFH)
Dimensions of Hose Leading to Duct	ID 25 mm (1 in.)

Pneumatic	
Valve bore*	7 mm (0.28 in.)

*: Capacity is given for 500 mm (20 in.) of ID 10 mm (0.4 in.) hose between ILS500 F/FHP and test volume.

Evacuation	
Max vacuum	-85 kPag (-0.85 barg, -12.3 psig)
Capacity	0.4 s/l to -50 kPag (-0.5 barg, -7.2 psig)
	1.5 s/l to -80 kPag (-0.8 barg, -11.6 psig)

Filling	
Capacity at 1 MPag supply	0.1 s/l to 0.6 MPag (6,0 barg, 87 psig)

Tooling Output Valves	
Valve type	Normally closed, 3/2 valve
Q_n	160 std l/min
C_v	0.16 USGPM/psig

Gas and Air Connection	
Ports	Female ISO 3/8" (ISO to NPT 3/8" adapter included)
Hose connector	4 of OD 10 mm (0.4 in.) connectors included

3.9.3 Other Data

General Data	
Dimensions	295 x 275 x 330 mm (12 x 11 x 13 in.)
Weight	15.1 kg (33.3 lb.)
Ambient temperature	10–40°C (50–100°F)
Ambient humidity	85% RH (non condensing)
Protection	IP30

3.9.4 Interfaces and Connectors

All interfaces signals except the serial. Communication interfaces are discrete 24 VDC logic signals.

Output signals (OUT) are sourcing transistor outputs. Input signals (IN) are transistor inputs.

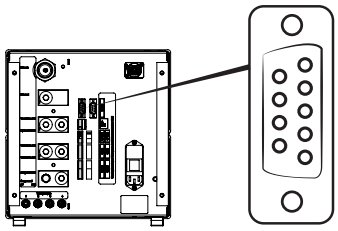
Max current of each signal is given in the tables below. Total current (sum) must, however, be within instrument specification.

NOTICE

Outputs are not relay types.

► Do not connect external drive source such as 24 V or 100/230 VAC.

3.9.4.1 RS232



Connector:	9 pin male D-sub
Purpose:	Connection of serial printer or logging device (e.g. PC or PLC)
Cable:	Standard female to female file transfer cable (null modem)
Baud Rate:	9600 default (1200 - 115200 selectable)

Pin	Signal
1	Not used
2	RD
3	TD
4	Not used
5	SG
6	Not used
7	Not used
8	Not used
9	Not used

Specification	
Standard	RS232C
Data rate	9600 baud
Data bits	8
Stop bits	1
Parity	none
Flow ctrl	none

Printing of results

The printer port prints the result of every test. In hand probe mode the result printed is “ACCEPT” or “REJECT” followed by date & time and recipe name (if used) and end Char New Line (0A, LF).<09> (Char Tab, 09) is used as a separator.

For Example: **"TEST_ACCE<09>2013-09-04 13:23:03<09>Factory Default<0A>"**

If the test cycle is rejected by any other test this will be printed. Followed with date, time and recipe name. Hardware error prints “ERROR”.

For example: **“ERROR<09>2013-09-04<09>Factory Default<0A>”**.

On the ILS500 (Service/RS232), you can choose if you want to include time and date in every result from the ILS500 or not. If it’s on the result will be: **"TEST_ACCE<09>2013- 09-04 13:23:03<09>Factory Default<0A>"** and if it’s off: **“TEST_ACCE<0A>"**.

When filling is successfully completed FILL OK is printed. No information about time and date is printed.

Results from ILS500 F/FHP

Results	Explanation
TEST_ACCE	Test accepted (if a leak detector is connected)
TEST_REJE	Test rejected (if a Leka detector is connected)
USER_FAIL	User has pressed stop
EVAC_FAIL	Evacuation failed
VDEC_FAIL	Vacuum decay test failed
FILL_FAIL	Tracer gas filling failed
PDEC_FAIL	Pressure decay test failed
BLOC_FAIL	Blockage test failed
REFI_FAIL	Tracer gas refill failed
TEST_STRT	Test cycle started
TEST_DONE	Test cycle finished
FILL_DONE	Filling completed
RECH_DONE	Recipe change done
RECH_FAIL	Recipe change failed
ERROR	Hardware error on ILS500

Commands

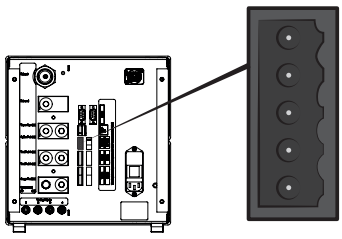
The printer port can also be used to control the ILS500 F/FHP. The most commonly used functions can be started/configured over the RS232 interface. Always use New Line (0A,LF) as end character.

Command	Action
M<0A>	Start measurement
Q<0A>	Stop measurement
S<0A>	Statistics (see table below)
RS<0A>	Reset statistics
R<09>	Factory Default <0A> loads a recipe. For example “R<09>Factory Default” loads the recipe Factory Default. When the recipe is loaded the recipe name is echoed back. If a recipe name isn’t in the ILS500 F/FHP, the answer from the ILS500 F/FHP will be “Not a recipe name!”

Statistics	Printed data	Explanation
REC:AP29	Recipe name	Printed if recipes is activated
TOT:00031	Total	
ACC:00009	Accepted	
REJ:00022	Rejected	
EVA:00001	Evacuation	
VDE:00000	Vacuum decay	
BLO:00006	-Blockage test	
FIL:00001	-Gas filling	
PRE:00000	-Pressure decay	
GAS:00014	Gas detector	

The number printed behind the colon represents the number of occurrences. For example: TOT:00031 means that 31 total tests have been made.

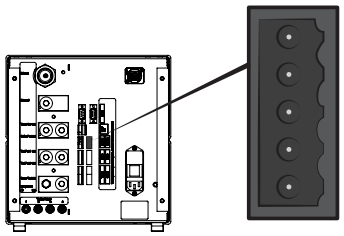
3.9.4.2 Input 1 (Optional)



Connector:	5 pin male Weidmüller, Omnimate BL3.5. Mating screw terminal included.
Purpose:	Options port 1. Optional analogue or digital input (not supported by std software).

Pin	Signal	Type	Load	Comment
1	+24 VDC	SUPPLY	250 mA	Option supply.
2	VIN1	IN	-60 mA	Voltage input: Digital 24 VDC or analogue 0-10 VDC.
3	IIN1	IN	+/-30 mA	Current input: 0-20 mA.
4	COM1	IN	-250 mA	Signal common (GND).
5	COM/SHLD	GND	+/-30 mA	Shield.

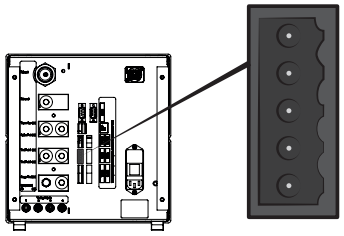
3.9.4.3 Input 2 (Optional)



Connector:	5 pin male Weidmüller, Omnimate BL3.5. Mating screw terminal included.
Purpose:	Options port 2. Used for “Active Holder for Hand Probe” (90630).

Pin	Signal	Type	Load	Comment
1	+24 VDC	SUPPLY	250 mA	Option supply.
2	VIN2	IN	-60 mA	Voltage input: Digital 24 VDC or analogue 0-10 VDC.
3	IIN2	IN	+/-30 mA	Current input: 0-20 mA.
4	COM2	IN	-250 mA	Signal common (GND).
5	COM/SHLD	GND	+/-30 mA	Shield.

3.9.4.4 Status Output



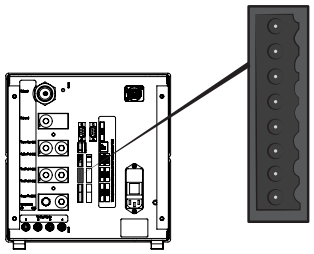
Connector:	6 pin male Weidmüller, Omnimate BL3.5. Mating screw terminal included.
Purpose:	Test Status Outputs. Sourcing 24 VDC transistor outputs.

Pin	Signal	Type	Load	Comment
1	RUNNING	OUT	0.5 A	Cycle running.
2	ACCEPT	OUT	0.5 A	Tested part accepted.
3	REJECT	OUT	0.5 A	Tested part rejected.
4	ERROR	OUT	0.5 A	Summing error.
5	EOT/FILLED	OUT	0.5 A	End of test or gas filled indicator (selectable).
6	COM	GND	-2.0 A	Common GND.

NOTICE

Gas filling status is available on the STATUS connector (pin 5) on the back of the unit. Connect to a lamp for easy notification of “End of test” status.

3.9.4.5 Tooling Interface



Connector:	8 pin male Weidmüller, Omnimate BL3.5. Mating screw terminal included.
Purpose:	Electrical tooling interface.

Pin	Signal	Type	Load	Comment
1	+24 VDC	SUPPLY	300 mA	Tooling switch supply (e.g. proximity switch).
2	TS1	IN	-7 mA	Tooling switch 1.
3	TS2	IN	-7 mA	Tooling switch 2.
4	TS3	IN	-7 mA	Tooling switch 3.
5	TS4	IN	-7 mA	Tooling switch 4.
6	MARKER*	OUT	0.5 A	Marker output. Selectable mark on REJECT or ACCEPT.
7	COM	GND	-1.0 A	Common GND.

Pin	Signal	Type	Load	Comment
8	COM	GND	-1.0 A	Common GND.

*: MARKER output (Tooling Connector, pin 6) can be used to send a start pulse to marking equipment such as an engraving machine or a valve controlling a simple pneumatic stamp. Function and length of pulse is set by the following two parameters:

- Marker Output:

  Length of marker output pulse.

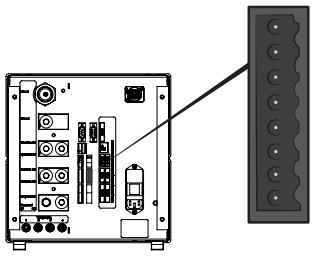
  Output will go high at end of gas test and stay high for the given time.

- Marker Output High if Leak:

  Decides function of marker pulse. To mark rejected part set to OFF.

  To mark accepted part, set to ON.

3.9.4.6 Control Output



Connector:	8 pin male Weidmüller, Omnimate BL3.5. Mating screw terminal included.
Purpose:	External start and stop. Control of optional external valves.

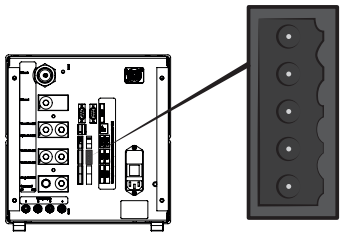
Pin	Signal	Type	Load	Comment
1	+24 VDC	SUPPLY	2.0 A	Start and stop switch and supply.
2	EXTSTART	IN	-7 mA	Start button return (NO contacts) or contact to +24 VDC.
3	EXTSTOP	IN	-7 mA	Stop button return side (NO contact) or contact to +24 VDC.
4	EVAC1	OUT	0.5 A	Venturi valve output.
5	EVAC2	OUT	0.5 A	Evacuation valve output.
6	GASFILL	OUT	0.5 A	Fill valve output.
7	OPTOUT	OUT	0.5 A	
8	COM	GND	-1.0 A	Common GND for outputs.

3.9.4.7 Power Input

Specification	
AC mains voltage	110-240 V 50/60Hz.
AC mains current	Typically 1 A (2 A pulse at power on).

3.9.4.8 Safety Interface

Risk assessment is the sole duty of the user of the ILS500 F/FHP.



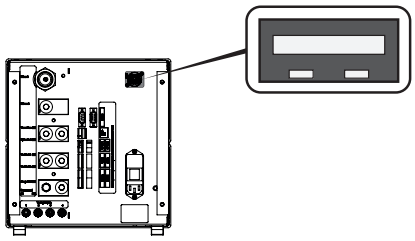
Connector:	6 pin male Weidmüller, Omnimate BL3.5. Mating screw terminal included.
Purpose:	Emergency stop interface.

Pin	Signal	Type	Load	Comment
1	+24 VDC	SUPPLY	2.5 A	
2	AUX1	-	+/-1-5 A*	Terminal 1 of safe relay contacts for auxiliary external use.
3	AUX2	-	+/-1-5 A*	Terminal 2 of safe relay contacts for auxiliary external use.
4	ESTATUS	OUT	0.5 A	Internal emergency circuit stopped. Use for reset lamp or PLC monitoring.
5	SAFESPLY**	SUPPLY	-2.5 A	24 VDC supply from EXTERNAL emergency stop circuitry.
6	COM	GND	1.0 A	Common GND.

*: 250 VAC 5 A cosj =1; 30 VDC 5 A L/R = 0 ms; 240 VAC 2A cosj = 0.3; 24 VDC 1A L/R = 48 ms

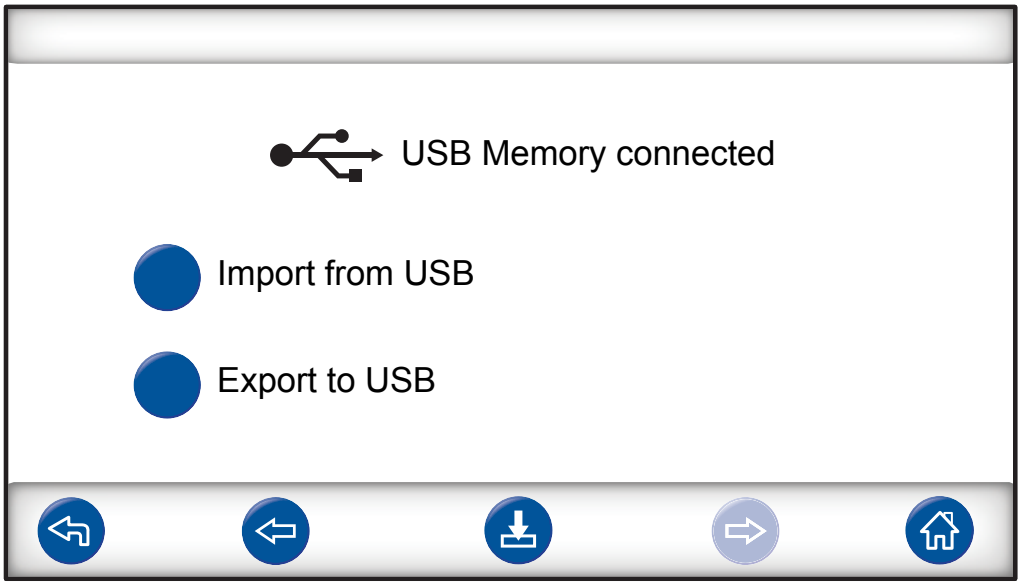
**: SAFESPLY feeds risk associated loads inside the ILS500 F/FHP. These include all gas and tooling valves.

3.9.4.9 USB Port



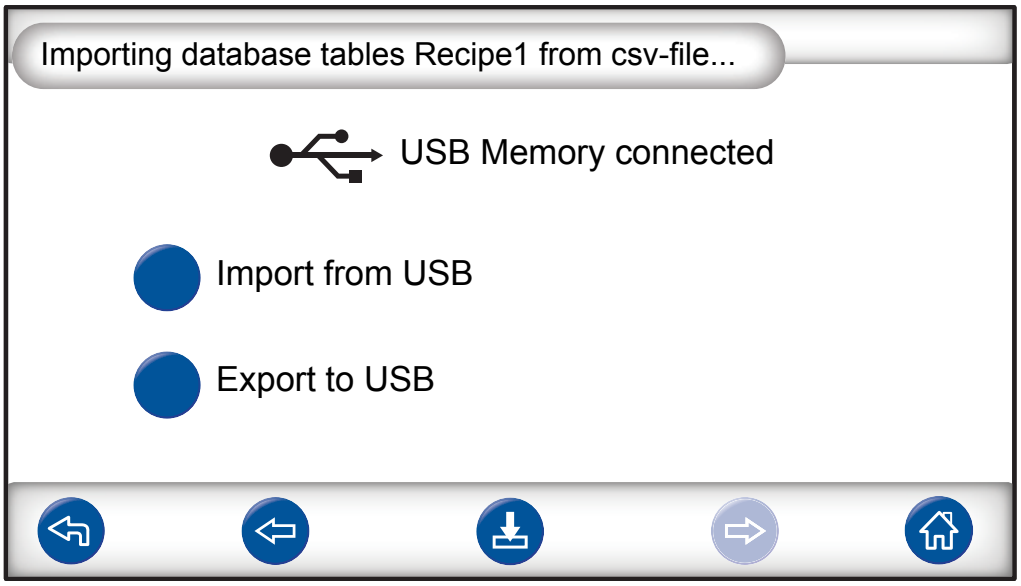
Connector:	USB
Purpose:	Used for import and export of recipes.

USB is connected



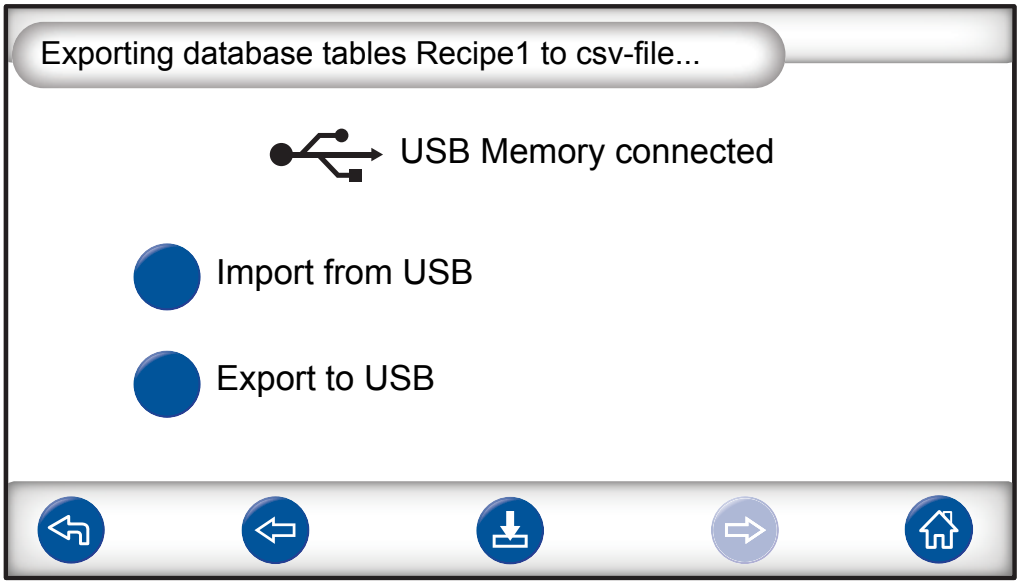
An icon for USB is shown when installing the USB flash drive.

Import Recipe from USB



When importing recipes all recipes are imported from a file named Recipe1.csv.

Export Recipe to USB



When exporting recipes all recipes are exported to a file named Recipe1.csv.

See also

Removing the Cover [▶ 80]

4 Equipment and Storage

4.1 Supplied Equipment

NOTICE

► When receiving the equipment, check that it has not been damaged during transport.

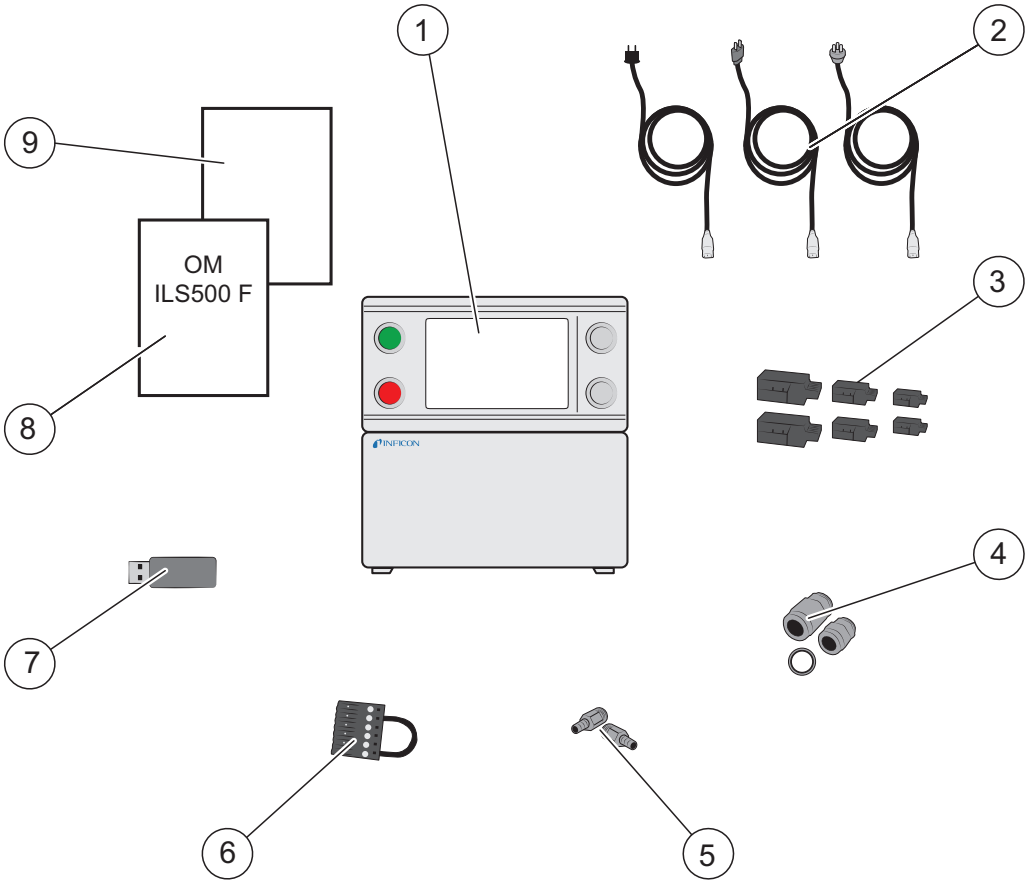


Fig. 7: Supplied Equipment

1	1 ×	Sensistor ILS500 F (590-580) Sensistor ILS500 FHP (590-581)
2	1 ×	Power cables (EU, UK, US) (592-082)
3	1 ×	Screw terminal connectors for external I/O signals (591-617, 591-633, 591-634)
4	4 ×	Thread converter set (ISO to NPT Conversion) with steel gasket
5	4 ×	10 mm hose connection female
6	1 ×	Safety override loopback
7	1 ×	USB flash drive with relevant manuals (592-095)

8	1 ×	Operating manual Sensistor ILS500 F/FHP (this manual, 592-121)
9	1 ×	Return Product Condition Report

Some pneumatic ports are plugged upon delivery.

► Store the removed plugs. They are used for future hardware testing.

Refer to Spare Parts and Accessories [▷ 85] for accessories to the ILS500 F/FHP.

4.2 Required Equipment

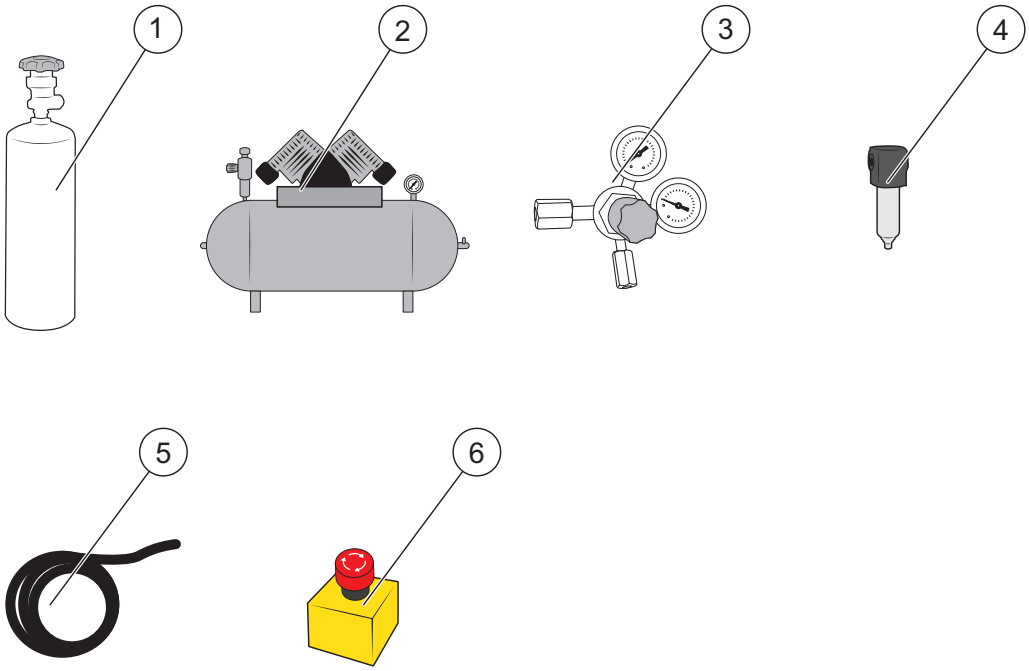


Fig. 8: Required Equipment

1	Tracer Gas
2	Compressed Air
3	Two-Step Gas Regulator
4	Compressed Air Filter
5	Exhaust Hose
6	Emergency Stop Circuit (recommended)

4.3 Storage

For prolonged storage, factors such as temperature, humidity, saline atmosphere etc., may damage the detector elements.

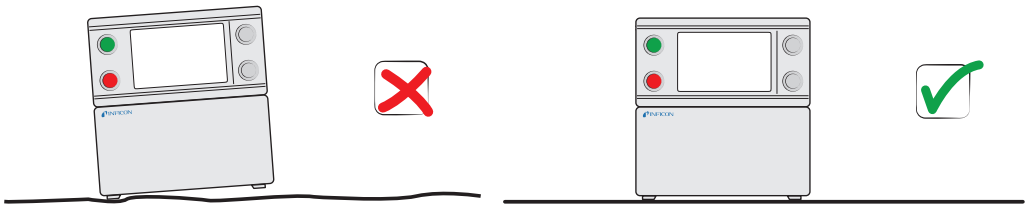
Please contact your local representative for more information.

5 Setup

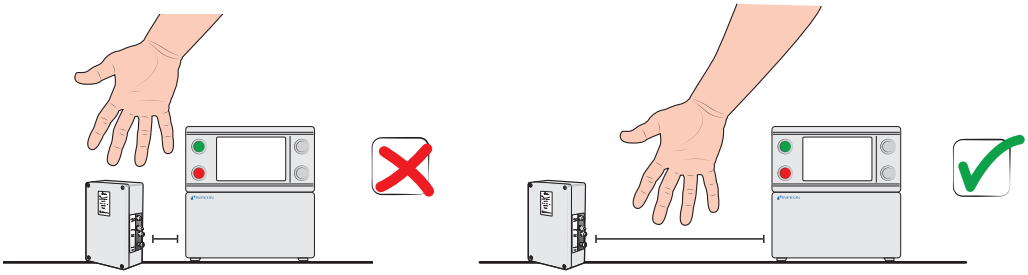
⚠ CAUTION

► Check that you comply with all relevant legislation and safety standards before putting your ILS500 F/FHP into service.

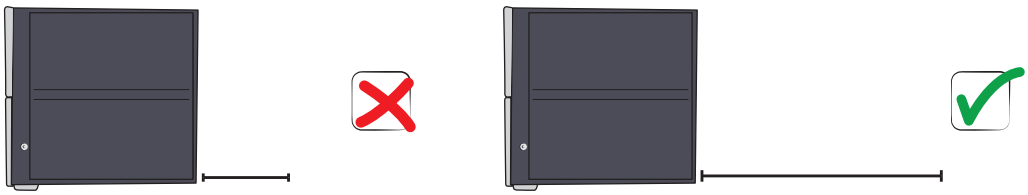
5.1 Placement of the ILS500 F/FHP



Place the ILS500 F/FHP on a flat surface, as close as possible to the test fixture and ventilation system.



Some free space must be provided around the ILS500 F/FHP to enable maintenance and service access.



Ensure that there is at least 350 mm (14 in.) of free space behind the ILS500 F/FHP to enable removal of service hatches, connection of supplies, test fixture etc.

NOTICE

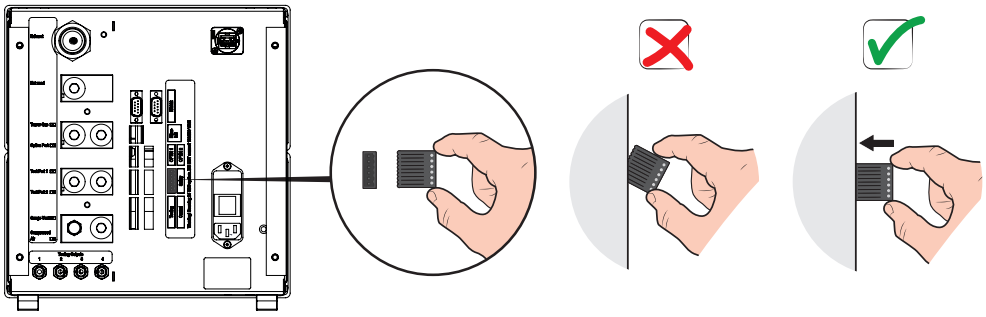
The front feet under the ILS500 F/FHP can be flipped out to raise the front for a better viewing angle.

5.2 Electrical Connections

5.2.1 Setting Up an Emergency Stop

NOTICE

► To short-circuit is not recommended and should only be made for preliminary testing before connecting compressed gases or test tooling with moving parts.



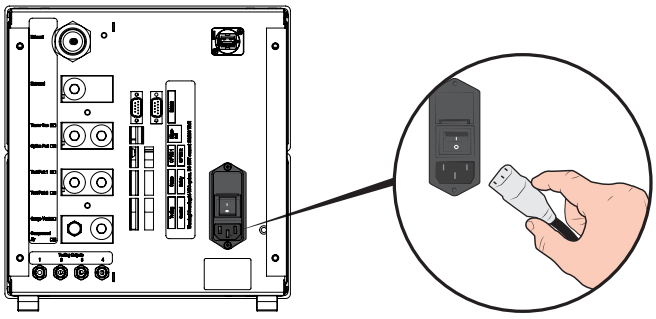
You have the following two options to prepare the ILS500 F/FHP for start:

- Connect the ILS500 F/FHP through an external emergency stop relay.
- Short circuit the SAFE SPLY terminal to “+24 V” on the Safety Connector. Use the Safety Override Loopback delivered with the unit.

NOTICE

ILS500 F/FHP will not start testing unless an emergency circuit has been installed. This can be ordered separately. For more information, see Spare Parts and Accessories [▷ 85].

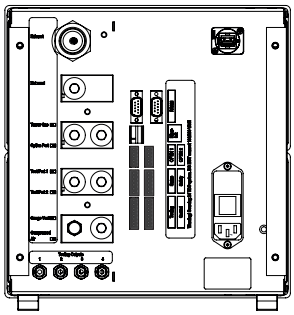
5.2.2 Connecting to Mains

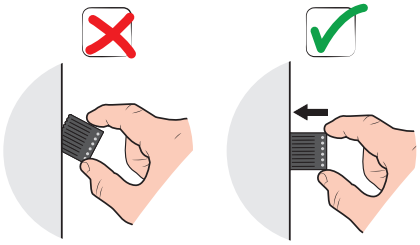


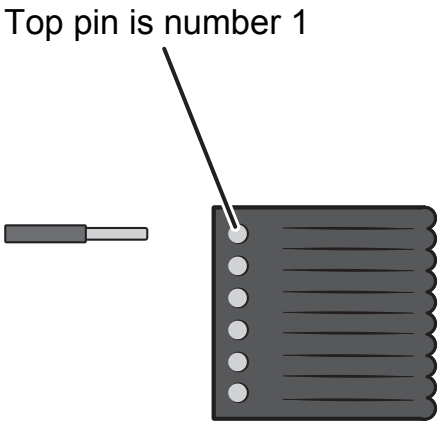
► Plug the Power Cable into the Power Inlet of the ILS500 F/FHP and into the nearest socket.

5.2.3 Connecting Extra Features

When using the ports for Options, Status, Tooling and Control, make sure to mount the connectors as shown below.







For more information about the connection ports, see Technical Data [▷ 16].

5.3 Pneumatic Connections

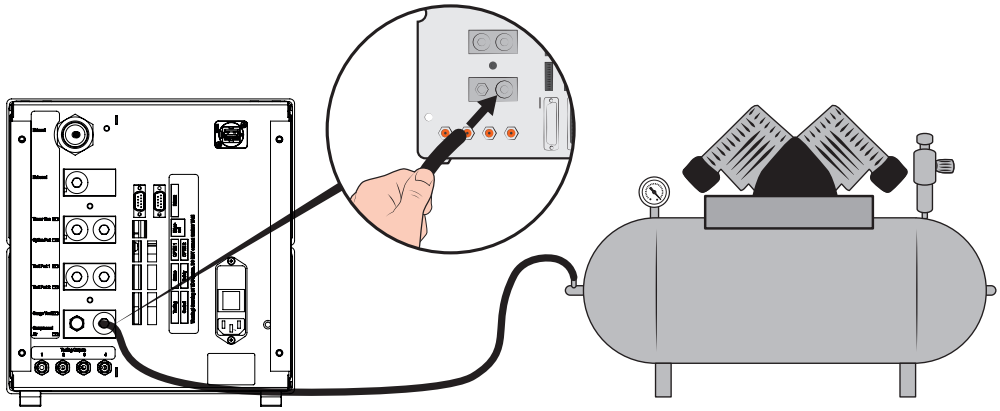
5.3.1 Connecting Compressed Air

NOTICE

► Make sure that compressed air is dry, well filtered and oil free. Recommended filter grade is 5 µm or finer. Inadequate filtering will result in increased maintenance.

► Make sure to use adequate pressure and flow. For more information, see Pneumatic Specifications [▷ 17].

► Use the hose to connect the compressor and the ILS500 F/FHP.



5.3.2 Connecting Tracer Gas

⚠ WARNING

Pressurizing objects at too high pressures can result in a burst object. This in turn can result in serious injury or even death.

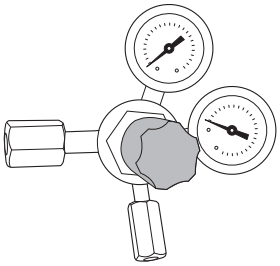
► Never pressurize objects that have not previously been burst tested or otherwise approved for the chosen test pressure.

⚠ WARNING

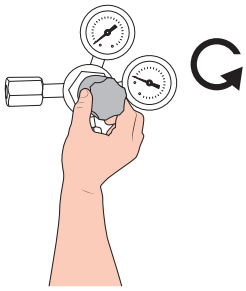
Tracer Gases can be flammable or asphyxiating.

► Use only ready-made Tracer Gas mixtures.

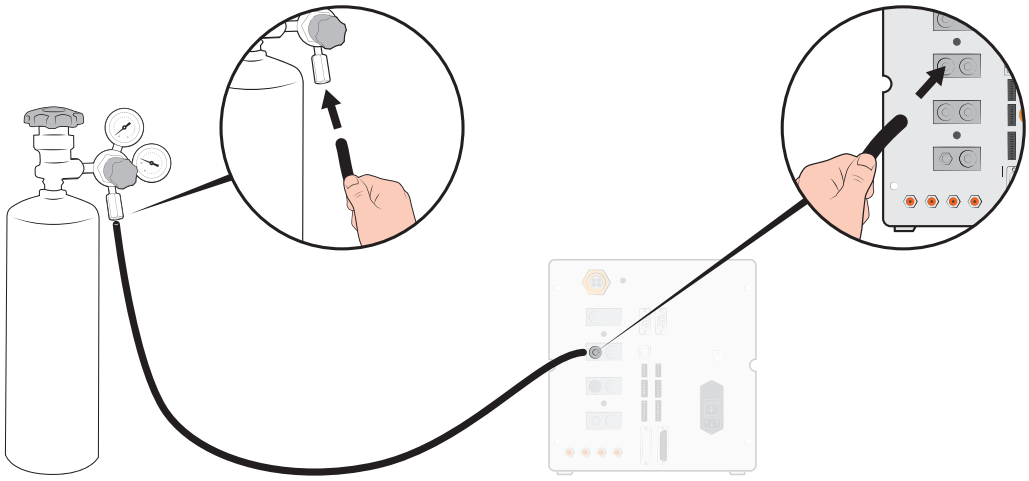
1. Secure gas cylinder safely.
2. Open the cylinder valve briefly to blow out dirt that may have collected in the outlet.
3. Install the two stage gas regulator on cylinder.



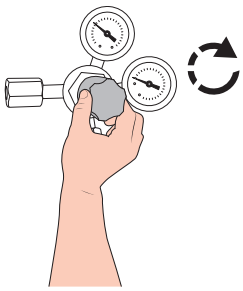
4. Turn regulator fully counterclockwise for zero output pressure.



5 Connect a regular welding gas hose or similar between the Tracer Gas Port and the pressure regulator. Check that the hose is certified to withstand the maximum output pressure of the regulator.



6 Open cylinder valve and set regulator to desired pressure. See warning banner!



7 Open regulator outlet valve (if any).

5.3.3 Connecting Exhaust to Air Vent

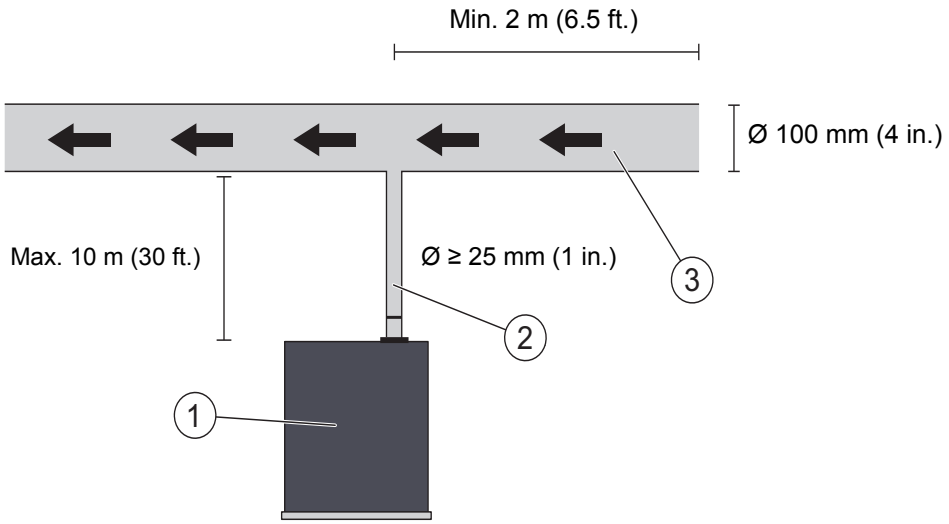


Fig. 9: Exhaust Recommendation

1	ILS500 F/FHP
2	Exhaust Hose
3	Bleed Air

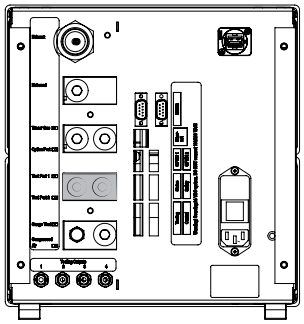
- The exhaust gas must be directed out of the building.
  It is best placed on the roof of the building, far away from the fresh air intake of the test station.
- It is recommend that a dedicated duct is installed. Install an electric duct fan and an optional wind extractor.
- It is not recommended to use the general ventilation system to ventilate the exhaust. If the ventilation system is equipped with energy recirculation there is a big risk that large amounts of tracer gas will be carried back to the test room thus disturbing the testing.

NOTICE

Inadequate exhaust installation is the most common reason for problems with tracer gas leak testing.

Too narrow or too long exhaust line will result in reduced evacuation capacity and thereby increased cycle time.

5.3.4 Connecting to Test Port 1 and 2



- Use both Test Ports if applicable.
- Hose ø ≥ 8 mm (0.31 in.).
- The hoses should be as short as possible.

If the test object has 2 or more ports, connect to ports on opposite sides of object.

NOTICE

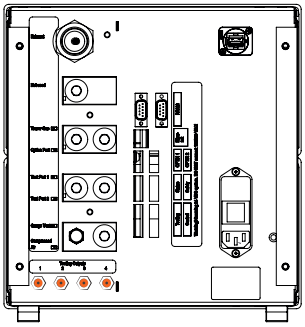
The larger the test object, the more important to follow the recommendations above.

5.3.5 Connecting Tooling

⚠ WARNING

Be aware that the faster the connection is made, the higher the risk for injury.

► Be careful and install guards etc, according to local legislation and safety standards so that your fixture is safe to use.



Tooling Valve Outputs 1-4 is available for connection of external Tooling.

5.4 Set Up Test Area

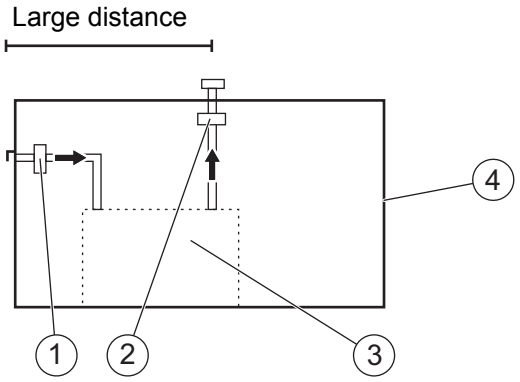


Fig. 10: Test Area Recommendation

1	Fresh Air Fan
2	Exhaust Fan
3	Test Area
4	Test Building

- Place fresh air intake on outer wall of building.
- Place air intake far away from tracer gas exhaust, cargo bays, and other tracer gas sources.
- Already tested objects may contain small amounts of tracer gas, which may interfere with next measurement.
- Do not use compressed air as fresh air supply when a hydrogen mixture is used as tracer gas. Industrial compressed air can contain varying and substantial amounts of hydrogen.

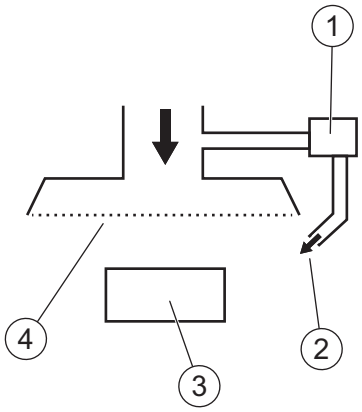


Fig. 11: Fresh Air Curtain Recommendation

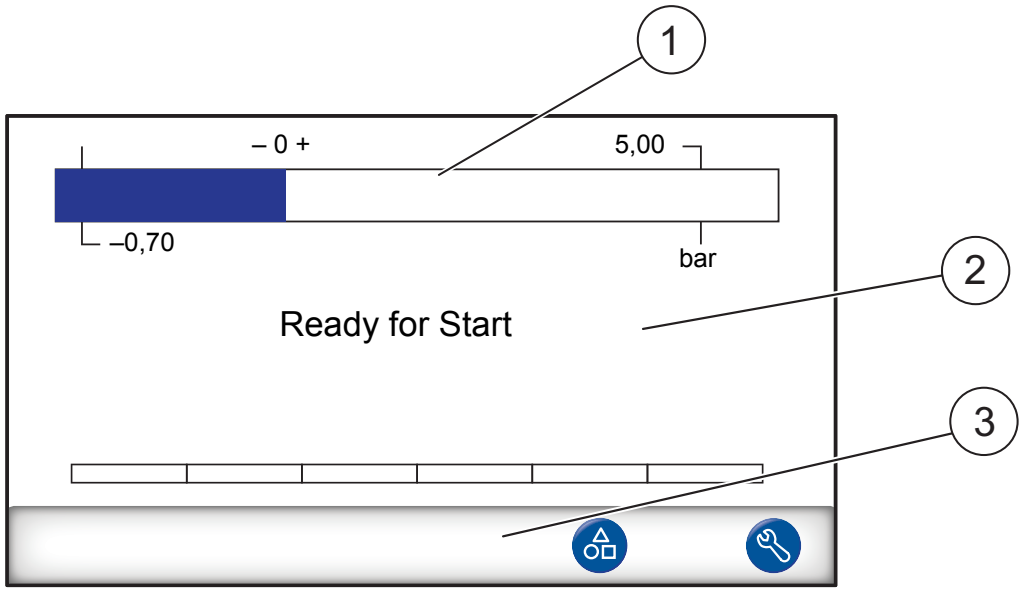
1	Fan
2	Local Air Jet
3	Test Object
4	Filter

- Try to create a laminar flow over the test area.

- Curtain should cover the entire test area (test hood or sample point) and extend at least 0.5 m outside the area.
- Air speed in curtain should be rather low, typically 0.1 m/s.
- Additional small fan(s) can be set up within the curtain for directional purging of test chamber etc.

6 Menu System

6.1 ILS500 F/FHP Display



1	Status Bar
2	Main Display
3	Navigation Button Bar (varies depending on menu)

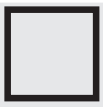
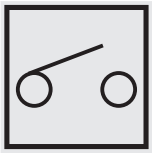
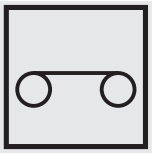
6.1.1 Menu Buttons

Use the menu buttons for quick navigation.

	Home		Load Recipe
	Settings		

6.1.2 Navigation and Other Buttons

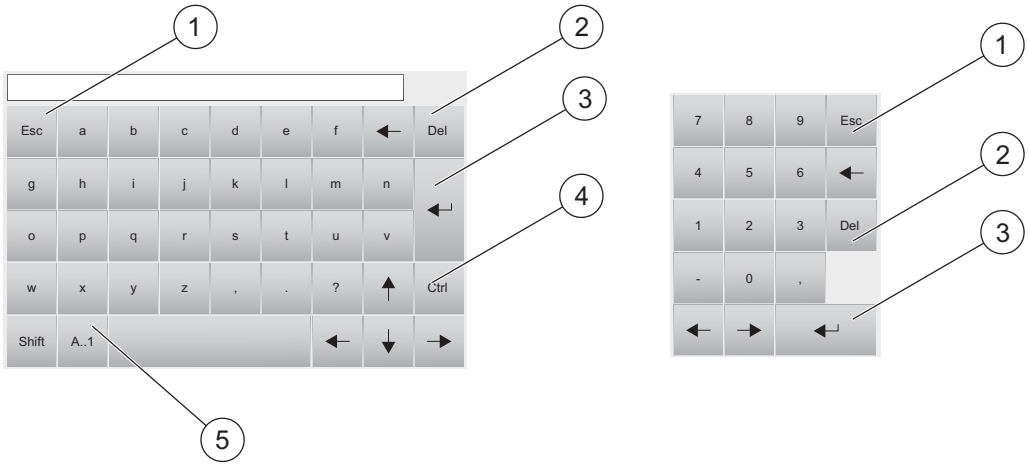
	Go Back		Escape (changes will not be saved)
	Previous Page (changes will be saved)		Next Page
	Activated		Unactivated

	Selected		Deselected
	Save (only shown if USB is connected)		Load
	Open switch		Closed switch

6.1.3 Entering Numbers and Text

To change a value:

1. Click on the value. A numeric or alphanumeric on-screen keyboard will open.
2. Enter the desired digits or characters.
3. Click on the enter symbol to store the new value.



1	Escape
2	Delete
3	Enter
4	Control
5	Upper/Lower Case and Numbers

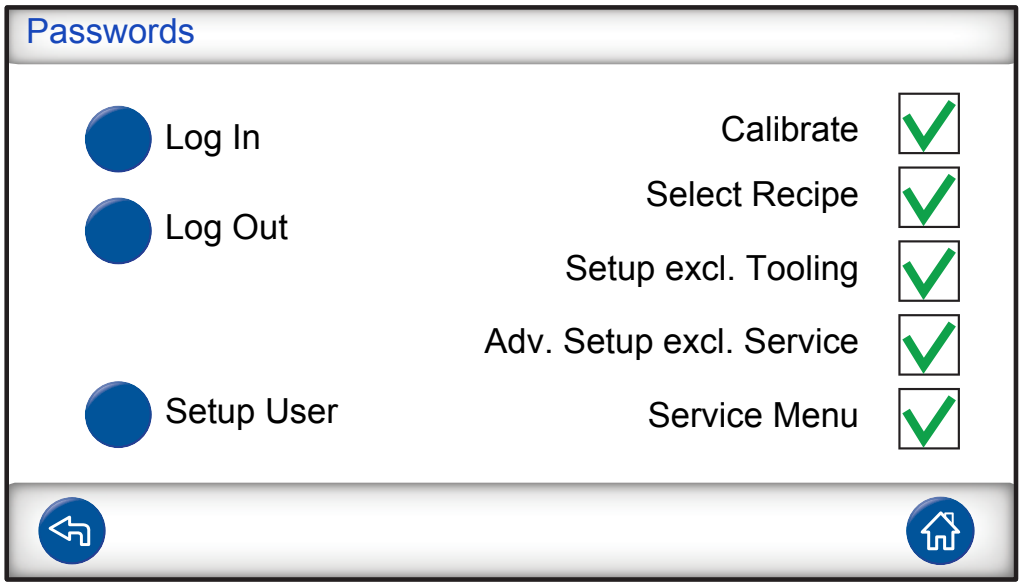
6.1.4 Screen Saver

If no operation takes place for a period of 20 minutes, the screen will automatically be locked. The display can be unlocked by one of the following actions:

- user touches the display
- user presses **START** or **STOP** button
- a start or stop command is sent by an external system

6.2 Passwords

To access the menus, use default password "1234" for "Service". The password can be changed under Settings / Advance Settings / Passwords.



NOTICE

Remember to change the passwords of all menus you want to protect. Anyone using this manual can access the system if you keep the default password.

6.2.1 Set Up New User

1. Click **Settings >> Advance Settings >> Passwords** to enter Passwords menu.
2. Click **Log In** and log in as Service.
3. Click **Setup User**.
4. Click **Add**.
5. Fill in user name and password for new user.
6. Click **Next**.
7. Select Security Group by checking the appropriate boxes.
8. Click **Finish**.

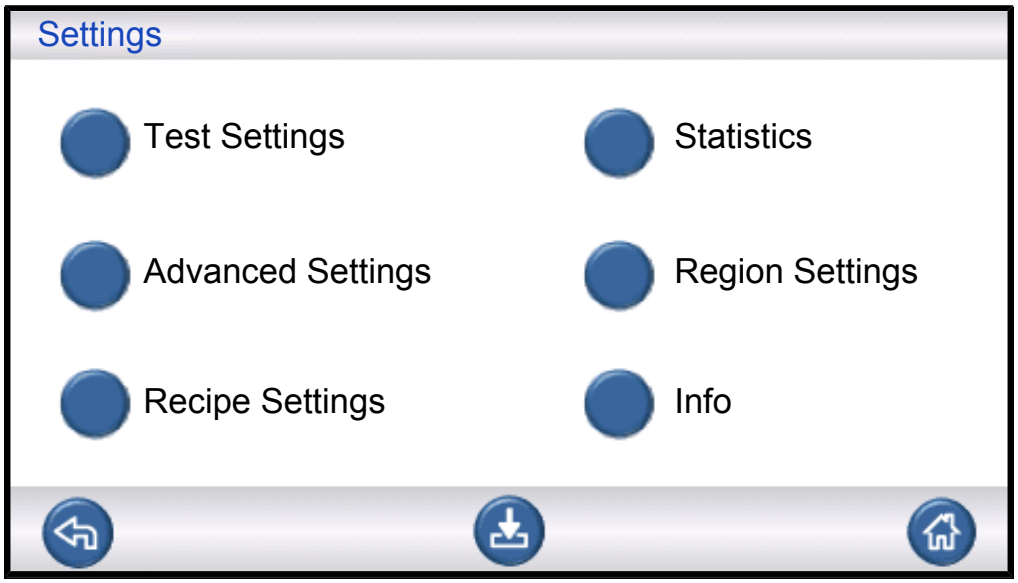
6.3 Menu Overview

For information about parameter factory default settings, see Parameter Index [▶ 91].

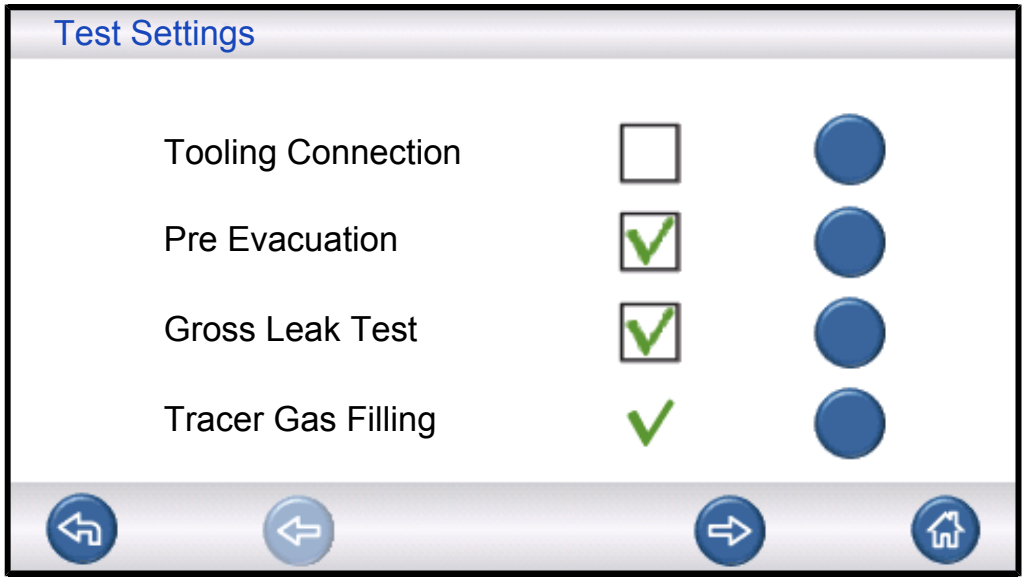
Load Recipe	

Settings	Test Settings	Tooling Connection	
		Pre Evacuation	
		Gross Leak Test	Vacuum Decay Test
			Pressure Decay Test
		Tracer Gas Filling	
		Blockage Test	
		Tracer Gas Test	
		Gas Evacuation	
		Tooling Disconnection	
	Advanced Settings	Timers	
		Pressures	
		Options	
		Service Menu	Outputs
			Inputs
			Analog Inputs
			System Reset
			ILS500 F/FHP
			RS232
			Service Run
			Hardware Test
		Passwords	
		IP-Settings	
	Recipes		
	Statistics		
	Region	Time Zone, Region and Daylight	
		Time and Date	
		Language	
	Info		

Settings

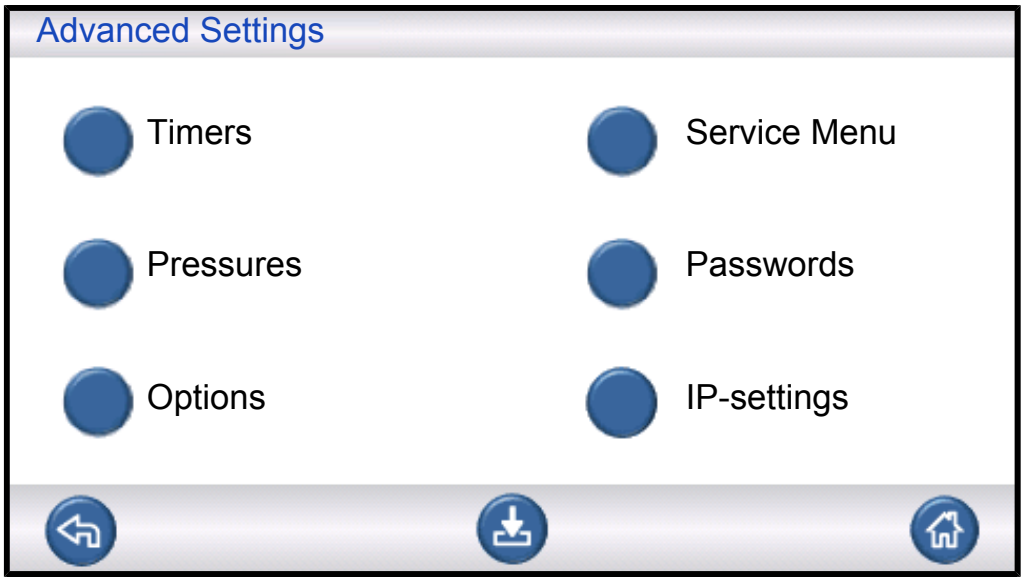


Test Settings



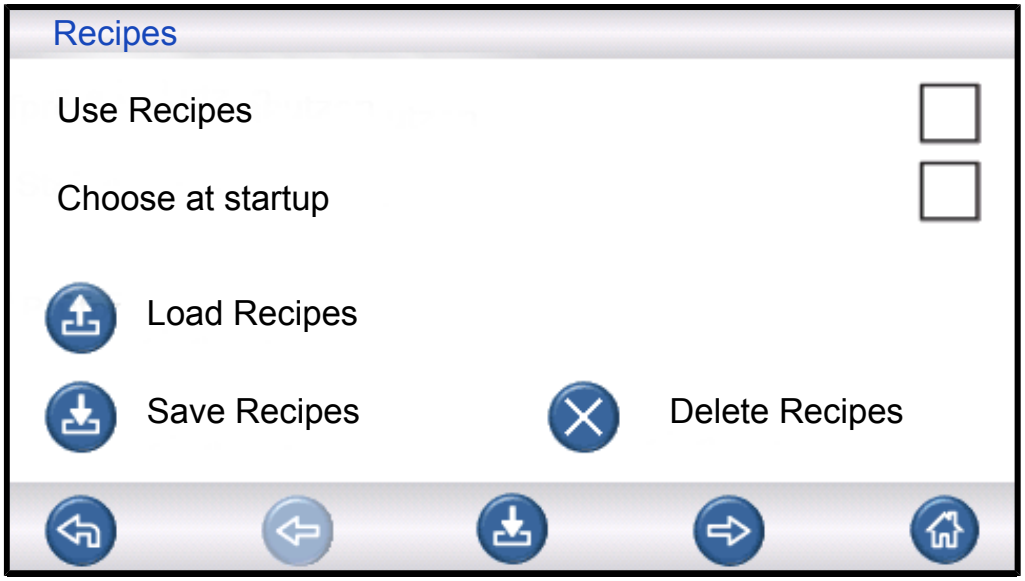
For more information see Recipes [▷ 50].

Advanced Settings



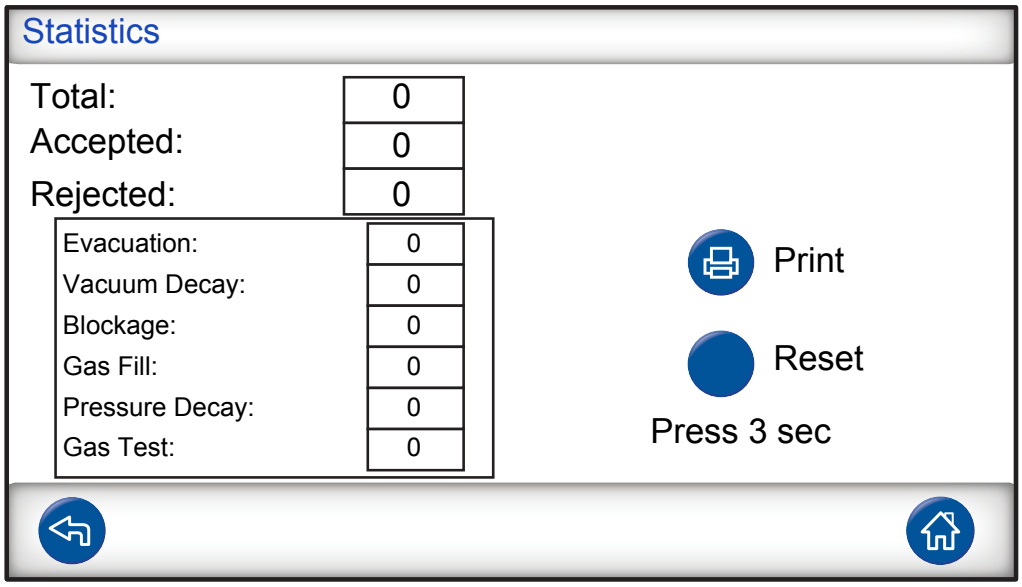
Advanced settings to fine tune the fill cycles and settings for service staff.

Recipes



For more information, see Maintenance Instructions [▷ 78].

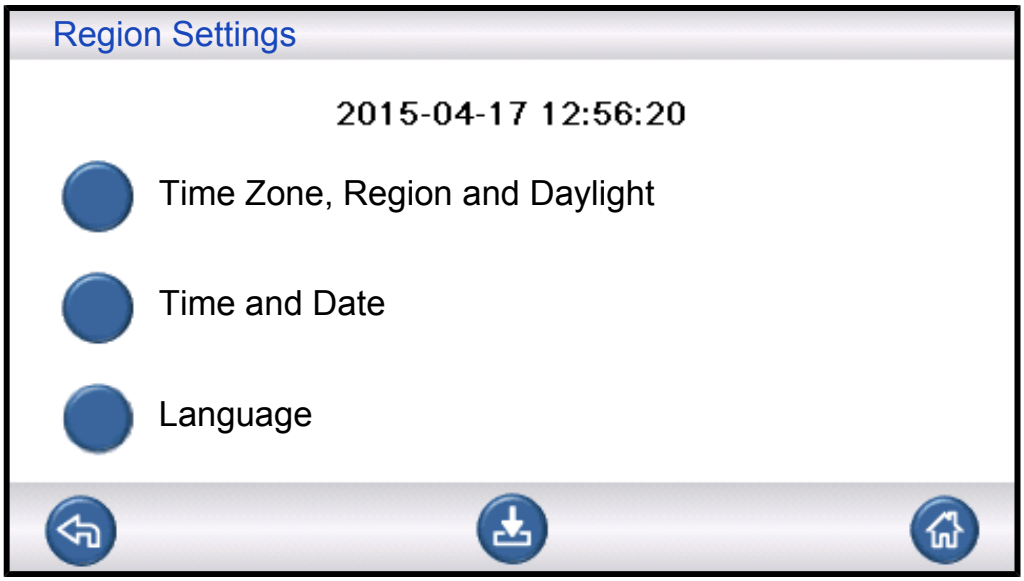
Statistics



Information about test statistics and number cycles events during a test period.

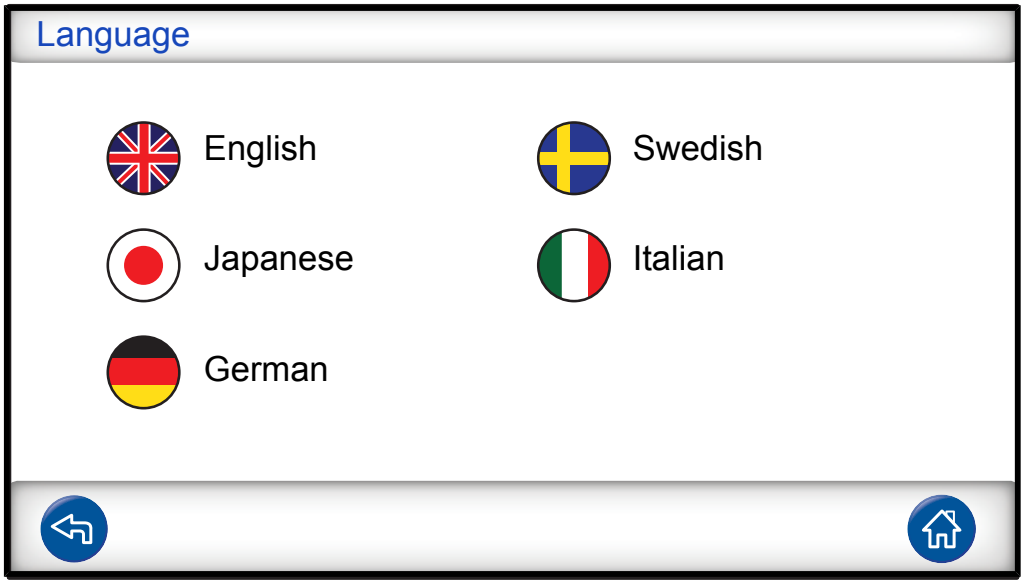
For more information see Test Sequence [▸ 47].

Region



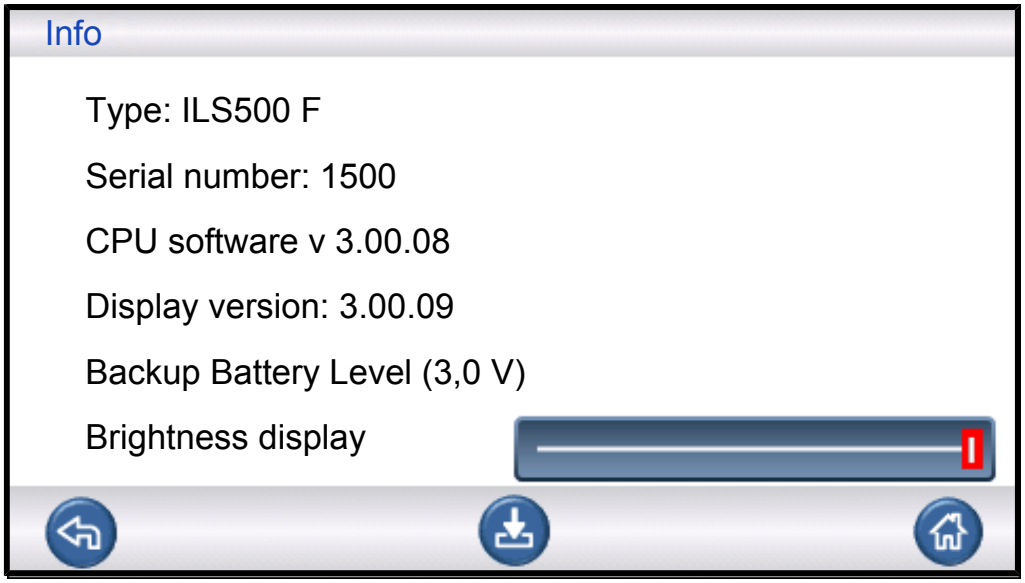
Regions settings.

Language



Language settings.

Info



Instrument information, software versions, battery status and display light settings.

7 Using the ILS500 F/FHP

NOTICE

► Ensure that the tracer gas supply pressure (feeding the ILS500 F/FHP tracer gas inlet) is set up properly.

To abort a test sequence and reset to standby, press STOP for 3 s.

The following description is an example for illustration only. The design of the text fixture, the use of probe(s) and tooling functions etc. should be adapted to suit your particular application.

7.1 Test Sequence

Step		Comment
1	Standby	ILS500 F/FHP is idle waiting for Start Signal.
2	Tooling Connection	Four Air Valves and four Proximity Switch Inputs can be set up to control moderate test fixtures. Controller can be expanded for more demanding fixtures.
3	Pre Evacuation Gross Leak Test 1-Evacuation Timeout	The air is evacuated from the test object and a first gross leak test is made simultaneously. The Gross Leak tests are used to detect larger leaks by pressure changes. Evacuation is often necessary to ensure that the Tracer Gas reaches all parts of the tested object, and to secure that the tracer gas concentration is as high as possible. Applicable for: • very long objects (e.g. pipes or heat exchangers). • low fill pressures (<1 atm). Less appropriate: • if the test object does not tolerate underpressure. • at higher test pressures (Fill Setpoint).
4	Gross Leak Test 2-Vacuum Decay Test	Can be used to reveal leaks before filling with gas. This minimizes spillage from gross leaks.
5	Tracer Gas Filling	Tracer gas filling before gas test.
6	Blockage Test	• Reveals internal blockages in tested object. • Ensures that connection lines and test fixture are correctly connected. The test object is filled through Test Port 1 while the pressure is recorded in Test Port 2. Practical for testing e.g. capillaries etc.
7	Gross Leak Test 3-Gas Pressure Decay Test	Performed in parallel with tracer gas test. Can be used for integral testing in parallel with a more sensitive gas test at selected points.

Step		Comment
8	Leak detect pressurized test object	Perform leak detection on the test object, pressurized with tracer gas.
9	Gas Evacuation	For a fast removal of tracer gas after test. Can also include an efficient air purge.
10	Tooling Disconnection	Disconnection of test fixture.

NOTICE

Several of the steps are optional and can be turned off.

► Chosen settings can be saved as a recipe. For more information, see Recipes [▷ 50]. It is also possible to combine two recipes in one test sequence. Contact your local supplier for more information and individual settings.

7.2 Run a Test

The ILS500 F/FHP will communicate through the lamps and messages on the display.

Lamp	Status	Indication
Red	ON	Acknowledge a leak. Tested object rejected. General error.
Green	ON	Test sequence is over (and the tested object accepted if Leak Detector is connected.)
Yellow (START Button)	ON	The test sequence is running.

7.2.1 Start Up

1. Turn the ILS500 F/FHP on.
2. Wait for Ready to Start to show on the display.
3. Click **Load Recipe** and choose a preset recipe, or follow the instructions in Recipes [▷ 50].

7.2.2 Place the Test Object

1. Place the test object in the Test Chamber or connect it to one, two or more connection ports.
2. Connect any extra equipment needed.

7.2.3 Perform Tracer Gas Filling

1. Press **Start** on the ILS500 F/FHP.

2 Perform a tracer gas leak test.

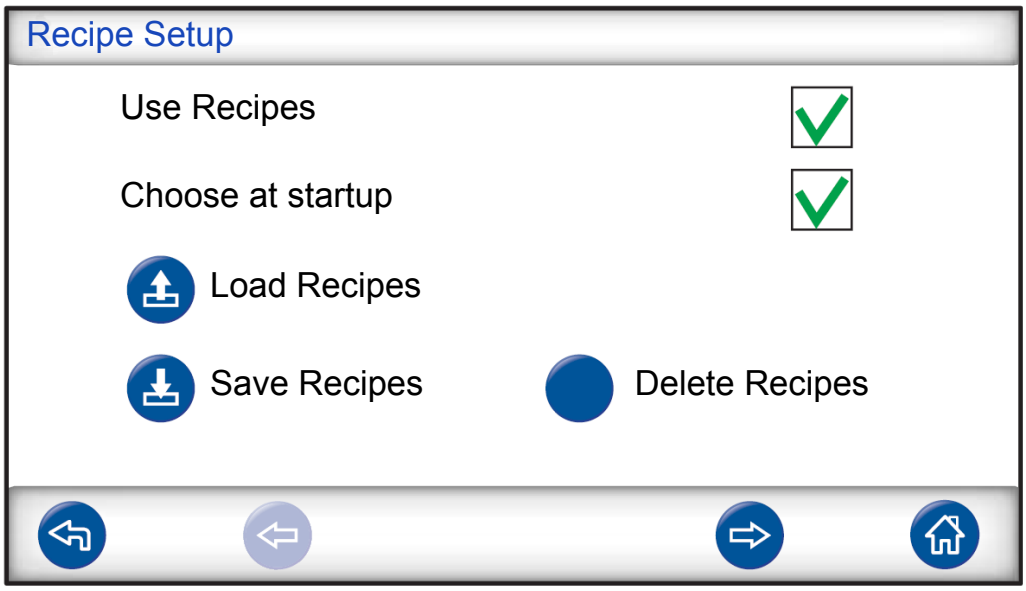
3 Press **Stop** on the ILS500 F/FHP to remove the tracer gas.

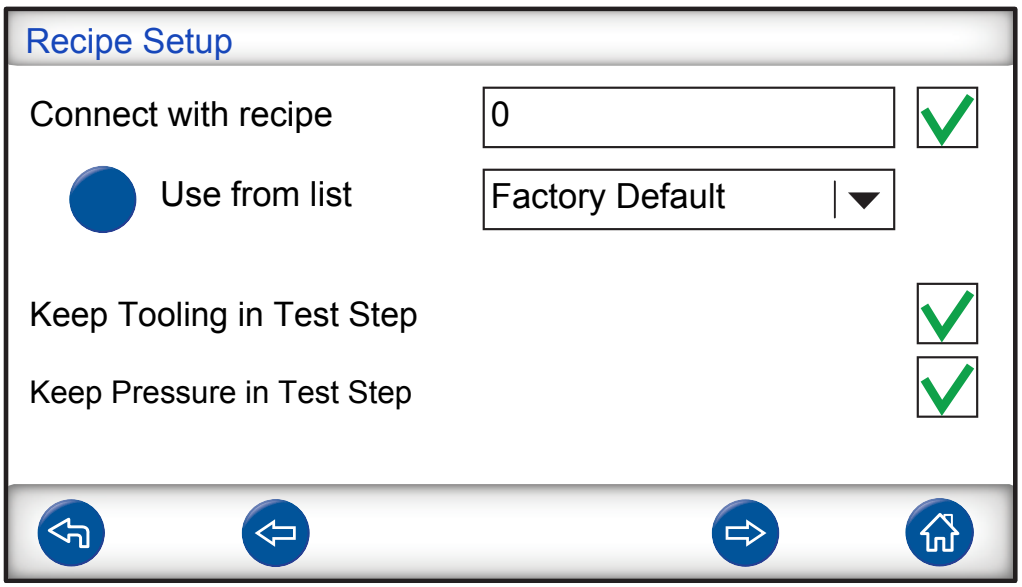
8 Recipes

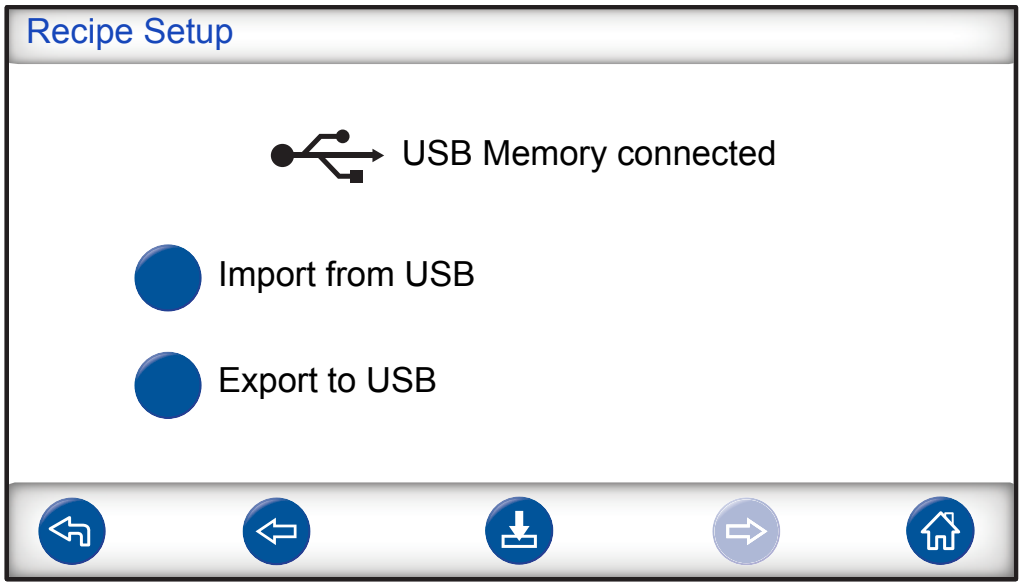
A recipe is a collection of settings suited for a particular test setup. This is used to have different settings for different test objects.

8.1 Recipe Overview

► Click **Settings >> Recipes** to enter the three Recipe Setup menus.







Use Recipes	Select the box to activate the recipe handling.
Choose at Startup	When power is switched on, the ILS500 F/FHP prompts the operator to choose recipe.
Load Recipe	Loads the parameters of chosen recipe. A new window will open.
Save Recipe	Saves the current settings under chosen recipe name. A new window will open.
Delete Recipe	Deletes the chosen recipe. A new window will open.
Connect with Recipe	Connects two recipes to form one test cycle. Write the name of the recipe to be included, or choose one from the list in Use from list.
Use from list	Shows all saved recipes. By clicking the blue button the recipe displayed is added to Connect with recipe.
Keep Tooling in Test Step	Excludes the disconnection step in the first recipe when two recipes are connected as described above.
Keep Pressure in Test Step	Retains gas pressure between two recipes.
Import from USB	Imports recipes from connected USB memory.
Export to USB	Exports all recipes to an editable file on connected USB memory.

8.2 Create a Recipe

8.2.1 New Recipe

1 Set all ILS500 F/FHP settings for the test sequence.
For more information, see Test Settings [▶ 52].

2 Click **Settings >> Recipes** to enter the three Recipe Setup menus.

3 Click **Save Recipe**.

4 Enter a name for the recipe.

5 Click **Save**.

8.2.2 Modify a Recipe

1 Click **Settings >> Recipes >> Load Recipe**.

2 Select the recipe to modify from the list and click **Load**.

3 Adjust the ILS500 F/FHP settings to suit the new recipe. For more information, see Test Settings [▶ 52].

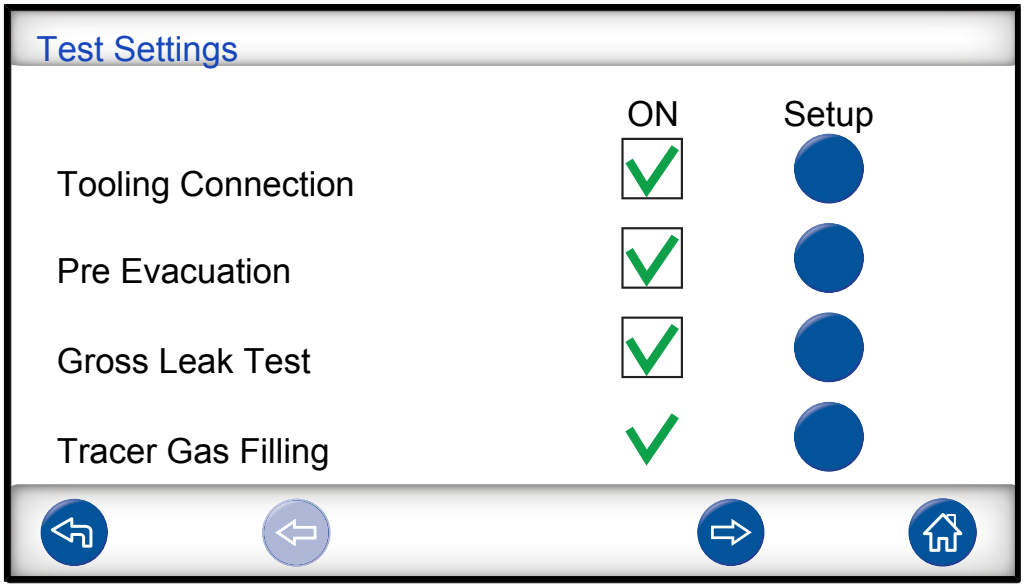
4 Click **Settings >> Recipes >> Save Recipe**.

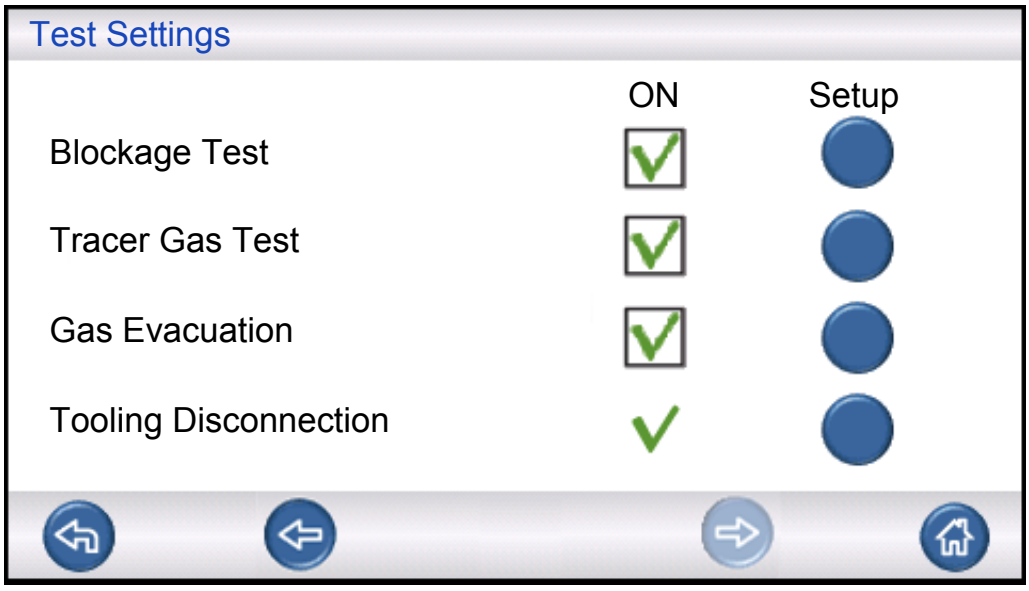
5 Enter the name of the new recipe.

6 Click **Save Recipe**.

8.3 Test Settings

1 Click **Settings >> Test Settings** to enter the two Test Settings menus.





2 Set which steps to include in the test sequence by selecting the ON boxes.

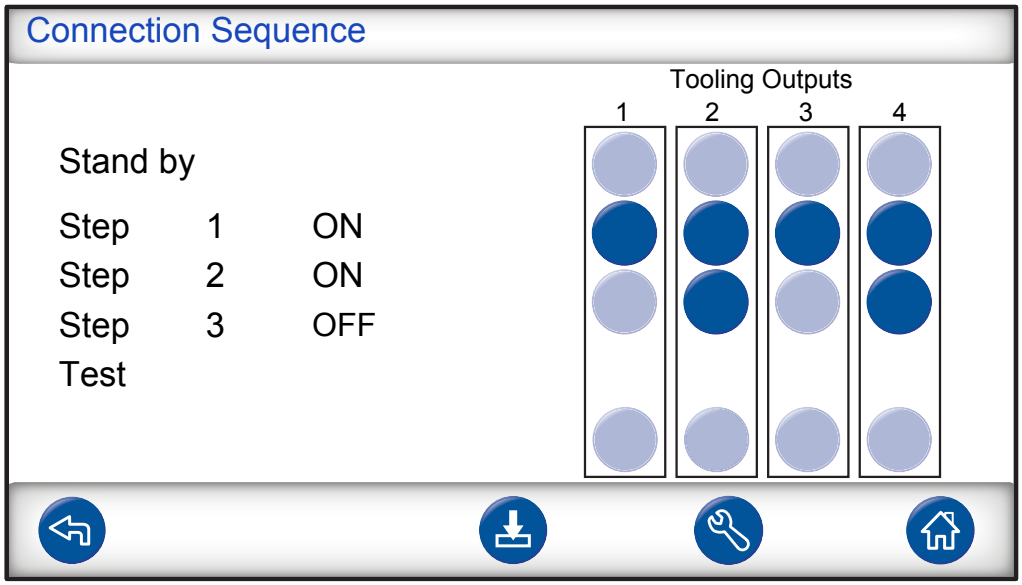
3 Click **Setup** to the right of each selected step to enter the Setup menus.

NOTICE

For more information about each step, see Test Sequence [▷ 47].

8.3.1 Tooling Connection

Connection Sequence menu shows the settings made for Tooling Connection.

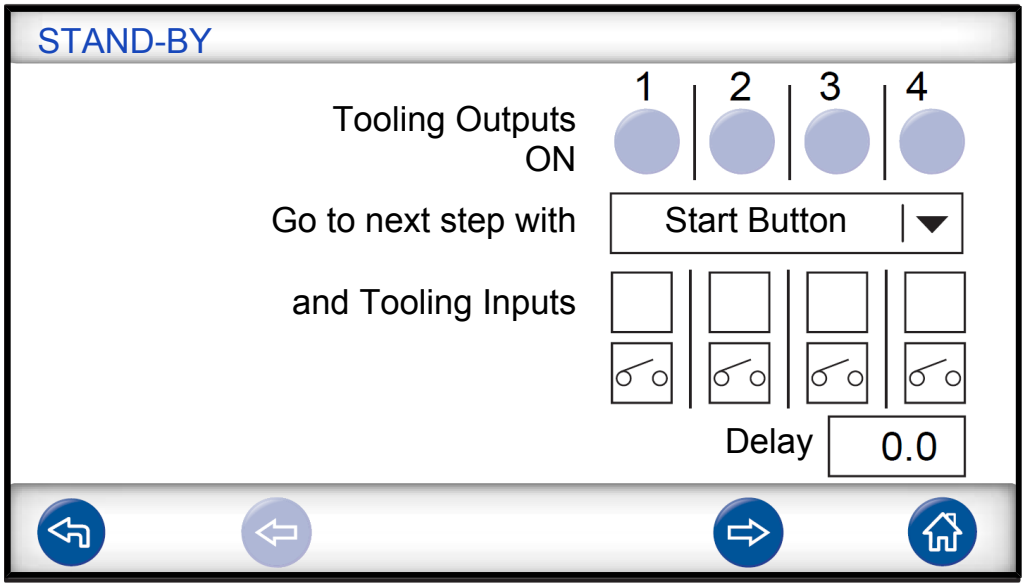


► Click on the **Settings** symbol to edit the settings.

NOTICE

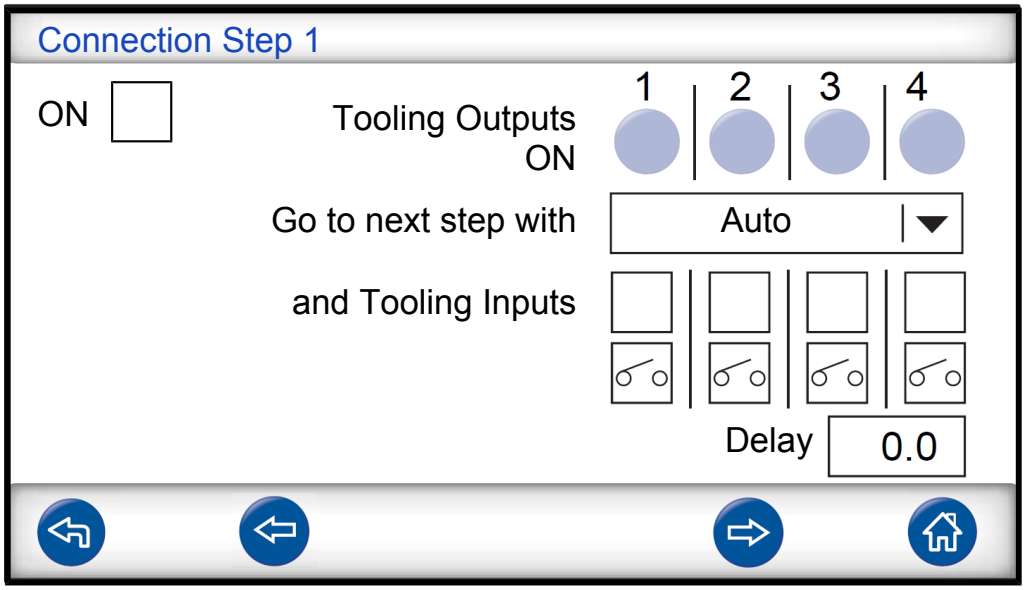
Up to four connection steps can be programmed.

Stand-By



1. Click on the Tooling Outputs to be activated in stand-by (between tests).
2. Choose how to move on to the next step.
   Set action in list.
   Select Tooling Inputs.
3. Set desired delay time.

Connection Step 1 — 3



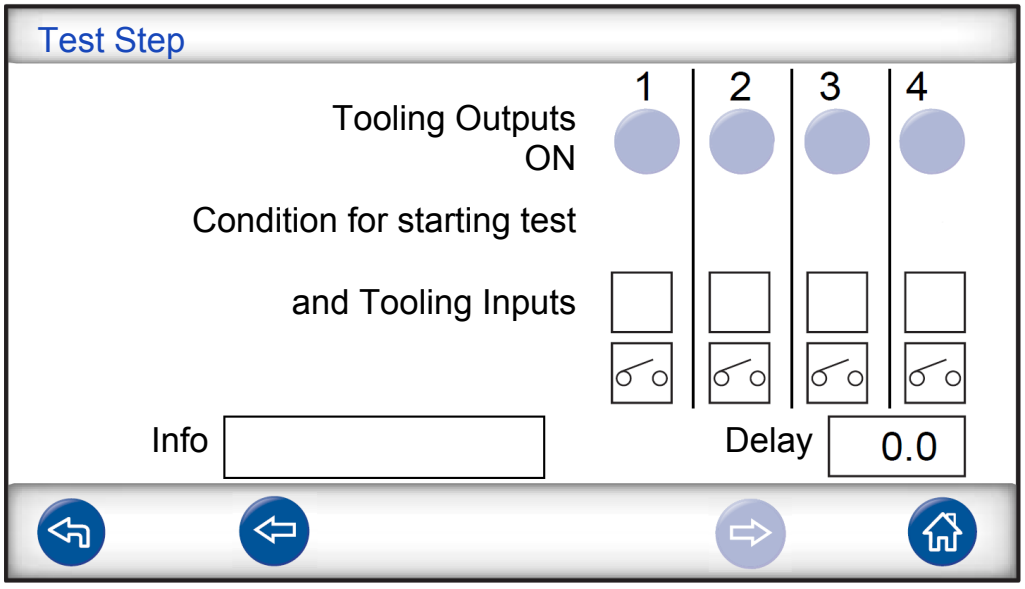
1. Select the ON check box to activate the step.
2. Click on the Tooling Outputs to be activated.

3 Choose how to move on to the next step.
Set action in drop-down-list.
Select the appropriate check box(es) for the Tooling Inputs.
Then set “Open” or “Closed” status for each switch symbol.

4 Enter a text to describe the step (click the Info field to activate the on-screen keyboard).

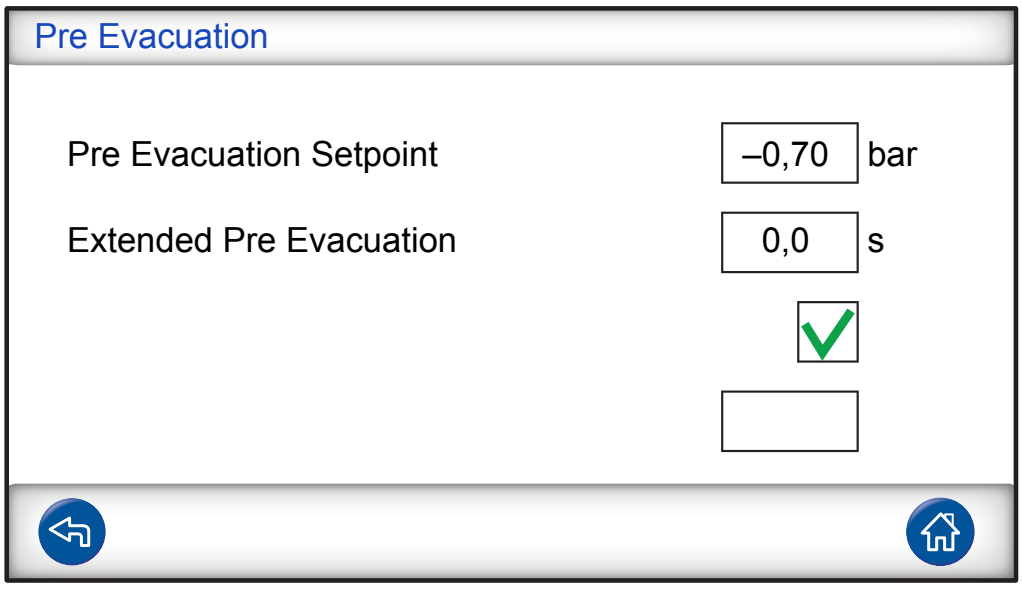
5 Set desired delay time.

Test Step



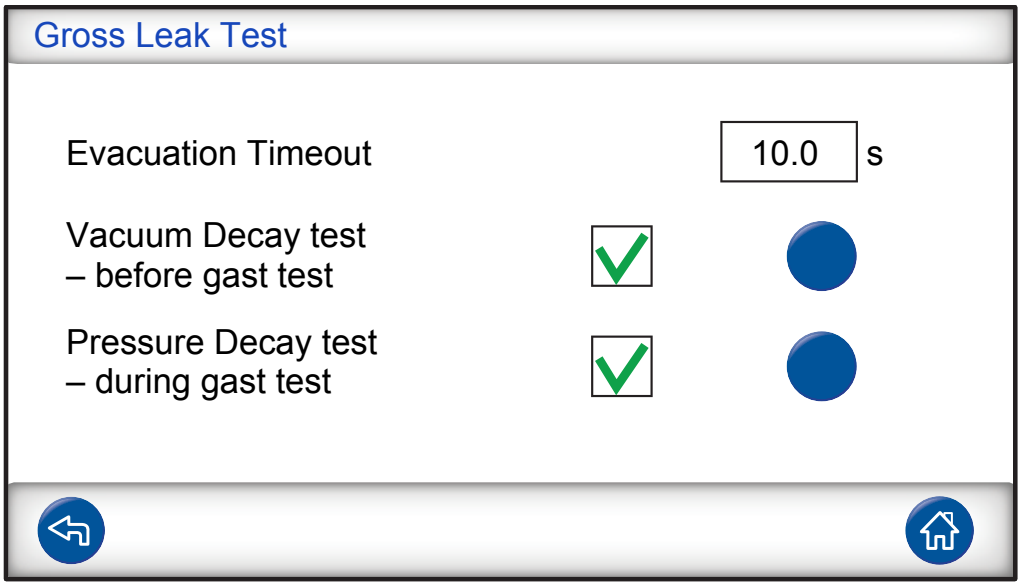
► See Connection Step 1 - 3 above and follow the instructions.

8.3.2 Pre Evacuation



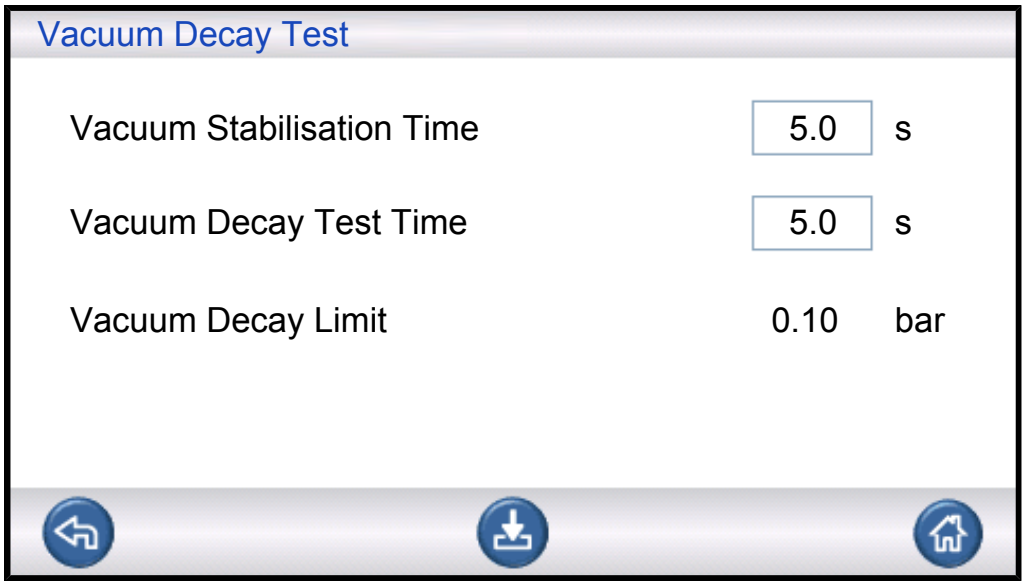
Pre Evacuation Setpoint	A value of -0.70 barg (-0.07 MPag, -10 psig) is adequate for most applications. This creates 70% vacuum.
Extended Pre Evacuation	To ensure a complete filling. Evacuation will continue for the set time after Evacuation Level has been attained.

8.3.3 Gross Leak Tests



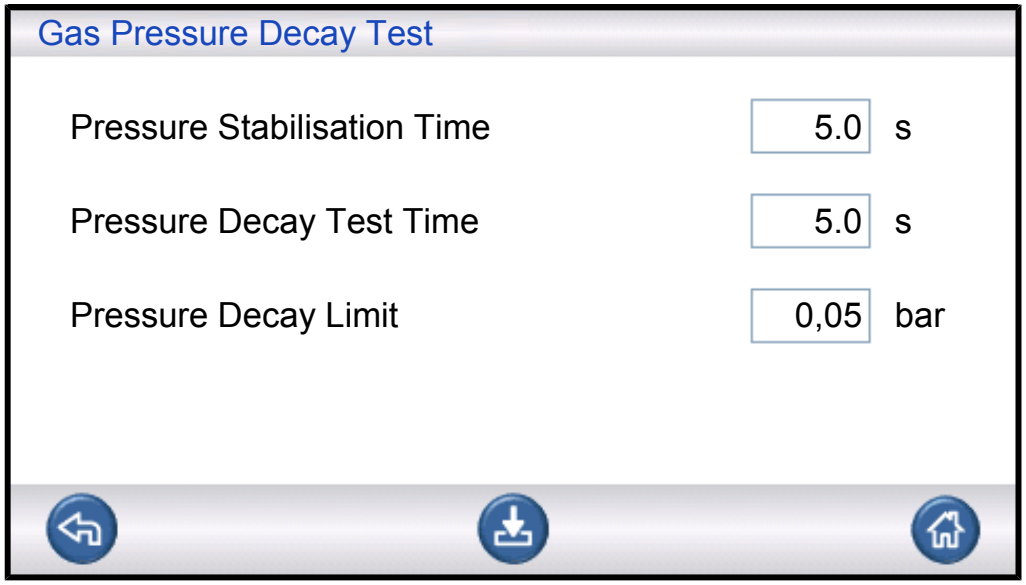
Evacuation Timeout	Object will be rejected if Pre Evacuation Setpoint is not attained within time set.
Vacuum Decay Test	If to be included in the test sequence, select the box and click the blue button to enter Pressure Decay Test setup menu (see below).
Pressure Decay Test	If to be included in the test sequence, select the box and click the blue button to enter Pressure Decay Test setup menu (see below).

Vacuum Decay Test



Vacuum Stabilisation Time	Delay time before Vacuum Decay test begins.
Vacuum Decay Test Time	Time during which pressure rise is recorded.
Vacuum Decay Limit	Allowed pressure rise during test time.

Pressure Decay Test



Pressure Stabilisation Time	Delay time before Pressure Decay test begins.
Pressure Decay Test Time	Time during which pressure drop is recorded.
Pressure Decay Limit	Allowed pressure drop during test time.

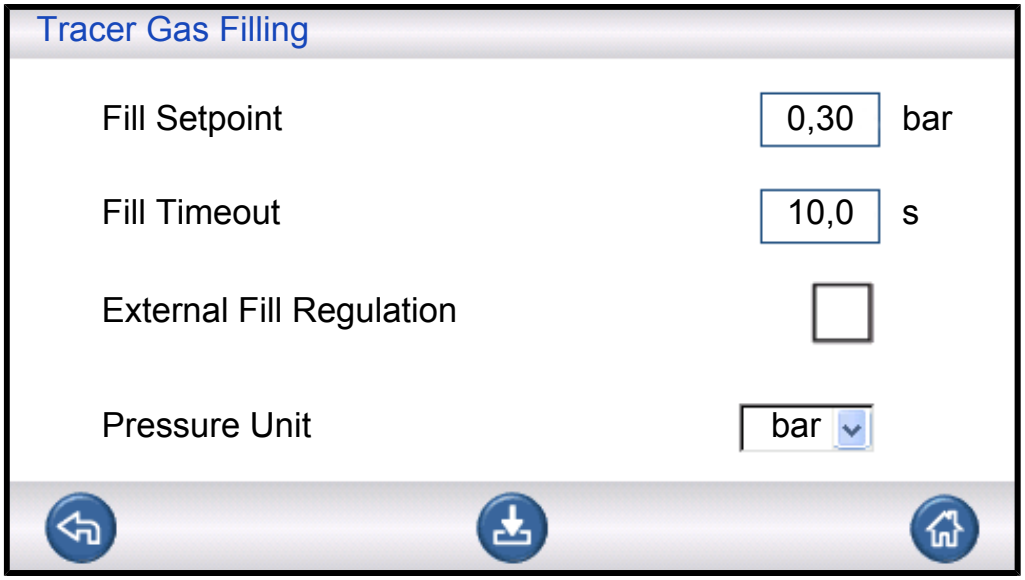
8.3.4 Tracer Gas Filling

⚠ WARNING

The ILS500 F/FHP must never be introduced to pressures higher than that approved for the object to be tested and never beyond the ILS500 F/FHP specification.

NOTICE

Ensure that the test object has time to become filled before Fill Time Out expires. In particular long narrow objects, as pipes, may need long filling time.

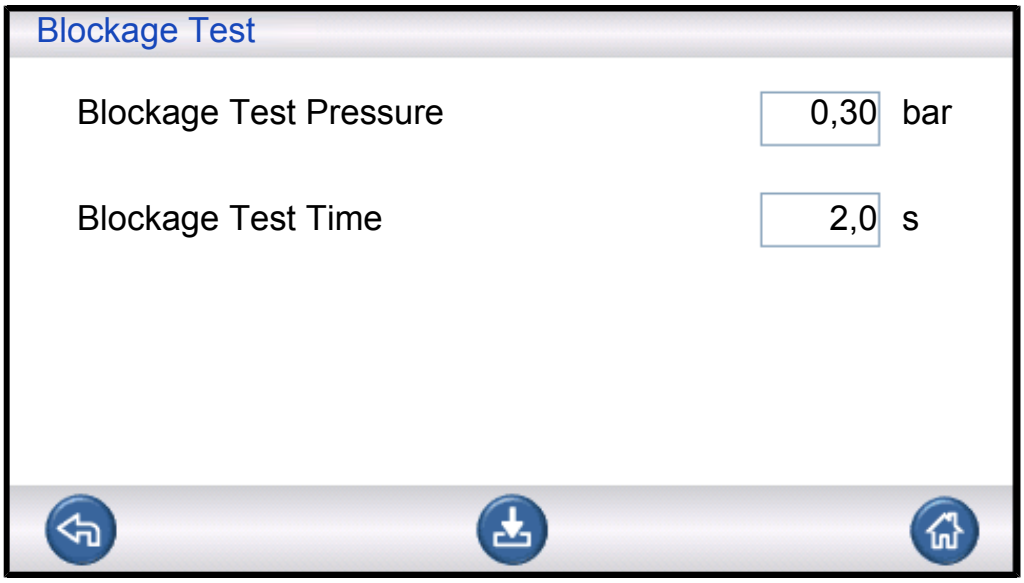


Fill Setpoint	Desired tracer gas fill pressure.
Fill Timeout	Object will be rejected if Pressure Setpoint has not been attained within this time. Cancels the fill if the test object has a major leak, opens, or if there are loose connections.
External Fill Regulation	If selected, this is the setpoint of fill pressure alarm. Internal pressure regulation is disengaged and pressure will be that of the gas supply line. ILS500 F/FHP checks that fill pressure is above Pressure Setpoint before proceeding to gas test step.
Pressure Unit	Select desired unit.

8.3.5 Blockage Test

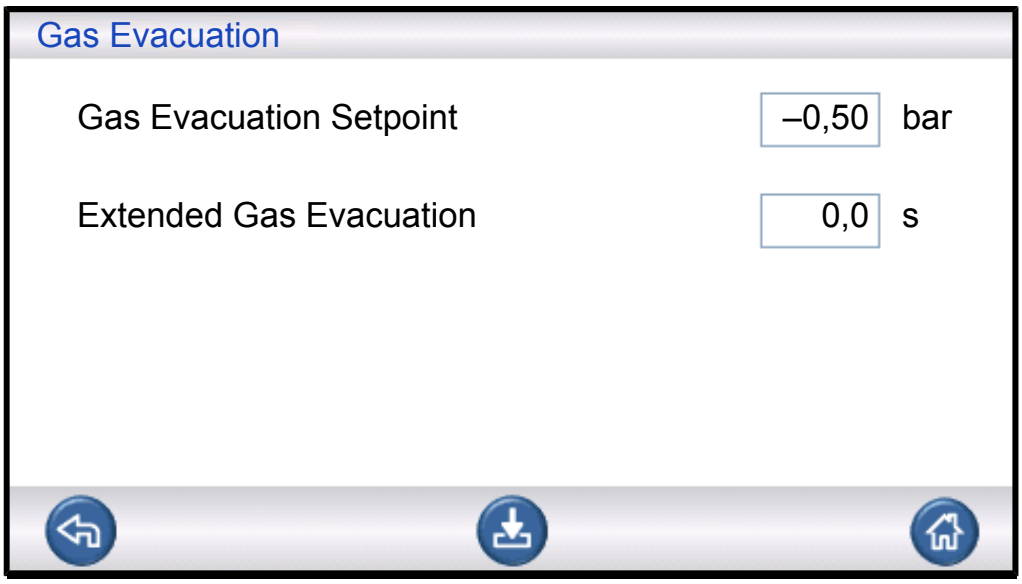
NOTICE

This test can only be performed if both test ports are used and connected on either side of the possible blockage.



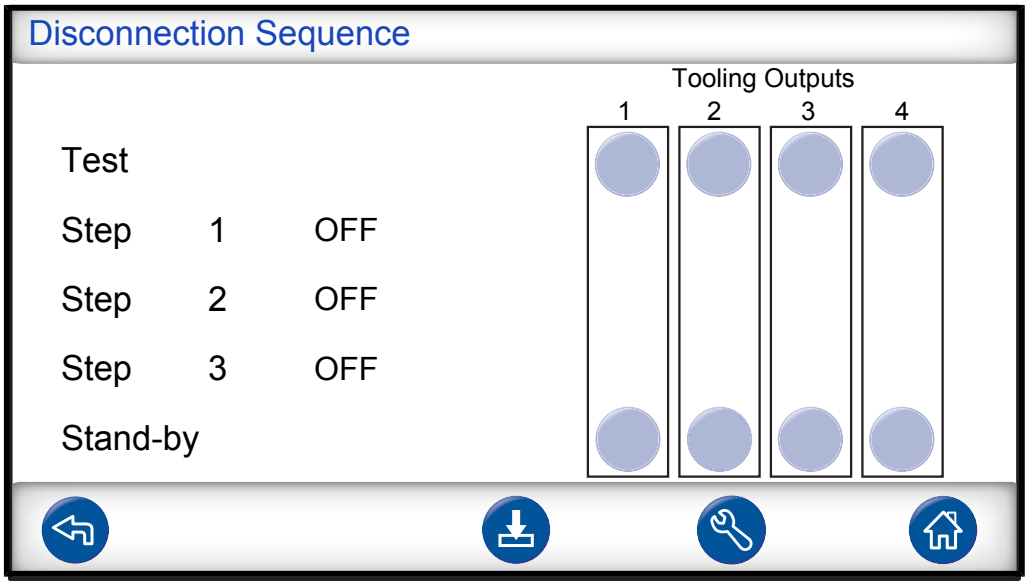
Blockage Test Pressure	Minimum pressure to be attained at Test Port 2 during Blockage Test time.
Blockage Test Time	Time within which Blockage Test Pressure must be attained at Test Port 2.

8.3.6 Gas Evacuation



Gas Evacuation Setpoint	Set desired level of Gas Evacuation. -30 kPag (-0.3 barg, -4.4 psig) creates 30% vacuum, which is adequate for most applications.
Extended Gas Evacuation	Extends time for gas evacuation, after Gas Evacuation Setpoint has been reached.

8.3.7 Tooling Disconnection



Same function as Tooling Connection but in revers order. For information about this step, see Tooling Connection [▶ 53].

8.4 Optimizing the Test Cycle

Test Cycle can be divided in six main blocks:

1. Connection of Tested Object
2. Pre Evacuation of Residual Air
3. Filling with Tracer Gas
4. Tracer Gas Leak Test
5. Removal and Venting of Tracer Gas
6. Disconnection of Tested Object

This section is a guide for optimizing step 2, 3 and 5.

8.4.1 Optimizing the Pre Evacuation Step

NOTICE

The fastest way to fill a pipe like object is to use push-through filling. That does not require pre evacuation.

Begin to determine how deep the pre evacuation needs to be, or if it can be skipped altogether. To do this it is important to fully understand the role of pre evacuation.

When the test object is connected it holds one atmosphere of ambient air. It is often necessary to remove some or most of this air before filling with tracer gas.

There are two effects of not removing the air (i.e. pre evacuating):

1. the actual tracer gas concentration will be reduced
2. tracer gas does not reach all parts of the object

8.4.1.1 Calculate Tracer Gas Concentration

Example:

The fill pressure is 0.05 MPag (7.2 psig) above atmosphere (gauge pressure). The object has 1 atm = 0.1 MPag of air before filling.

Leaving this air in the object means the average tracer gas concentration will be:

A = Fill Pressure
B = 1 atm
C = Tracer Gas Fill Factor

$$\frac{A}{A+B} = C$$

$$\frac{0{,}05}{0{,}05+0{,}1} = 0{,}33$$

The average tracer gas concentration in this example is only a third (33%) of what expected.

When using a tracer gas mix of 5% the result will be:

0.33 x 5% = 1.7%

Pre evacuating down to -0.7 atm (-0.07 MPag) means there will be 0.3 atmospheres (0.03 MPag) of residual air in the object before filling. This gives the following average concentration:

A = Fill Pressure
B = 1 atm
C = Tracer Gas Fill Factor
D = Evacuation Pressure

$$\frac{A + D}{A + B} = C$$

$$\frac{0,05 + 0,07}{0,05 + 0,1} = 0,8$$

The average tracer gas concentration in this example will be 0.8 (80%). When using a tracer gas mix of 5% the result will be:

0.8 x 5% = 4%

This is almost twice of that achieved with no pre evacuation.

8.4.1.2 Example - Calculate Tracer Gas Filling

The air left in the object can not always be expected to mix evenly with the injected tracer gas. This is especially so for tube shaped objects such as pipes etc. The flow inside a regular “tube” is predominantly laminar. This means no or very little turbulence occurs. Air left in the “tube” will therefore be pushed in front of the injected tracer gas and end up in the remote end of the “tube”.

Example:

The test object is an aluminium pipe for a refrigerator with brazed copper ends. The joints between copper and aluminium must both be tested.

Fill pressure is 0.5 MPag (72 psig). Length is 10 m (33 ft.). Skipping pre evacuation we will have:

A = Fill Pressure
B = 1 atm
E = Air left in the object

$$\frac{B}{A + B} = E$$

$$\frac{0,1}{0,5 + 0,1} = 0,17$$

of air left in the pipe. This is equivalent to 1.7 m (5.7 ft.) of the total length if no turbulence occurs during filling. There is an evident risk that there will be only air inside one of the joints, which means that a leak there will remain undetected.

Pre-evacuating down to -0.7 atm (-0.07 MPag) means there will be 0.3 atmospheres (0.03 MPag) of residual air in the pipe before filling.

We will now have:

$$\frac{B}{A + B} = E$$

$$\frac{0,03}{0,5 + 0,03} = 0,056$$

of air left in the pipe. This is equivalent to 0.57 m (1.9 ft.). This air volume is normally small enough to be mixed into the tracer gas by turbulence and diffusion.

8.4.2 Optimizing the Tracer Gas Filling

Regulation of the tracer gas pressure can either be controlled by:

- the ILS500 F/FHP
- an external pressure regulator

NOTICE

The ILS500 F/FHP is set to regulate internally as default.

8.4.2.1 External Pressure Regulation

NOTICE

External Pressure Regulation does not support recipes with different test pressure (i.e. Fill Setpoints).

External regulation is recommended mainly for very small objects (<50 cc).

Tracer gas pressure is controlled by external regulator. ILS500 F/FHP opens a path between the gas feed line and the test object. The pressure will equate and the tested object will attain the pressure delivered by the external regulator. ILS500 F/FHP checks that the fill pressure is above Fill Setpoint before proceeding to the next test step.

8.4.2.2 Internal Pressure Regulation

Tracer gas pressure can be set to be controlled by the ILS500 F/FHP. Internally regulated filling is generally faster than externally regulated. The reason for this is that the feeding pressure can be set higher than Fill Setpoint which results in a higher fill flow.

9 Troubleshooting

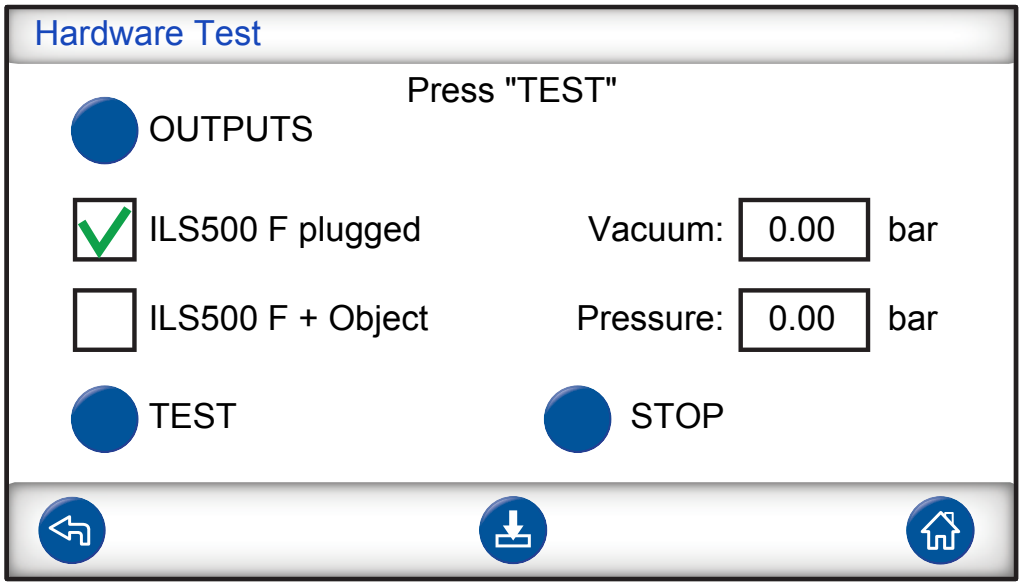
9.1 Fault Symptoms

Fault Symptom	Fault	Measures
Evacuation Failed	Failed to reach vacuum within the specified time. Large leak on Test Object or connections.	Check the compressed air supply.
Gas Fill Failed	Failed to fill to the right pressure within the specified time. Large leak on Test Object or connections.	Check the incoming gas pressure.
Gas Refill Failed	Failed to refill the object. Large leak on Test Object or connections.	Check the incoming gas pressure.
Gas Evac Failed	Failed to reach vacuum within the specified time.	
HW Error During Test	Serious error has occurred during test.	Check external equipment, e.g Active Probe.
Test Timeout	Maximum time for the test was exceeded.	Check that time is correctly set.

9.2 Perform Hardware Test

NOTICE

Before performing the hardware test, carefully check that your tracer gas and compressed air feed pressures are correct. Wrongly set pressure can cause erroneous test results.



- For troubleshooting and testing of the system, use Service menu.
- For remote troubleshooting, use Service Run menu.
- Venturi Pump and all Gas Valves can be tested automatically.

The hardware test is a diagnostic tool helping you in preventive maintenance as well as service and repair. The test takes you through a number of steps testing all units that are subject to wear and should thereby help you to find almost any problem in the ILS500 F/FHP system.

NOTICE

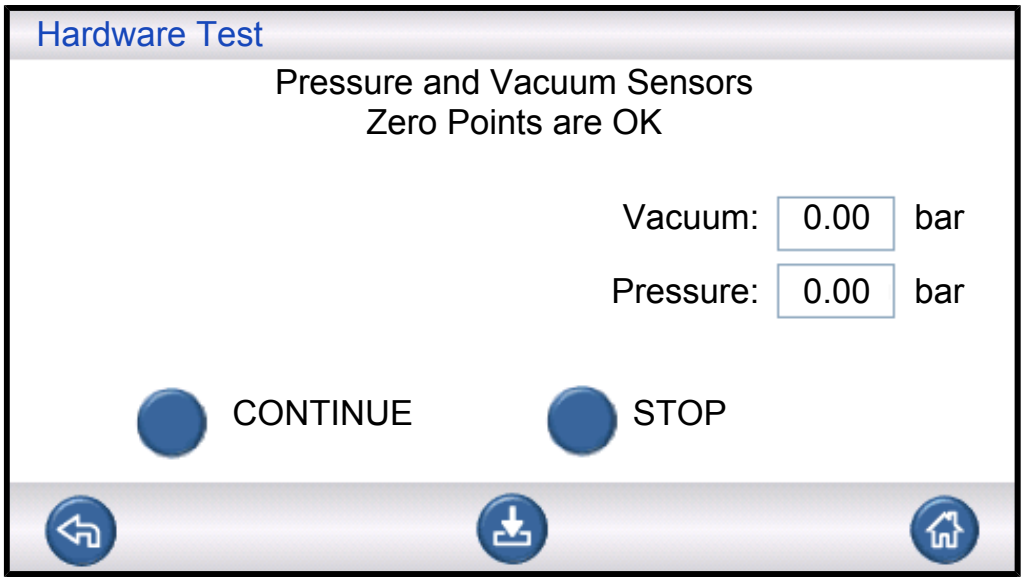
Run through the whole sequence to interpret the results correctly.

You will need the reference table at the end of this section to help you interpret the test results correctly. Keep this manual at hand when performing the test.

You can choose to test according to the limits of your specific application.

1. Setup all parameters for your test object (or load desired recipe) and connect a leak free sample.
2. Set test selection switch to ”ILS500 F/FHP + Object” for application specific hardware test. You can also test the ILS500 F/FHP against factory specification. In this case you should plug both test ports using the plugs delivered with the units. Remove ISO to NPT converters if installed and install the blind plugs. Set test selection switch to ”ILS500 F/FHP plugged” for factory specified hardware test.
3. The ”Continue” button will be displayed at the end of each test step. Press ”Continue” for next test step.

Pressure and Vacuum Sensors



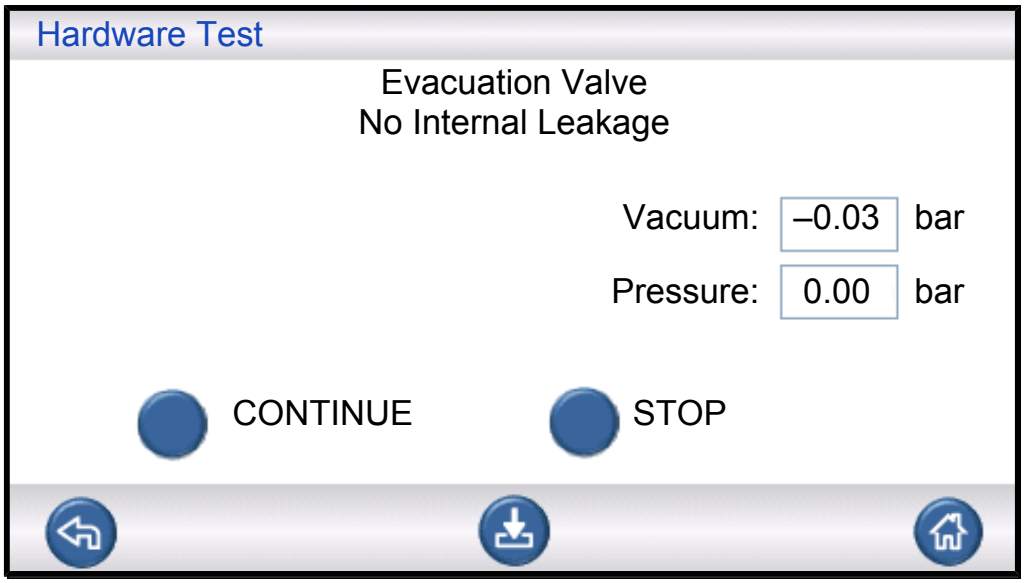
Zero points of pressure and vacuum sensors are tested. Possible results:

- Zero Points are OK
- Vacuum Zero Point not OK

Offset zero point can result in:

- Incorrect gas filling
- Erroneous vacuum or pressure decay results

Evacuation Valve



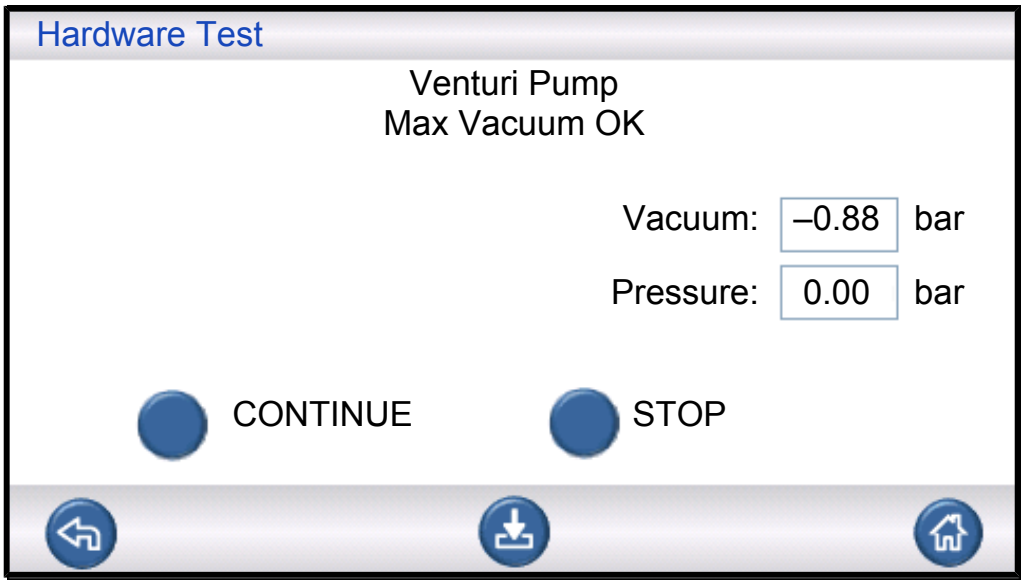
Evacuation valve is checked for internal leakage. Possible results:

- No Internal Leakage
- Internal Leakage

Internal leakage can result in:

- False vacuum decay rejects
- Increased tracer gas consumption

Venturi Pump



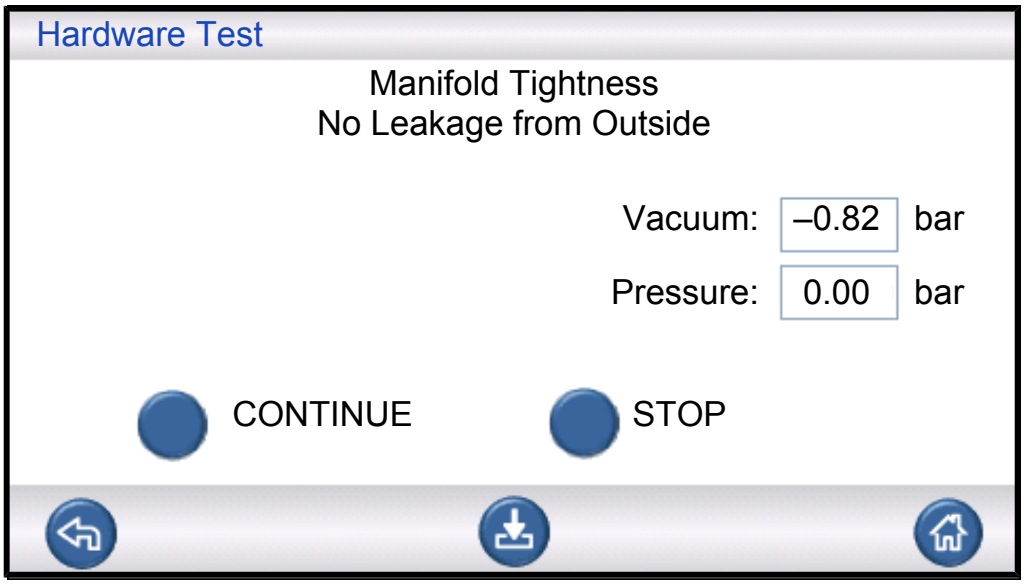
Checking max vacuum of Venturi pump. Possible results:

- Max Vacuum OK
- Poor Max Vacuum

Poor max vacuum can result in:

- Failed pre-evacuation
- Slower evacuation

Manifold Tightness (gross)



The overall tightness of the manifold is tested using the vacuum raise method.
Possible results:

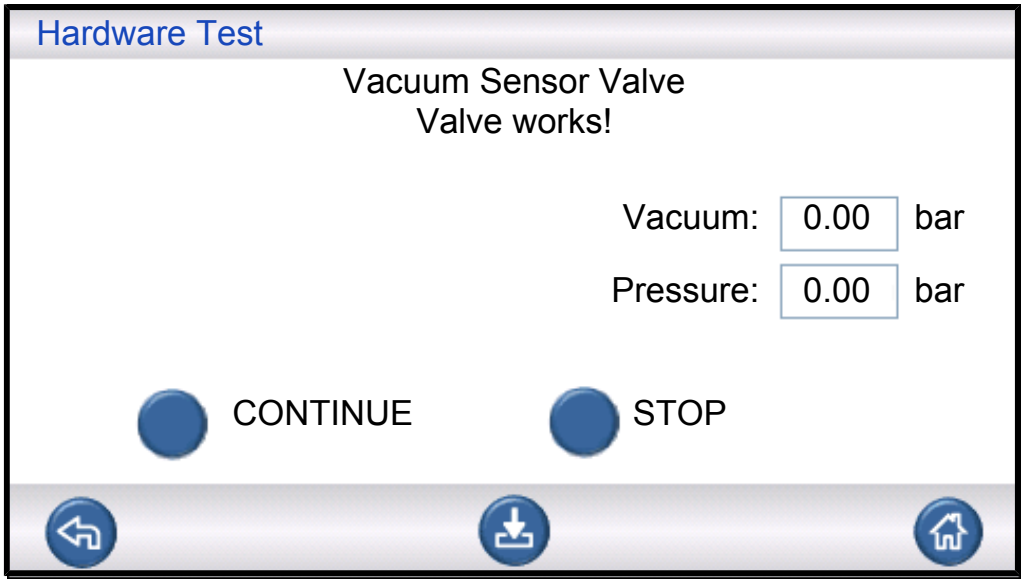
- No Leakage from Outside
- Leakage from Outside

Leaks in the manifold can result in:

- False vacuum decay rejects
- Increased gas consumption

Minor external leakage will be found later during the gas test step.

Vacuum Sensor Valve



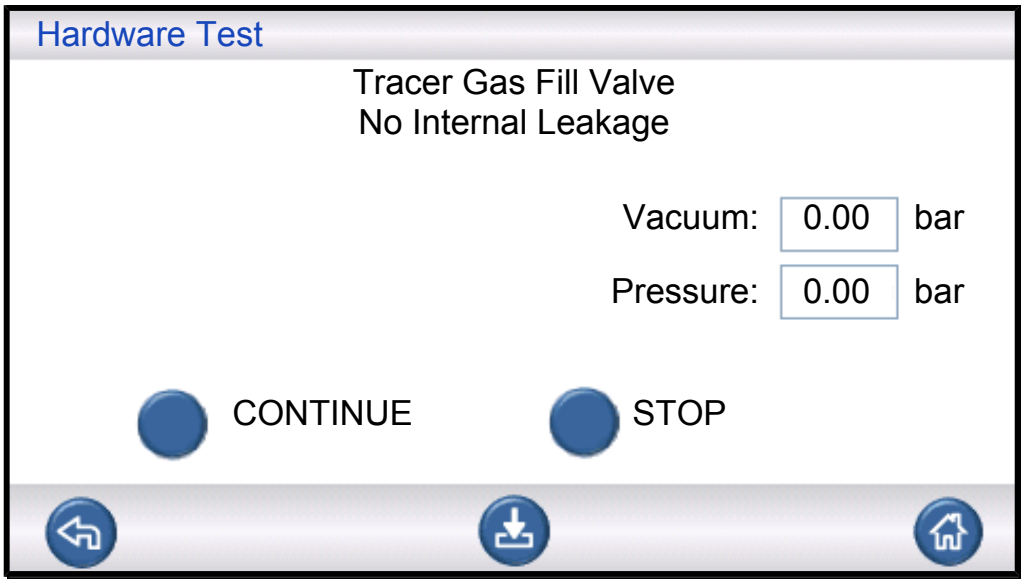
This checks that the valve shuts to protect vacuum sensor before filling. Possible results:

- Valve works
- Faulty!

Malfunction can result in:

- Damage to vacuum sensor
- Failed pre-evacuation

Tracer Gas Fill Valve



The step tests the gas fill valve for internal leakage by registering pressure rise behind the valve.

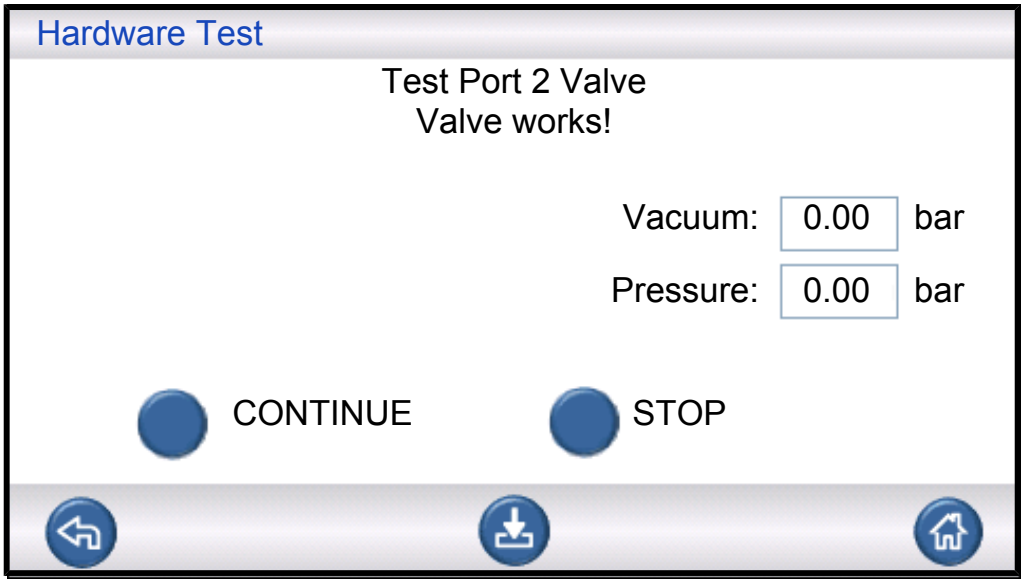
Possible results:

- No Internal Leakage
- Internal Leakage

Internal leakage can result in:

- Erroneous pressure decay results
- False vacuum decay rejects increased gas consumption

Test Port 2 Valve



NOTICE

This test will fail if both test ports are connected to a test object. Proceed and then repeat the entire hardware test sequence with both ports plugged to perform this test step.

This step tests Test Port 2 valve for internal leakage by registering pressure rise behind the valve.

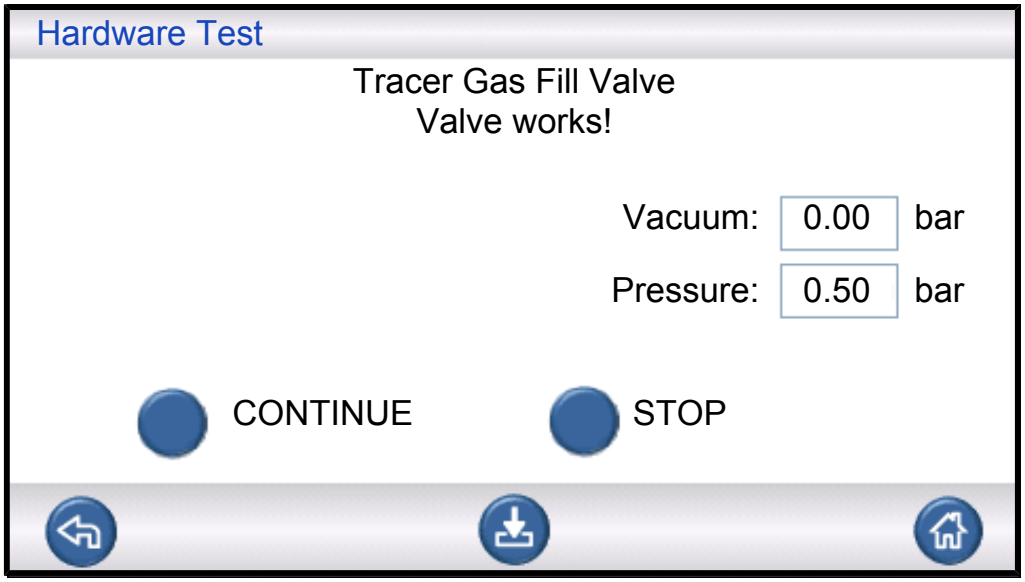
Possible results:

- No Internal Leakage
- Internal Leakage

Internal leakage can result in:

- False blockage test accepts

Tracer Gas Fill Valve



This step tests that tracer gas fill valve opens to fill gas. Test will fail if tracer gas feed pressure is too low. If this is the case, adjust pressure and restart hardware test from beginning.

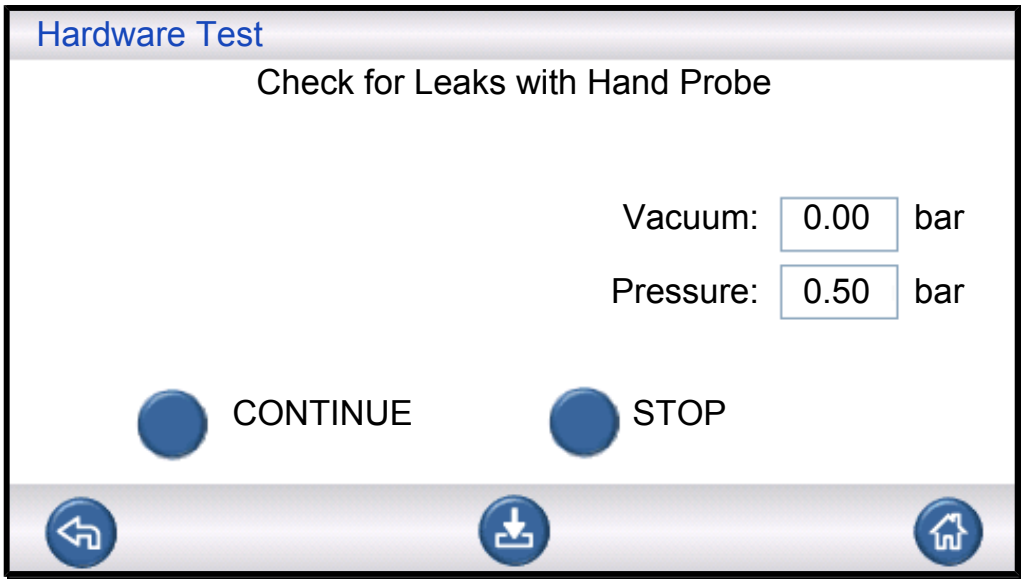
Possible results:

- Valve works
- Faulty!

Malfunction will result in:

- Failed gas filling

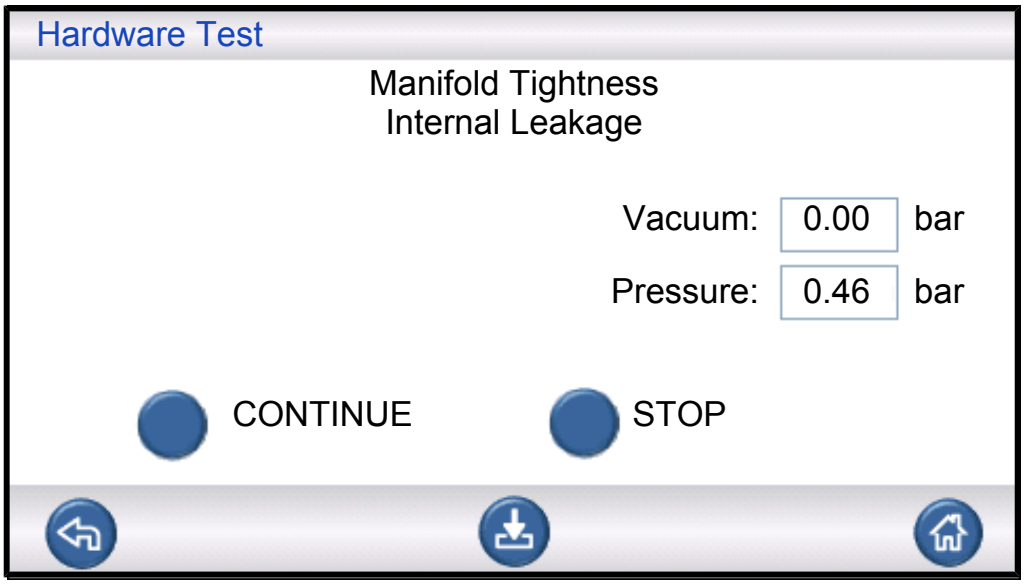
External Gas Leaks



The ILS500 F/FHP is now prepared for a manual test for external leakage. Use a Leak detector with hand probe to check for leakage.

- Start by checking all connections between the ILS500 F/FHP and your test object. Follow each test line carefully and check every joint.
- Proceed to check around the gas valves and manifold inside the ILS500 F/FHP.

Manifold Tightness (gross)



The overall tightness of the manifold is tested using the pressure decay method. This is a complement to the gas test, revealing leakage out, through the exhaust etc.

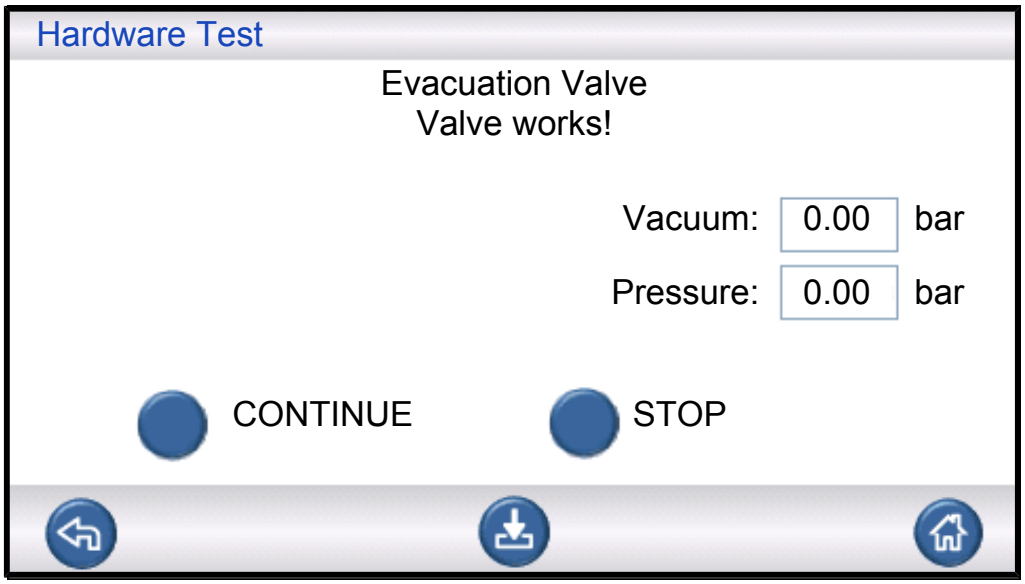
Possible results:

- No Internal Leakage
- Internal Leakage

Internal leakage can result in:

- False pressure and vacuum decay rejects
- Increased tracer gas consumption

Evacuation Valve



This step tests that evacuation valve opens to release tracer gas to exhaust. Same test as previously but under pressure instead of vacuum.

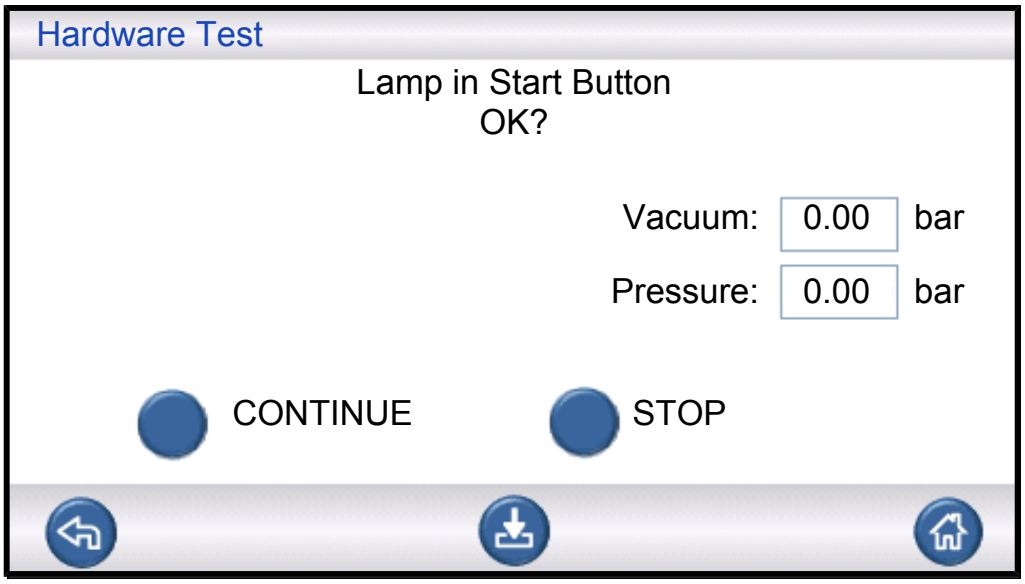
Possible results:

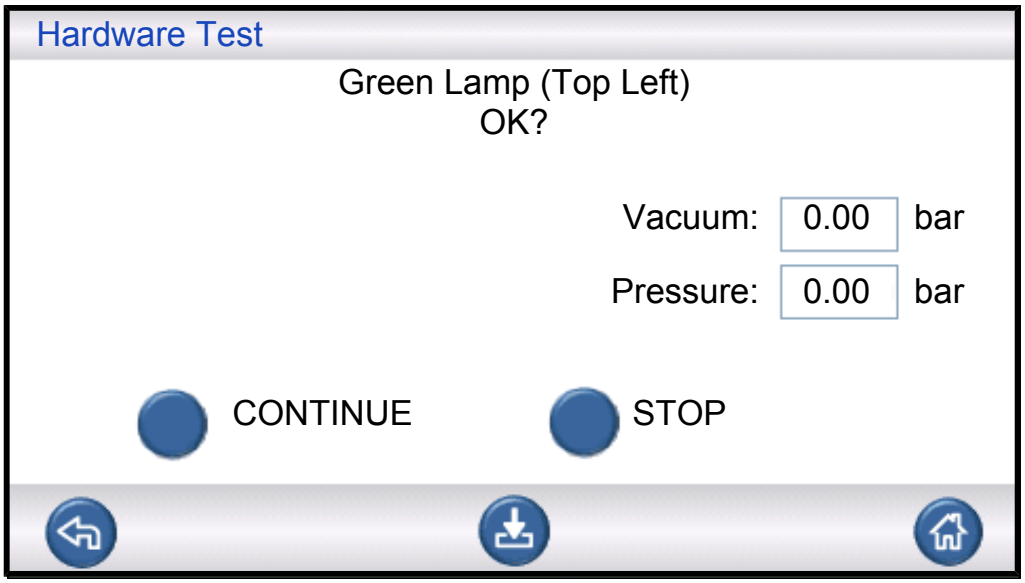
- Valve works
- Faulty!

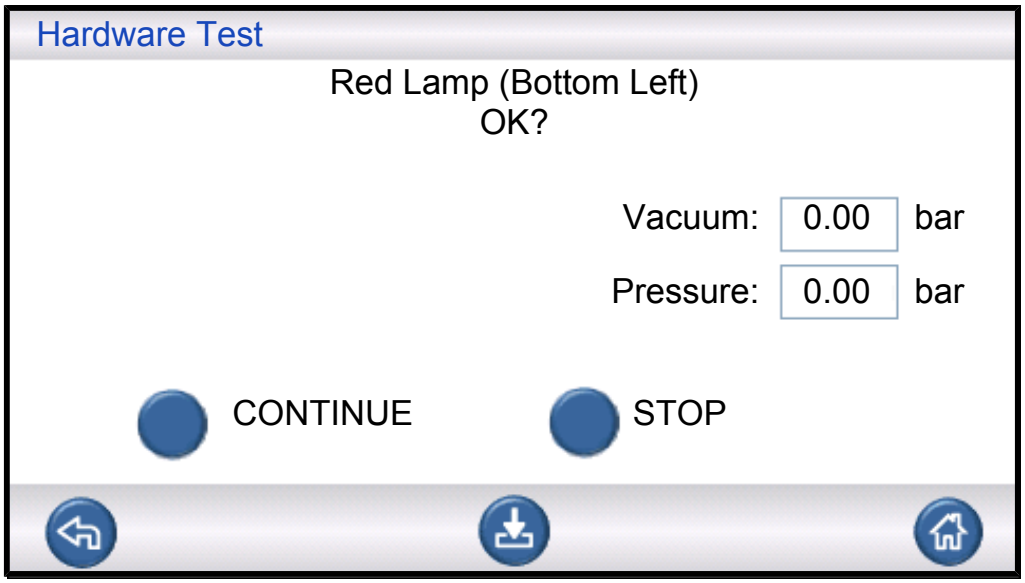
Malfunction will result in:

- Failure to terminate test cycle

Indicator Lamps



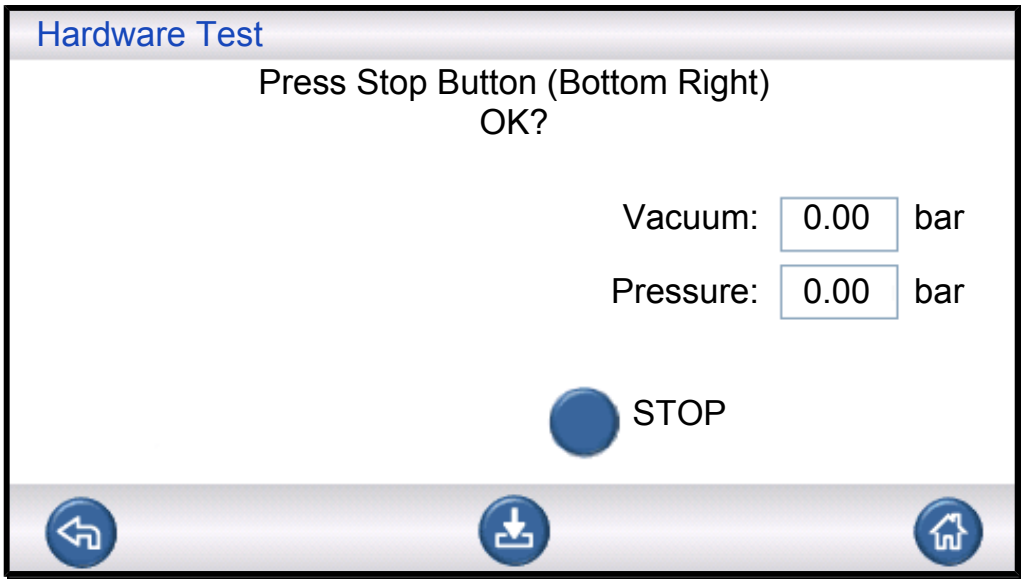




This is a “manual” test. The ILS500 F/FHP lights up one lamp at the time. Simply check that the right lamp comes on.

► Check function of each lamp by pressing “Continue”.

START and STOP buttons



This is a “manual” test. The test continues when the correct button is pressed. The test checks the activated START and STOP buttons only. Use INPUT menu under Service menu to check buttons that are turned off.

9.2.1 Hardware Error Messages

Error Message	Reason for Error	Corrective Action*
Hardware Error Vacuum Sensor Error	No power to vacuum sensor.	Check cable to sensor.
	Sensor not connected to AD.	Check connection to AD.
	Damaged vacuum sensor.	Send in for repair.
Hardware Error Pressure Sensor Error	No power to pressure sensor.	Check cable to sensor.
	Sensor not connected to AD.	Check connection to AD.
	Damaged pressure sensor.	Replace sensor.
Analog Inputs Power Off	No power to AD module.	Check power cable on left side of AD module.

*: Contact your supplier if the suggested action does not clear the error.

9.2.2 Interpretation of Hardware Test Results

Use the table below, to correct errors detected by the hardware test routine.

Tested Unit	Tested Feature	Reason for Error	Action
Evacuation Valve	Internal leaks	Dirty or worn valve seals.	Replace clean evacuation valve.

Tested Unit	Tested Feature	Reason for Error	Action
Venturi Pump	Maximum vacuum	Compressed air pressure too low or too high.	Adjust compressed air pressure.
		Dirt inside Venturi.	Remove and clean Venturi.
		Dirty or broken Venturi pilot valves.	Replace two upper valves in pilot ramp.
		Dirty or broken Evacuation pilot valves.	Replace fourth valve from bottom in pilot valve ramp.
Gas Valve Manifold	Leaks from outside	Leaks to outside.	Check for leaks with Hand Probe (later in hardware test sequence).
		If no gas leaks.	Check internal leaks in tracer gas fill valve.
		If no internal leaks in tracer gas valve.	Replace/clean vacuum sensor protection valve.
Vacuum Sensor Protection Valve	Function	No signal to pilot valve.	Check ”Sensor Protect” output. Send in for repair.
		Dirty or broken pilot valve.	Replace valve third valve from bottom in pilot ramp.
		Vacuum sensor protection valve broken.	Replace valve.
Tracer Gas Fill Valve	Internal leaks	Dirty or worn valve seals.	Replace or clean tracer gas fill valve.
		Leaking pilot valve.	Replace fourth valve from bottom in pilot valve ramp.
Test Port 2 Valve	Function	Dirty or broken pilot valve.	Replace third valve from bottom in pilot ramp.
		Test port 2 valve broken.	Replace valve.
Tracer Gas Fill Valve	Function	Dirty or broken pilot valve.	Replace fourth valve from bottom in pilot ramp.
		Tracer gas fill valve broken.	Replace valve.

Tested Unit	Tested Feature	Reason for Error	Action
Gas Valve Manifold	Leaks to outside	Wrongly assembled gas valve.	Remove leaking valve. Clean and grease valve seal before installing again. See instructions.
		Wrongly installed connectors/plugs.	Remove leaking unit. Clean and grease o-ring Install again. Units lacking o-ring seal should be sealed with Loctite 577 or similar.
Evacuation Valve	Function	Dirty or broken Evacuation pilot valves.	Replace fourth valve from bottom in pilot valve ramp.
Lamp	Function	Broken lamp.	Replace lamp. Send in for repair.
Tooling Valves	Function	Dirty or broken pilot valve.	Replace first or second valve from bottom in pilot ramp.
Button	Function	Broken switch.	Send in for repair.

10 Maintenance Instructions

There are three different parts that needs regular maintenance:

- Venturi Pump

  Needs regular cleaning.

- Gas Valves

  Needs regular cleaning and wears out.

- Pilot Valves

  Maintenance free if incoming compressed air is dry and filtered to 5 µm.

Changing Venturi Pump and all Gas Valves takes less than 15 minutes.

Cleaning of the instrument is done with a moistened cloth.

10.1 Maintenance Plan

Part	Interval	Action
Venturi Pump	3 months	Perform a Hardware Test. Check Ultimate Vacuum. Clean venturi nozzles when necessary.
Evacuation, Fill and Test Port 2 Valves	3-6 months*	Perform a Hardware Test. Check condition of valves. Replace or clean valves when necessary.
Vacuum Sensor Valve	12 months	Perform a Hardware Test. Check condition of valve. Replace or clean valve when necessary.
Pilot Valves	12 months	Change valve if unexpected pressure builds.

*: Depends on the amount of particulates in the objects tested. Metal burrs and other sharp particles will wear the valves down, requiring shorter maintenance intervals.

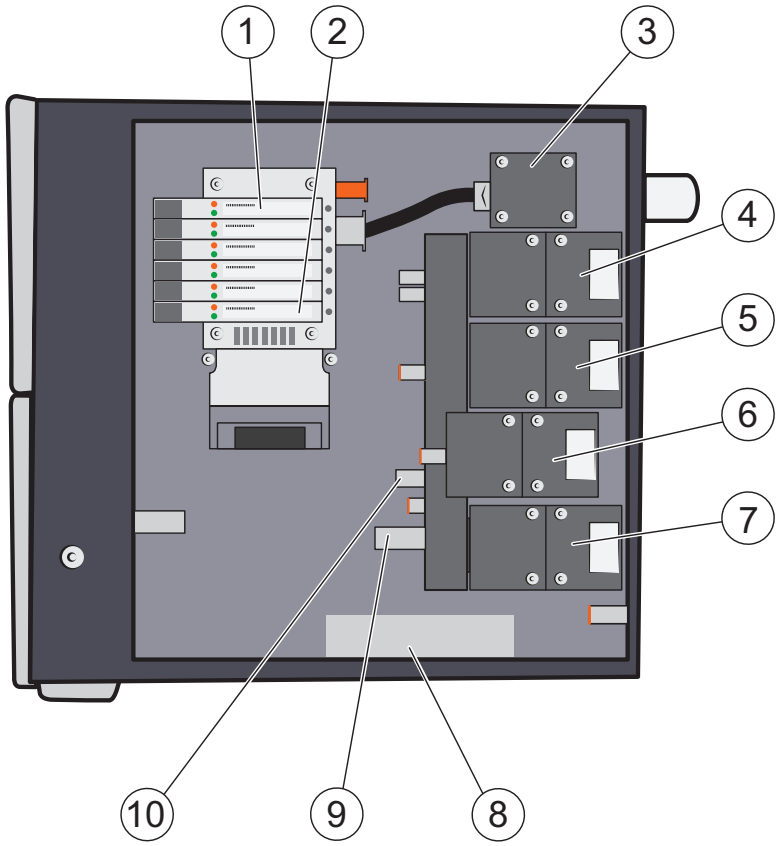
10.2 Maintenance

10.2.1 Tools and Safety Equipment

When performing regular maintenance of the ILS500 F/FHP the following equipment is needed.

Description	Note
Allen Keys (Hexagonal 3 and 4 mm)	
Torx Key (T25)	
Screwdriver (Philips 1 or Pozidrive 1)	
Protective Eyewear	When performing tooling output test.
Protective Ear Plugs	When performing tooling output test.

10.2.2 Interior View



1	Pilot Valve 6	2	Pilot Valve 1
3	Venturi Pump (Ejector)	4	Evacuation Valve
5	Tracer Gas Fill Valve	6	Test Port Valve 2
7	Vacuum Sensor Control Valve	8	Pressure Sensor (HP model only)
9	Vacuum Sensor	10	Pressure Sensor

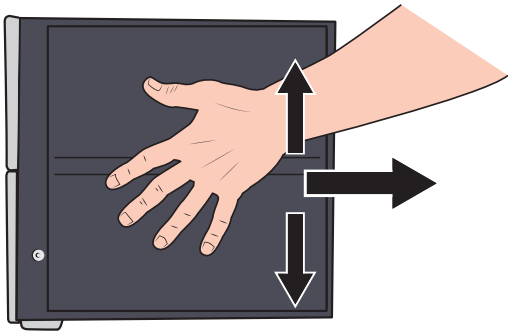
Pilot Valve Ramp

The pilot valves are characterized by a dual function. They can be used separately or combined for higher capacity.

Position	Valve
6	Main Air Valve
5	Venturi Pump Supply
4	Evacuation Valve and Tracer Gas Fill
3	Test Port 2 Valve and Sensor Protection Valve
2	Tooling Valve 1, 2
1	Tooling Valve 3, 4

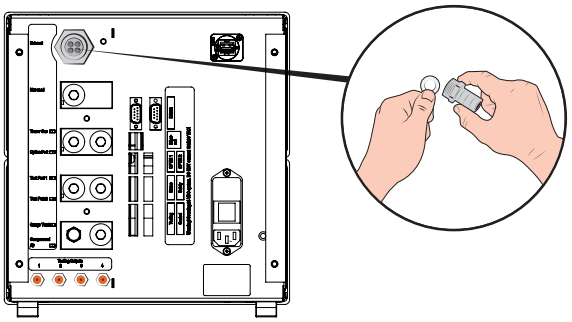
10.2.3 Removing the Cover

1. Use a T25 key to remove the two screws holding the right hand cover (next to gas ports).
2. Slide the cover back and lift it off. Rock the rear end of the cover up and down a few times to loosen. See below.

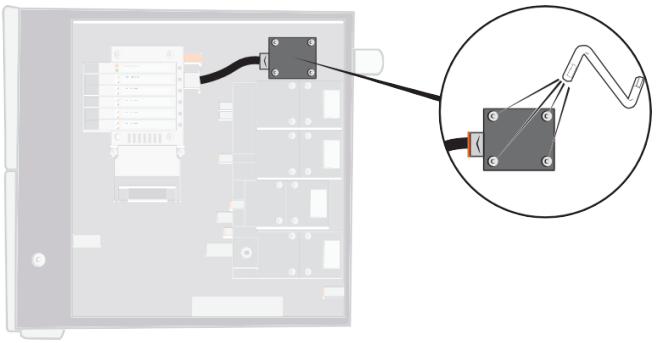


10.2.4 Cleaning or Replacing the Venturi Pump

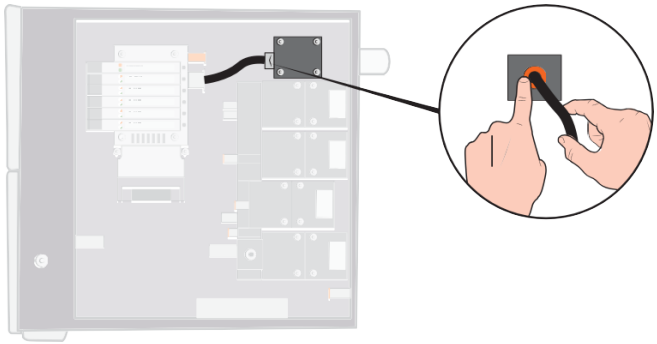
1. Remove the exhaust hose from the barbed hose fitting.
2. Unscrew and remove the barbed hose fitting and the plastic washer.



3. Use a 4 mm Allen key to remove the four screws holding the Venturi pump.

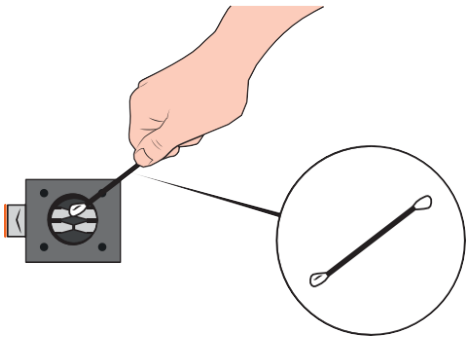


4. Remove the o-ring under the Venturi. Remove the hose from Venturi inlet. Push hose into connector and press orange ring down to release hose, then pull hose out.



5 Remove the hose fitting from the Venturi.

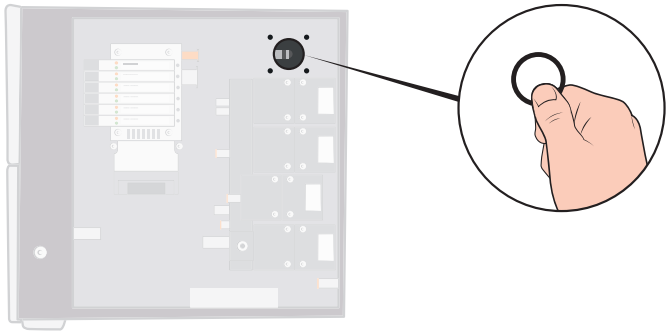
6 Install new Venturi or use compressed air jet and a cotton bud, pipe cleaner or small brush to clean the nozzles inside the Venturi.



7 Replace hose fitting on Venturi inlet.

8 Reconnect inlet hose.

9 Clean o-ring and install in groove on valve manifold.



10 Reinstall and tighten the four screws.

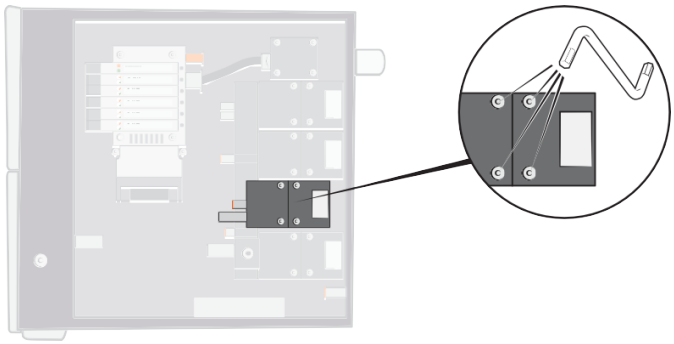
11 Put plastic washer inside Venturi outlet and reinstall barbed fitting. Tighten with spanner.

12 Reconnect the exhaust hose.

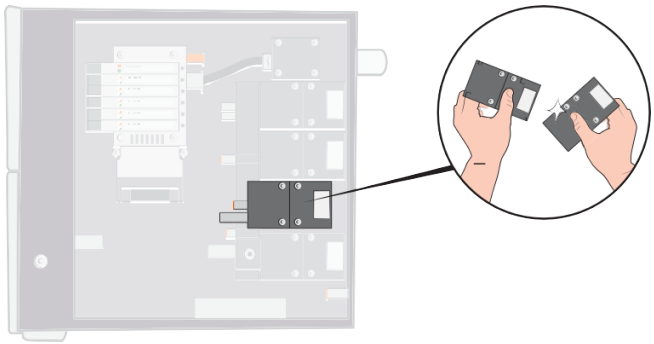
13 Run through the hardware test again to test that the Venturi delivers adequate max vacuum.

10.2.5 Replacing Gas Valves

1. Use a 3 mm Allen key to remove the four screws holding the valve to be changed.



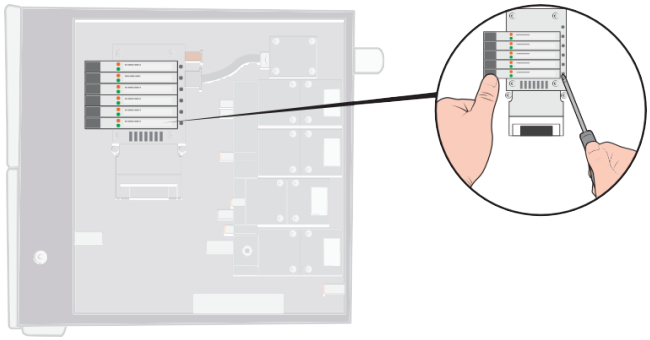
2. Lift the old valve out and put the new valve in. Notice the correct orientation in the picture below.



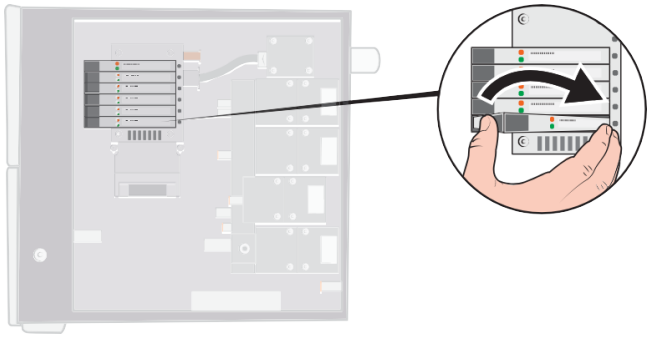
3. Tighten the screws 2-3 mm (0.08-0.12 in.) at a time moving the key from screw to screw so that the valve doesn't tilt much.
4. Tighten the screws and replace the cover.
5. Run through the hardware test again to test that the changed/removed valve(s) perform as required.
6. Use hand probe to check that there is no external leakage (this part of Hardware Test is routine).

10.2.6 Replacing Pilot Valves

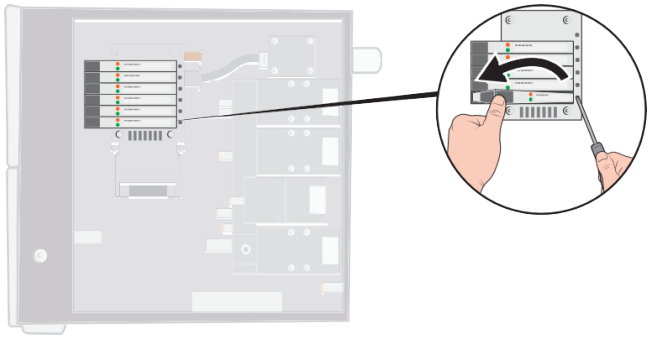
1. Use small screw driver to loosen the screw holding the valve. You must back the screw all the way out until you feel it "jumping" in the thread entrance.
2. Push down on the LEDs while pressing the screw down until you feel the locking mechanism "snap".



3 Lift the old valve out from the coil side. If the valve does not come off, repeat steps 3 and 4 making sure the screw is completely backed out.



4 Push the screw in while inserting the new valve. Insert the end facing the screw first and then push the coil side down.



5 Tighten the screw.

6 Replace the cover.

10.2.7 Replacing Sensors

⚠ CAUTION

Service of the sensors may only be carried out by service organizations authorized for this purpose by INFICON.

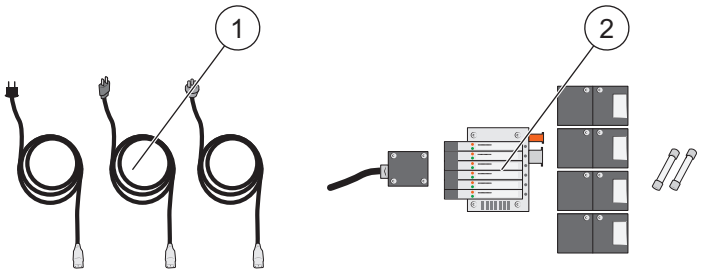
10.3 Functional Verification

See Perform Hardware Test [▶ 64].

11 Service

In case of a dysfunctional Sensistor ILS500 F/FHP, please send the product for service at your most convenient service facility. Please visit http://www.inficon.com for addresses.

12 Spare Parts and Accessories



Pos.	Part	Type	Part No.	
1	Power Cables	EU	591-146	
		UK	591-147	
		US	591-853	
2	No-Stop Maintenance Kit, Standard Model		590-680	
		Part		**Qty.**
		Ejector E240	591-422	1
		Valve 3/2 10 bar	591-419	4
		Valve to valve block VQC1000	591-630	1
		Fuse 2A T	591-578	2
		Allen Key (Hexagonal) 3 mm	591-864	1
		Allen Key (Hexagonal) 4 mm	591-865	1
		Torx T25	591-866	1
		Screwdriver Philips 1	591-867	1
	No-Stop Maintenance Kit, HP Model		590-685	
		Part		**Qty.**
		Ejector E240	591-422	1
		Valve 3/2 HP 30 bar	591-621	4
		Valve to valve block VQC1000	591-630	1
		Fuse 2A T	591-578	2
		Allen Key (Hexagonal) 3 mm	591-864	1
		Allen Key (Hexagonal) 4 mm	591-865	1
		Torx T25	591-866	1
		Screwdriver Philips 1	591-867	1

For a complete list of all spare parts and accessories, please contact:
support.sweden@inficon.com

13 Support from INFICON

13.1 How to Contact INFICON

For Sales and Customer Service, contact your nearest INFICON Service Center. The address can be found on the website: www.inficon.com

If you are experiencing a problem with your instrument, please have the following information readily available before contacting Customer Service:

- A serial number and firmware version for your instrument,
- A description of your problem,
- A description of any corrective action that you may have already attempted, and the exact wording of any error messages that you may have received.

13.2 Returning Components to INFICON

Please use the Product Return Form that was included with the product on delivery.

Do not return any component of your instrument to INFICON without first speaking with a Customer Service Representative. You must obtain a Return Material Authorization (RMA) number from the Customer Service Representative.

If you deliver a package to INFICON without an RMA number, your package will be held and you will be contacted. This will result in delays in servicing your instrument.

Prior to being given an RMA number, you may be required to complete a Declaration Of Contamination (DOC) form if your instrument has been exposed to process materials. DOC forms must be approved by INFICON before an RMA number is issued.

14 Disposal

According to EU legislation, this product must be recovered for separation of materials and may not be disposed of as unsorted municipal waste.

If you wish you can return this INFICON product to the manufacturer for recovery.

The manufacturer has the right to refuse taking back products that are inadequately packed and thereby presents safety and/or health risks to the staff.

The manufacturer will not reimburse you for the shipping cost.

Shipping address:
INFICON AB
Wahlbeckgatan 25A
S-58216 Linköping
Sweden

15 EU Declaration of Conformity

EU Declaration of Conformity

We – INFICON AB - herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON AB.

In case of any products changes made without our approval, this declaration will be void

Designation of the product:

Sensistor® ILS500 Leak Detection Filler

Models:

Sensistor ILS500 F

Sensistor ILS500 FHP

Catalogue numbers:

590-580

590-581

Type number:

ILS.210.307

The products meet the requirements of the following Directives:

- ***Directive 2006/42/EC (Machinery)***
- ***Directive 2014/30/EU (EMC)***
- ***Directive 2011/65/EC (RoHS)***
- ***Directive 2014/35/EU (Low Voltage)***

Applied harmonized standards:

- ***EN ISO 12100:2010***
- ***EN 61326-1:2013***
  Class B according to EN 55011:2009, edition 4
- ***EN 61010-1:2010+A1:2019***
- ***EN IEC 63000:2018***

Authorized person to compile the relevant technical files:
Peter Hebo, INFICON AB, Walbecksgatan 24, S-582 13 Linköping, Sweden

Linköping, December 7th, 2021

Patrik Kaliff, CEO

Linköping, December 7th, 2021

Peter Hebo, R&D Manager

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Fax: +46 (0)13-355901
www.inficon.com
E-mail: reach.sweden@inficon.com

16 EC Declaration of Incorporation

EC DECLARATION OF INCORPORATION

We – INFICON AB - herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON AB.

In case of any products changes made without our approval, this declaration will be void.

Designation of the product:

Sensistor® ILS500 Leak Detection Filler

Models:

Sensistor ILS500 F

Sensistor ILS500 FHP

Catalogue numbers:

590-580

590-581

Type number:

ILS.210.307

The products meet the requirements of the following Directives:

- ***Directive 2006/42/EC (Machinery)***

Applied harmonized standards:

- ***EN ISO 12100:2010***

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive (2006/42/EC), where appropriate.

The manufacturer will electronically transmit, in response to a reasoned request by the national authorities, relevant information on the partly completed machinery.

The relevant technical documentation is compiled in accordance with part B of Annex VII.

Authorized person to compile the relevant technical files:
Peter Hebo, INFICON AB, Walbecksgatan 24, S-582 13 Linköping, Sweden

Linköping, December 7th, 2021

Patrik Kaliff, CEO

Linköping, December 7th, 2021

Peter Hebo, R&D Manager

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www.inficon.com
E-mail: reach.sweden@inficon.com

17 UK Declaration of Conformity

UK Declaration of Conformity

We – INFICON AB - herewith declare that the products defined below are in conformity with the requirements regarding safety, health and relevant provisions of the relevant legislation by design, type and the versions, which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON AB.

In case of any products changes made without our approval, this declaration will be void

Designation of the product:

Sensistor® ILS500 Leak Detection Filler

Models:

Sensistor ILS500 F

Sensistor ILS500 FHP

Catalogue numbers:

590-580

590-581

Type number:

ILS.210.307

The products meet the requirements of the following UK legislation:

- ***S.I. 2008 No. 1597 (Machinery)***
- ***S.I. 2016 No. 1091 (EMC)***
- ***S.I. 2012 No. 3033 (RoHS)***
- ***S.I 1989 No. 728 (Low Voltage)***

Applied designated standards:

- ***EN ISO 12100:2010***
- ***EN 61326-1:2012***
  Class B according to EN 55011:2009, edition 4
- ***EN 61010-1:2010***
- ***EN IEC 63000:2018***

Authorized person to compile the relevant technical files:
Peter Hebo, INFICON AB, Walbecksgatan 24, S-582 13 Linköping, Sweden

Linköping, December 7th, 2021

Patrik Kaliff, CEO

Linköping, December 7th, 2021

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E-mail: reach.sweden@inficon.com

18 Appendix A

18.1 Parameter Index

Parameter	Range	Factory Default	Customer Modification
Abort Above Fill Setpoint		20 %	
Block Test Pressure		0.3 bar	
Blockage Test Time		2 s	
Blockage Test		OFF	
Choose at startup		OFF	
Demo Mode		OFF	
End of Test Signal		1 s	
Evacuation Timeout		10.0 s	
Extended Gas Evacuation		0 s	
Extended Gas Fill		0 s	
Extended Pre Evacuation		0 s	
External Acknowledge		OFF	
External Gas Regulation		OFF	
External Start/Stop		OFF	
Fill Pulse Open		20 ms	
Fill Pulse Closed		200 ms	
Fill Setpoint		0.3 bar	
Fill Signal Filter		0.0 s	
Fill Timeout		10 s	
Gas Evacuation		ON	
Gas Evac. Setpoint		0.3 bar	
Gas Evac. Test Port 1		OFF	
Gas Fill Test Port 1		OFF	
Marker Output		0 s	
Marker Output High if Leak		OFF	
Pre Evac Test Port 1		OFF	
Pre Evacuation		ON	
Pre Evacuation Setpoint		–0.7 bar	
Pressure Stabilisation Time		5 s	
Pressure Decay Limit		0.1 bar	
Pressure Decay Test		OFF	

Parameter	Range	Factory Default	Customer Modification
Pressure Decay Test Time		5 s	
Pressure Unit		bar	
Pulse Fill from (%) of Setpoint		90%	
Purge Level		0.001	
Purge Object		0 s	
Refill Hysteresis		0.2 bar	
Refill Timeout		5 s	
Status - pin 5		End of Test	
Test Timeout		10 min	
Tooling Connection		OFF	
Tooling Disconnection		OFF	
Two-Hand Control		OFF	
Use Recipes		OFF	
Vac. Stabilisation Time		5 s	
Vacuum Decay Limit		0.1 bar	
Vacuum Decay Test		OFF	
Vacuum Decay Test Time		5 s	

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