PROVASET T2P (BASE AND PLUS)

PRESSURE DECAY LEAK TESTER

INSTRUCTION MANUAL
Rev: 20210629
Updated to fw 1.0.22

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Revision	Description	Date
20210218	Issued	18/02/2021
20210427	Added Screen capturing function for FW version 1.0.16 or newer on page 55	27/04/2021
20210506	Fixed the language of some image	06/05/2021
20210629	Updated par. 6.1.2 on page 57	29/06/2021

Legend:
ABC = display message
ABC = programmed parameter

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1. LIST OF SYMBOLS USED

CAUTION: safety rules for the operator - operators are defined as any installer, user or other personnel who may be present.

WARNING: these instructions must be followed carefully to ensure correct operation of the equipment and avoid any damage to the equipment or injury to the operator.

NOTE: contains important indications regarding equipment maintenance.

NOTE: contains important supplementary information or useful suggestions.

2. RISKS AND WARNINGS

CAUTION: Compressed air risk: when the equipment is installed and in use, the operator must be protected against the risk of injuries caused by the accidental detachment of pressurised parts from the product being tested. The product being tested must conform with the requirements of the applicable regulations (e.g. “Pressure Equipment Directive”, PED 97/23/EEC).

CAUTION: Electrical shock risk: class I equipment.
The electrical power supply must be equipped with a mandatory a protective ground connection. Check the protective ground connection of the power supply at regular intervals. Ensure the power supply cable is maintained in good condition at all times. Disconnect the power supply cable when carrying out any maintenance work and before cleaning the equipment housing.

CAUTION: Moving parts risk: if the pneumatic or electrical outputs of the equipment are used to drive external moving parts, the operator must be protected by applying all the safety standards set out in the Machinery Directive regarding moving parts.

CAUTION: Before carrying out any maintenance work, depressurise the pneumatic system and disconnect the power supply cable from the device.

WARNING: Clean the outside of the equipment with soft cloths, using only water and neutral detergents or disinfectants.
Do not use alcohol, benzine or thinners; do not use flammable or toxic detergents.
Do not spray the cleaning agent directly on the device.
Use specific cleaning products when cleaning the LCD monitor screens.

WARNING: Do not pour fluids on the equipment: this could damage some of its parts permanently, especially the electrically live parts.

WARNING: Use the equipment only for the intended purposes, described in this manual; all other uses may be unsafe for the operator and can damage the equipment.

WARNING: Read this manual carefully before using the equipment, of which it forms an integral part. Keep this manual for future reference.

3. GENERAL INFORMATION

3.1 Description

Provaset T2P is an electro-pneumatic instrument, designed for leak tests with pressure decay measurements.
Main features:

- Modern and powerful electronics, with a 32 bit microprocessor, flash memories;
- 3.5" TFT, 320 x 240 pixel resolution, colour display ;
- Touch screen, for fast and easy programming of all operating parameters;
- Advanced serial interfaces, for data collection and remote programming of all functions;
- Innovative pneumatic circuit., designed to ensure the safety of the tests and the accuracy of the measurements.

Provaset T2P models can be used both for manual testing benches and for test stations on highly automated systems, controlled by a PLC or computer.
Provaset T2P is available in two different configurations: T2P base and T2P PLUS.

The T2P model in the PLUS configuration offers the following functions:

- leak test up to a full scale value of 2 bar (T2P2) or 6 bar (T2P6);
- blockage tests
- 2P leak tests:
- pressure measurements with a resolution of 1 Pa;
- 100 programmable test parameter programs;
- various pressure measurement scales (Pa, mbar, mmH2O, mmHg, psi, inH2O);
- manual pressure adjustments
- selectable languages;
- PLC inputs and outputs;
- clock/calendar;
- test counters;
- USB device port for communication with a PC;
- USB slave and RS232/RS485 serial lines for remote management from a computer;
- USB slave port for saving test data and firmware updates;
- menu guided procedure for the calibration of the pressure sensors.
- Ethernet connector;
- Staubli quick connector for leak masters;
- leak flow rate display, with flow rate units (cm^3/min, cm^3/h);
- menu guided procedure for the calibration of the pressure sensors.

The T2P model in the BASE configuration differs from the PLUS version as follows:

- 16 programmable test programs instead of 100;
- No Ethernet connector;
- No Staubli quick connector for leak masters;
- -EP option for continuous Blockage Tests

NOTE: Unless explicitly indicated by the phrase **[VALID FOR PLUS VERSION ONLY]**, the content of this manual applies to both versions of the instrument.

All Provaset T2P instruments are provided with valid calibration reports valid for ISO9001:2008 certification.

3.2 Packaging and transport

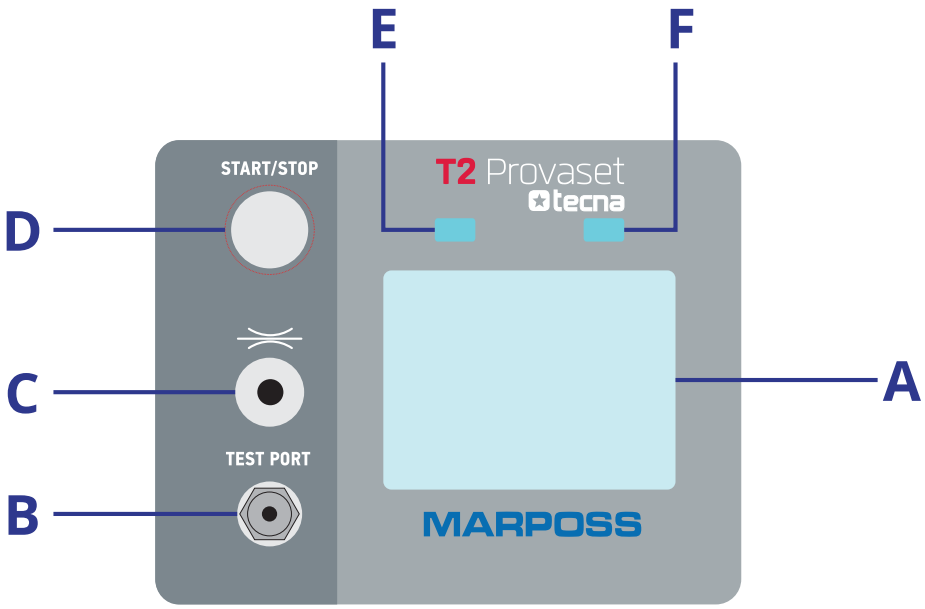
The type of packaging is selected according to the form of transport, the quantity to be delivered and the place of destination.
Normally, each individual instrument is shipped in a cardboard box.

Keep the cardboard packing so you can use it when shipping the equipment to authorized service centres or to the manufacturer if maintenance is required.
If the original packaging is no longer available, use an adequately sized cardboard box, filling all the empty spaces with soft material (paper, foam. etc...) to prevent any movement of the instrument inside the box.
The equipment must be transported at temperatures between –10 °C and 50 °C, with a maximum relative humidity of 50% and ambient pressure between 700 hPa and 1100 hPa.

3.3 Storage

If the equipment is not used for prolonged periods, store it in its original packaging, or suitably protected, in an environment having a temperature between 0 ° C and 50 ° C, maximum relative humidity 50%, ambient pressure between 700 hPa and 1100 hPa.

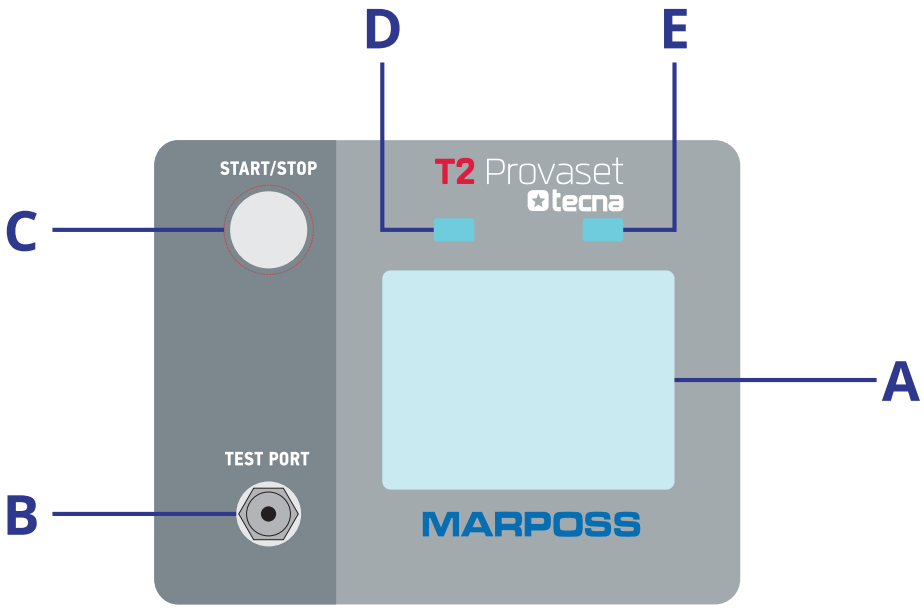
3.4 T2P PLUS front panel



A	LCD Display, Colour TFT, 3.5” with touch screen
B	TEST output for the pneumatic test circuit
C	Leak master quick connector, with Staubli RBE03 type shut-off valve.
D	Start/Stop push button, push to start a new test, push again for about 1 s to stop the test.
E	Green light: test result “Passed”
E	Red light: test result “Failed”

WARNING: do not use sharp or pointed objects on the touch screen, use fingers only, without pressing too hard.

3.5 T2P BASE front panel

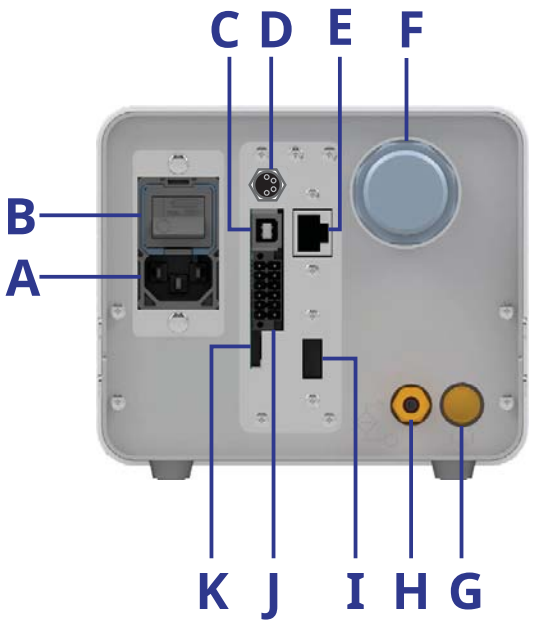


A	LCD Display, Colour TFT, 3.5” with touch screen
B	TEST output for the pneumatic test circuit
C	Start/Stop push button, push to start a new test, push again for about 1 s to stop the test.
D	Green light: test result “Passed”
E	Red light: test result “Failed”

WARNING: do not use sharp or pointed objects on the touch screen, use fingers only, without pressing too hard.

3.6 T2P PLUS rear panel

3.6.1 Rear panel with mains power supply (90 - 230 Vac)



A	Power input socket with protective earth ground connection, type IEC630
B	On/Off switch with fuses
C	USB slave port
D	4-pin connector for opto-isolated serial line
E	Ethernet connector
F	Manual pressure regulator
G	Silencer
H	Air inlet fitting
I	USB host port
J	12-pin digital inputs/outputs connector
K	Acoustic signal beep

3.6.2 Fuses

Version with mains power supply (90 - 230 V~)
Two fuses, size 5x20 mm, retarded type T, 630 mA rated.
Switch module with extractable fuse-holder, positioned above the power socket.

⚠ **CAUTION:** disconnect the power supply cable before changing the fuses.

Version with 24 V= power supply
Single fuse, internally mounted, resettable, 1.5 A.

3.6.3 Rear panel for external 24 Vdc power supply

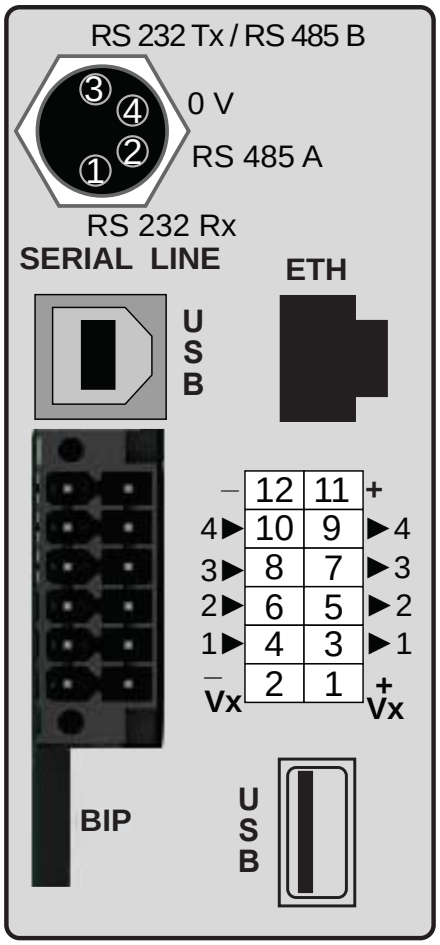
A Terminal block plug, 3 positions, pitch 5.08, clamping screw for wires, Phoenix Contact type 1777992

The power supply with two common +24 Vdc and 0V outlets, is supplied only if requested by the client. (option)
Terminals:
+24 V = 24 Vdc, 1.0 A min power supply
0 V 0 V common (connected to the frame)
⏚ Earth

⚠ **CAUTION:** EMI/EMC compliance; the ground connection is required for EMI/EMC electromagnetic compliance.

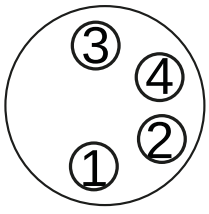
⚠ **CAUTION:** Electrical shock risk.
The external power supply must comply with standards.

3.6.4 Expansion board, 4 inputs / 4 outputs)



The expansion board, for serial lines and digital input/output signals, includes:

SERIAL LINE: isolated serial line, configurable for RS232 or RS485; 4-pin shielded M8 connector.



Type of configuration:

1. **RX** (RS232)
2. **A** (RS485+)
3. **TX** (RS232), B (RS485-)
4. **SC** (0 V serial line common)

If requested by the user, Tecna can also supply the serial line cable, complete with connector - 1.5 metre 4x0.34 cable + male, M8 type, shielded 0° connector, Part no. 7000-08711-6010150, MURR ELEKTRONIC. (**option**)

Type of configuration an wiring colour scheme:

1. **RX** (RS232) - **brown**
2. **A** (RS485+) - **white**
3. **TX** (RS232), B (RS485-) - **blue**
4. **SC** (0V serial line common) - **black**

USB:serial line USB device serial line; type B connector for communication with a Personal Computer;

DIGITAL I/O: +24 V= power supply, digital inputs/outputs, Phoenix Contacts connector, type DFMC 1,5/6-ST-3,5-LR, code 1787056.

1:	+Vx	(Output +Vx)	2:	–	(Output -Vx)
3:	<1	(Output 1)	4:	1<	(Input 1)
5:	<2	(Output 2)	6:	2<	(Input 2)
7:	<3	(Output 3)	8:	3<	(Input 3)
9:	<4	(Output 4)	10:	4<	(Input 4)
11:	+	+24V=	12:	–	-0 V common

Power supply for digital inputs/outputs:

+	external PLC power supply: +24 V=
-	external PLC power supply: -0 V common

Digital I/O

Output <1: <4	0.7 A max, non-configurable PNP output
Output +	Auxiliary output at positive power supply voltage +
Output -	Auxiliary output at power supply common 0 Volt -
Input 1<: 4<	5 mA max, non-configurable PNP input

Auxiliary internal power supply +Vx, -Vx

If an external power supply is not available (+ PLC 24 V=), it is possible to use the equipment internal power supply (+Vx , -Vx); connections:

1: +Vx	(Output +Vx)	connected to	11: +	(PLC: +24 V=)
2: -Vx	(Output -Vx)	connected to	12: -	(PLC: 0 V common)

The maximum output current is limited to 300 mA (max 10 W), protected by a self-resetting internal fuse.

The digital outputs and inputs are isolated, up to 50 Volts, if supplied by an external power supply (24 V=PLC). The digital inputs and outputs are not isolated if powered by the internal power supply +VX and -VX.

BIP: acoustic buzzer, low intensity

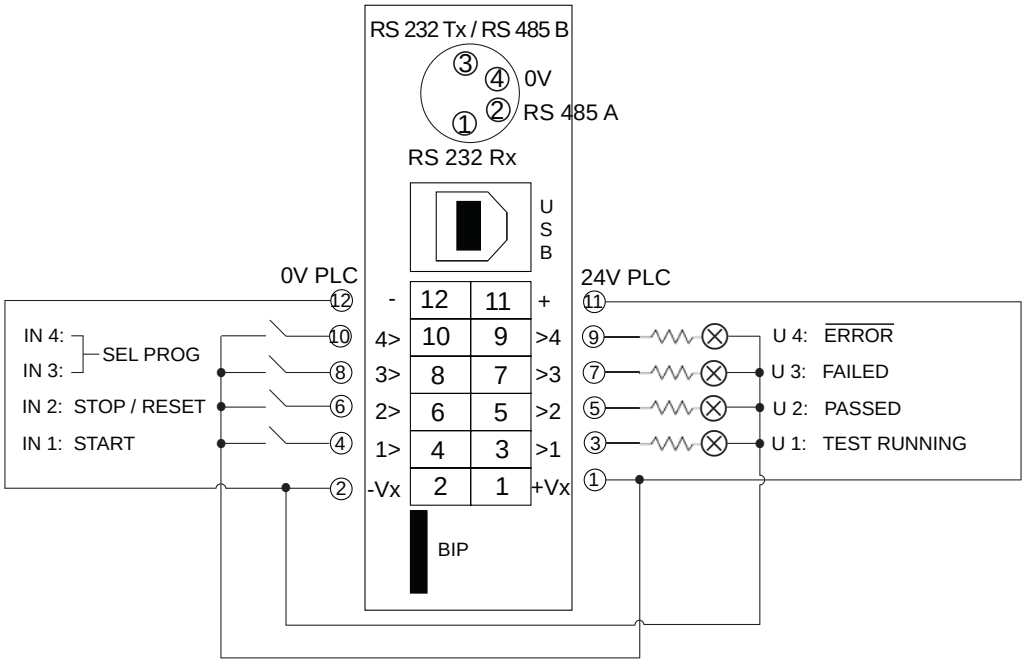
USB: Host USB port for saving test data and firmware updates

ETH: Ethernet connector

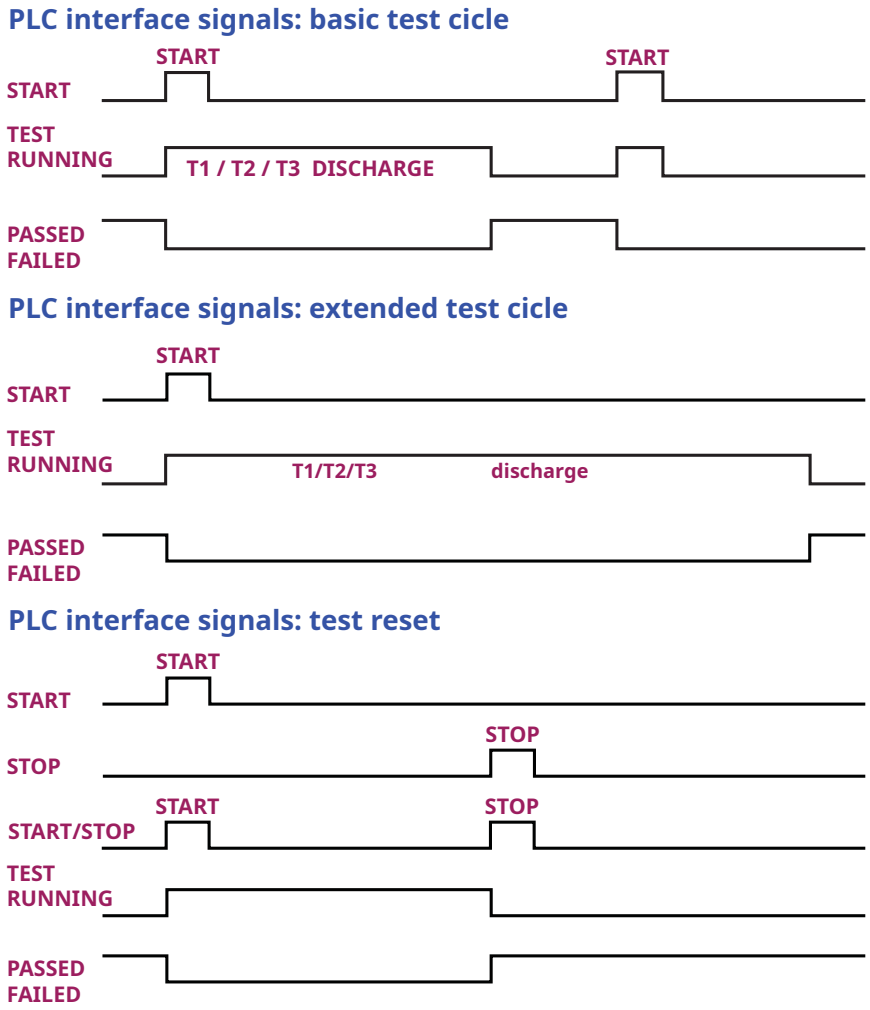
WARNING: Use only a single power supply source. Never connect the external PLC power supply to the internal power supply.

CAUTION: Electrical shock risk. Any external conductive connection to the expansion board must be considered as an accessible conductive part of the equipment and must be doubly insulated with respect to the mains supply.

Inputs IN1 and IN2 are used for mechanical contacts for the START and STOP/RESET signals, while inputs IN3 and IN4 are used to select the test program.



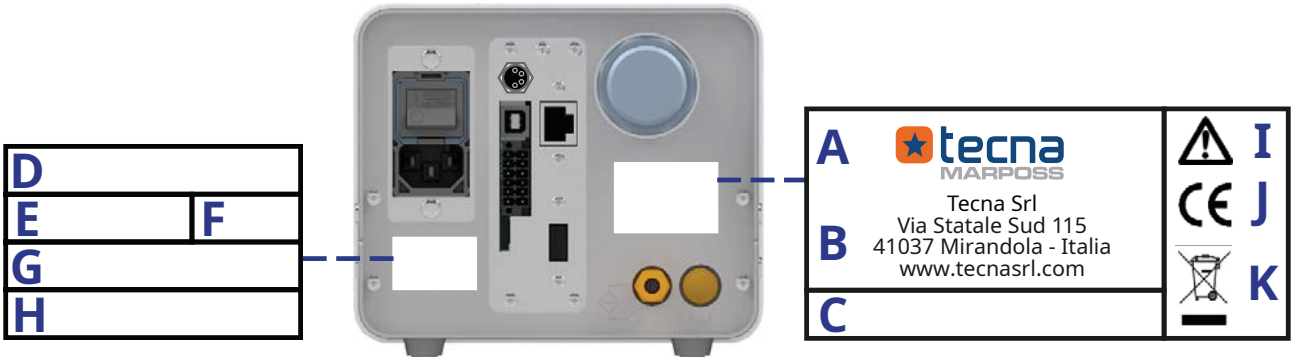
3.6.5 PLC: interface signals



A Programmable Logic Controller (PLC) may use a single START/STOP signal to command the START of a test cycle or reset a running test.
The START signal should be a pulse, that can set low when the "TEST RUNNING" signal is received.
The START signal must be set low before starting a new test.
If the START/STOP pulse is repeated while a test is running, the test is terminated (reset).
If a separate signal is used as the RESET command, the reset signal terminates the current test and disables the start command input (START).

All PLC inputs and outputs are PNP signal (active at 24 Vdc).

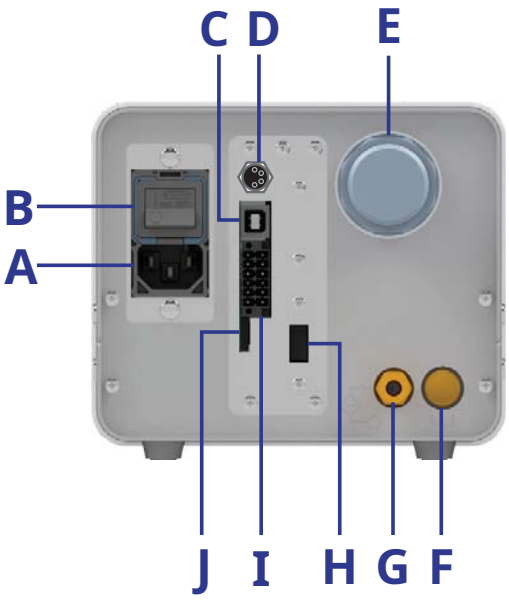
3.6.6 Manufacturer's name plate



A	Tecna Srl logo
B	Company address
C	Compressed air supply, 3 <= bar <= 10
D	Type code, T2Px
E	Serial number
F	Year of manufacture
G	Electrical power supply, 100/240 Vac, 50/60 Hz
H	Fuses, T-type 0.630 A
I	Instruction manual
J	CE marking
K	WEEE marking

3.7 T2P BASE rear panel

3.7.1 Rear panel with mains power supply (90 - 230 Vac)



Power input socket with protective earth ground connection, type IEC630
On/Off switch with fuses
USB slave port
4-pin connector for opto-isolated serial line
Manual pressure regulator
Silencer
Air inlet fitting
USB host connector
12-pin digital inputs/outputs connector
Acoustic signal beep

3.7.2 Fuses

Version with mains power supply (90 - 230 V~)
Two fuses, size 5x20 mm, retarded type T, 630 mA rated.
Switch module with extractable fuse-holder, positioned above the power socket.

⚠ **CAUTION:** disconnect the power supply cable before changing the fuses.

Version with 24 V= power supply
Single fuse, internally mounted, resettable, 1.5 A.

3.7.3 Rear panel for external 24 Vdc power supply

Terminal block plug, 3 positions, pitch 5.08, clamping screw for wires, Phoenix Contact type 1777992;

The power supply with two common +24 Vdc and 0V outlets, is supplied only if requested by the client. (option)
Terminals:
+24 V = 24 Vdc, 1.0 A min power supply
0 V 0 V common (connected to the frame)
⏚ Earth

⚠ **CAUTION:** EMI/EMC compliance; the ground connection is required for EMI/EMC electromagnetic compliance.

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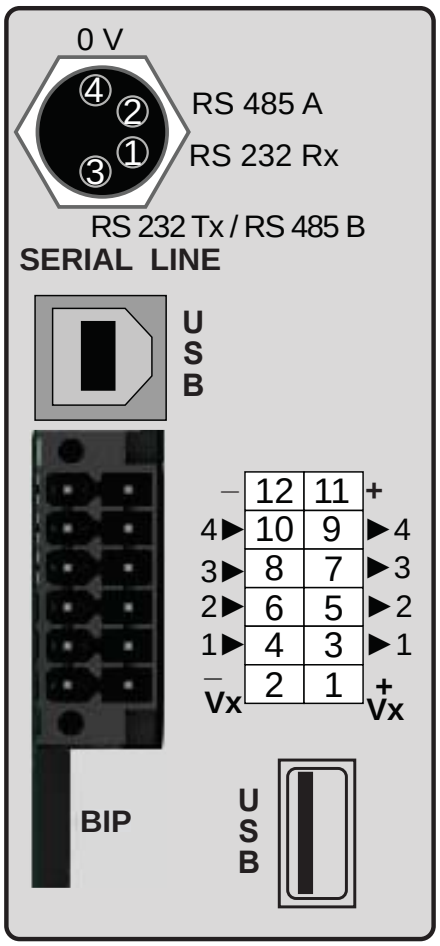
The external power supply must comply with standards.

3.7.4 Expansion board, 4 inputs / 4 outputs)



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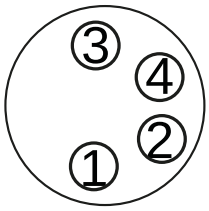

Type of configuration:

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USB:serial line USB device serial line; type B connector for communication with a Personal Computer;

DIGITAL I/O: +24 V= power supply, digital inputs/outputs, Phoenix Contacts connector, type DFMC 1,5/6-ST-3,5-LR, code 1787056.

1:	+Vx	(Output +Vx)	2:	–	(Output -Vx)
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11:	+	+24 V=	12:	–	-0 V common

Power supply for digital inputs/outputs:

+	external PLC power supply: +24 V=
-	external PLC power supply: -0 V common

Digital I/O

Output <1: <4	0.7 A max, non-configurable PNP output
Output +	Auxiliary output at positive power supply voltage +
Output -	Auxiliary output at power supply common 0 Volt -
Input 1<: 4<	5 mA max, non-configurable PNP input

Auxiliary internal power supply +Vx, -Vx

If an external power supply is not available (+ PLC 24 V=), it is possible to use the equipment internal power supply (+Vx , -Vx); connections:

1: +Vx	(Output +Vx)	connected to	11: +	(PLC: +24 V=)
2: -Vx	(Output -Vx)	connected to	12: -	(PLC: 0 V common)

The maximum output current is limited to 300 mA (max 10 W), protected by a self-resetting internal fuse.

The digital outputs and inputs are isolated, up to 50 Volts, if supplied by an external power supply (24 V=PLC). The digital inputs and outputs are not isolated if powered by the internal power supply +VX and -VX.

BIP: acoustic buzzer, low intensity

USB: USB Host port for firmware updates

WARNING: Use only a single power supply source. Never connect the external PLC power supply to the internal power supply.

CAUTION: Electrical shock risk. Any external conductive connection to the expansion board must be considered as an accessible conductive part of the equipment and must be doubly insulated with respect to the mains supply.

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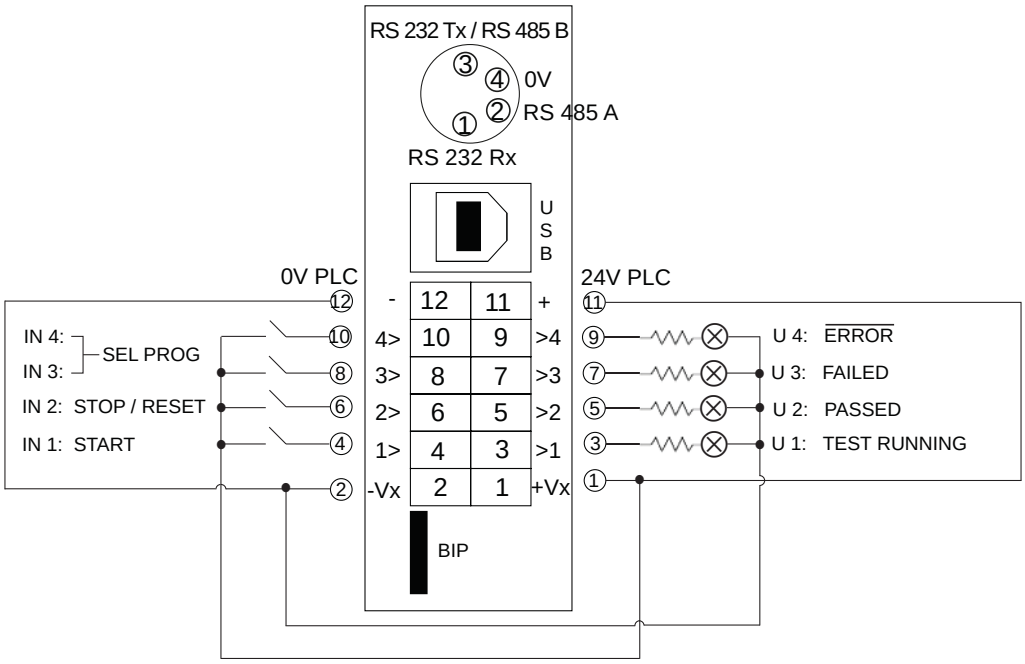
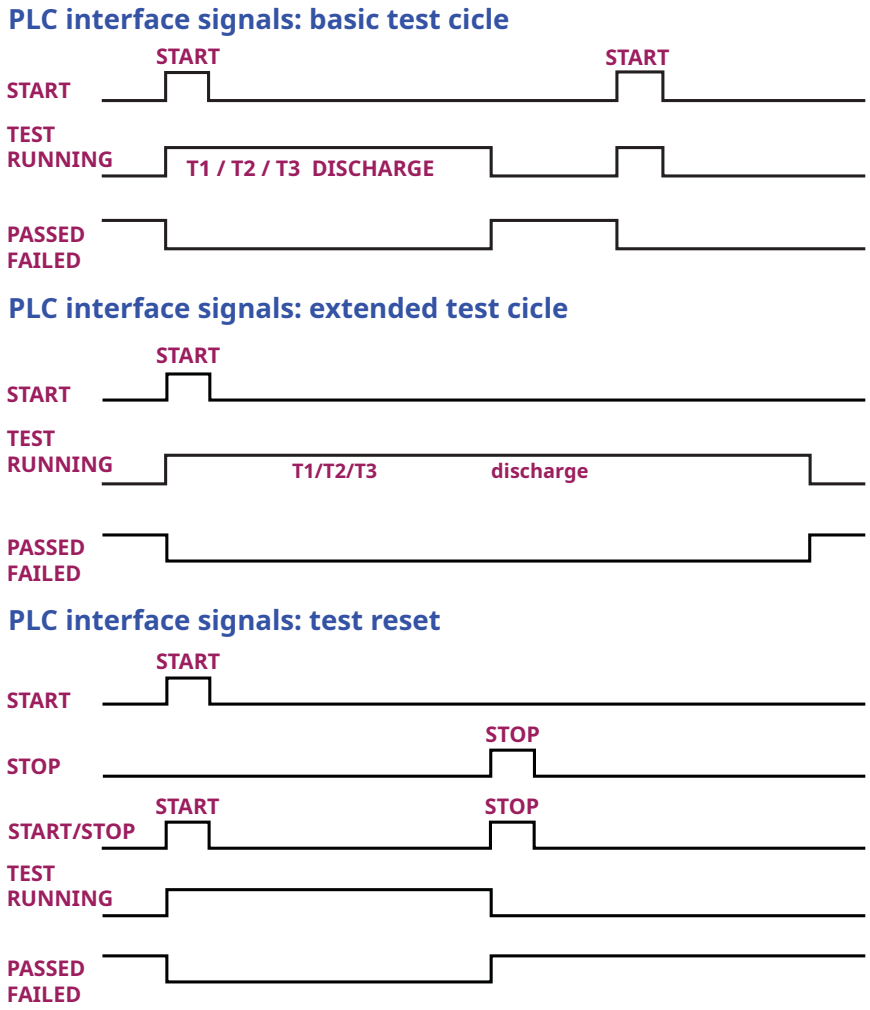


3.7.5 PLC: interface signals



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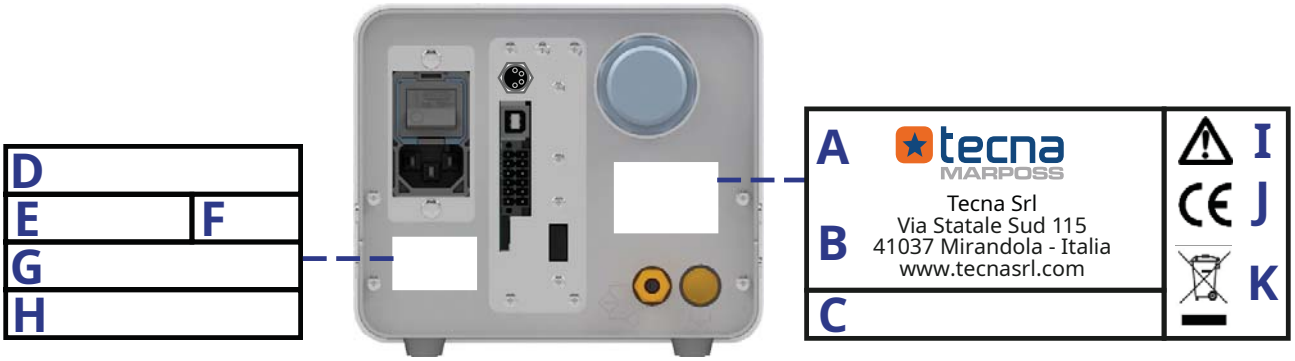
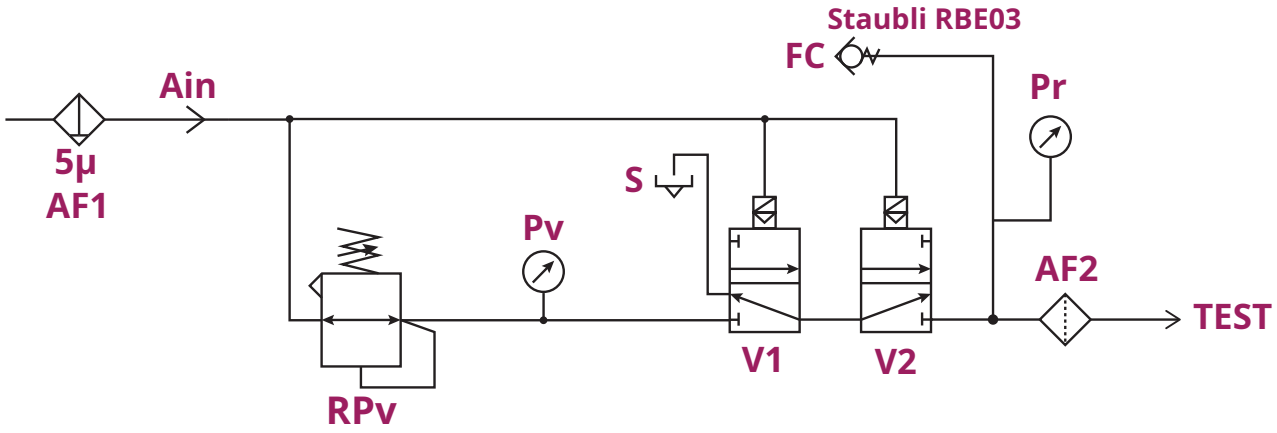
All PLC inputs and outputs are PNP signal (active at 24 Vdc).

3.7.6 Manufacturer's name plate



Logo Tecna Srl
Company address
Compressed air supply, 3 <= bar <= 10
Type code, T2Px
Serial number
Year of manufacture
Electrical power supply, 100/240 Vac, 50/60 Hz
Fuses, T-type 0.630 A
Instruction Manual
CE marking
WEEE marking

3.8 T2P PLUS pneumatic circuit diagram



AF1	5µ air filter (supplied by the Customer)
Ain	Compressed air supply
RPv	Manual line pressure regulator
Pv	Regulated pressure
V1	Internal valve
S	Discharge connection

V2	Internal valve
FC	Master leak connection (option)
Pr	Relative test pressure
AF2	Internal filter
TEST	Output connection to the test circuit

Ain: compressed air supply
Connection to the compressed air supply, quick connector for 6x4 mm pipe, max. pressure 10 bar, min. pressure 3 bar.

AF1: air filter
5 micron filter on the inlet compressed air (to be supplied by the customer).

RPv: manual line pressure regulator
The line pressure must be adjusted manually so it corresponds to the value set-up in the current test program.

Pv: regulated pressure
The regulated pressure is read by a dedicated transducer and is displayed on a menu page on the screen so as to check the outlet pressure before starting a test.

V1
Internal valve, normally closed, open only to admit compressed air during filling.

V2
Internal valve, normally closed, open only during the filling phase (with valve V1 open) or upon completion of the output pneumatic circuit discharge tests (with valve v1 closed)

FC: master leak connection (option)
Quick coupling with Staubli RBE03 type check valve on the front panel for the connection of a leak master.

Pr relative test pressure
Pressure transducer used to measure the relative pressure in the test circuit on the TEST output.

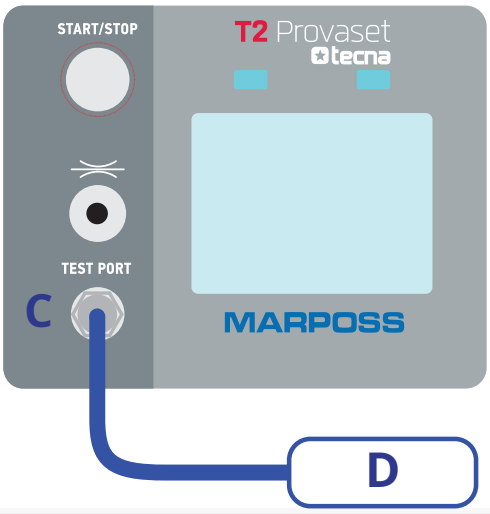
AF2: internal filter
Sintered, disc filter mounted inside the TEST outlet fitting.

TEST
Outlet fitting to test circuit, ring nut, for plastic tube.

S: discharge connection

3.8.1 Pneumatic installation, air supply and test connections

A Compressed air supply fitting
B Manual line pressure regulator



C	TEST PORT Pneumatic circuit test output, with a fitting for a plastic tube. A small air filter is mounted inside the flange, behind the threaded fitting.
D	Part under test

A. **Compressed air supply fitting**
Quick release fitting for 6x4 mm tube
The air supply pressure should be at least 1 bar over the regulated test pressure.
Maximum supply pressure: 10 bar
Minimum supply pressure: 3 bar (for the internal pilot valves)

WARNING: use only dry air, without condensation, filtered, not lubricated and free from explosive gases, conforming to ISO 8573-1 air quality.

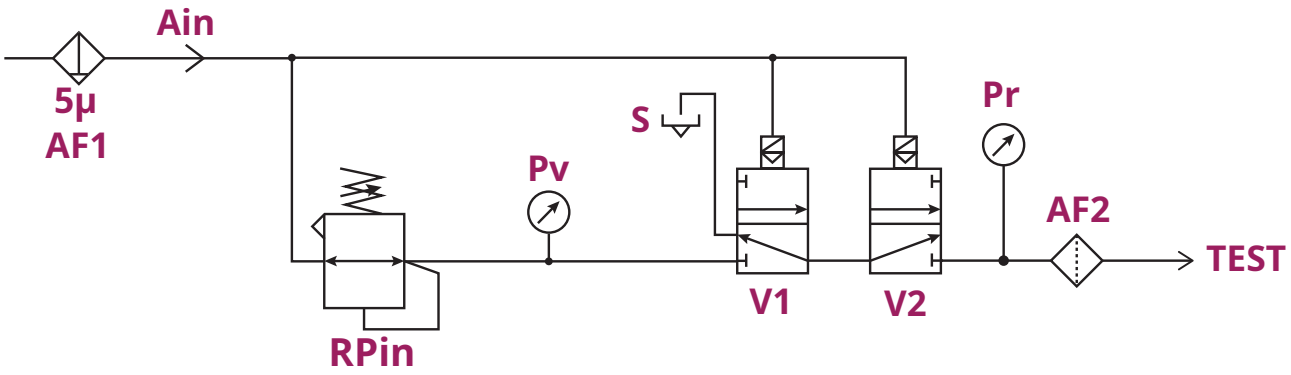
CAUTION: all the pneumatic tubes must be approved for safety at the maximum air supply pressure.

B. **Manual line pressure regulator**
To regulate the pressure, release the knob (pull), rotate it clockwise to increase the pressure and counter-clockwise to reduce it, and then lock it in position (push).
When adjusting the pressure the regulated value is indicated on a page of the base menu.

ATTENTION: Before starting the test, the operator must check that the active test program parameters and the regulated pressure output are safe and correctly set for the parts to be tested.

C. **TEST PORT**
Pneumatic circuit output test port, with a fitting for a plastic tube. A small air filter is mounted inside the flange, behind the threaded fitting.

3.9 T2P BASE pneumatic circuit diagram



AF1	5µ air filter (supplied by the Customer)
Ain	Compressed air supply
RPIN	Manual line pressure regulator
Pv	Regulated pressure
V1	Internal valve
S	Discharge connection
V2	Internal valve
Pr	Relative test pressure
AF2	Internal filter
TEST	Output connection to the test circuit

Ain: compressed air supply
Connection to the compressed air supply, quick connector for 6x4 mm pipe, max. pressure 10 bar, min. pressure 3 bar.

AF1: air filter
5 micron filter on the inlet compressed air (to be supplied by the customer).

RPv: manual line pressure regulator
The line pressure must be adjusted manually so it corresponds to the value set-up in the current test program.

Pv: regulated pressure
The regulated pressure is read by a dedicated transducer and is displayed on a menu page on the screen so as to check the outlet pressure before starting a test.

V1
Internal valve, normally closed, open only to admit compressed air during filling.

V2
Internal valve, normally closed, open only during the filling phase (with valve V1 open) or upon completion of the output pneumatic circuit discharge tests (with valve v1 closed)

Pr relative test pressure
Pressure transducer used to measure the relative pressure in the test circuit on the TEST output.

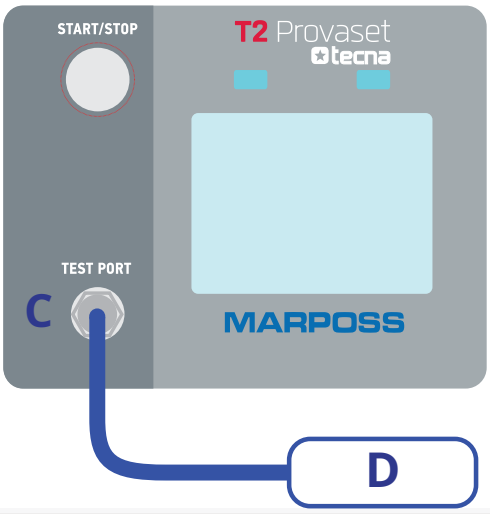
AF2: internal filter
Sintered, disc filter mounted inside the TEST outlet fitting.

TEST
Outlet fitting to test circuit, ring nut, for plastic tube.

S: discharge connection

3.9.1 Pneumatic installation, air supply and test connections

A Compressed air supply fitting
B Manual line pressure regulator



C	TEST PORT Pneumatic circuit test output, with a fitting for a plastic tube. A small air filter is mounted inside the flange, behind the threaded fitting.
D	Test component

A. **Compressed air supply fitting**
Quick release fitting for 6x4 mm tube
The air supply pressure should be at least 1 bar over the regulated test pressure.
Maximum supply pressure: 10 bar
Minimum supply pressure: 3 bar (for the internal pilot valves)

WARNING: use only dry air, without condensation, filtered, not lubricated and free from explosive gases, conforming to ISO 8573-1 air quality.

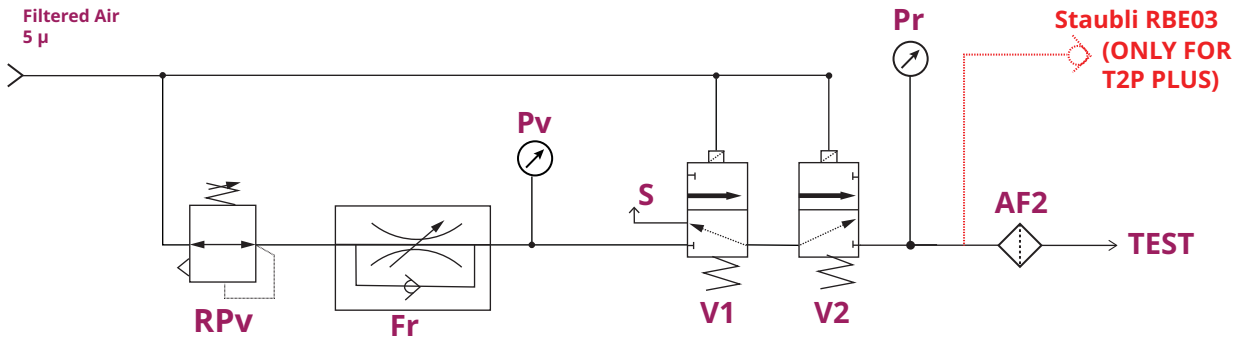
CAUTION: all the pneumatic tubes must be approved for safety at the maximum air supply pressure.

B. **Manual line pressure regulator**
To regulate the pressure, release the knob (pull), rotate it clockwise to increase the pressure and counter-clockwise to reduce it, and then lock it in position (push).
When adjusting the pressure the regulated value is indicated on a page of the base menu.

CAUTION: Before starting the test, the operator must check that the active test program parameters and the regulated pressure output are safe and correctly set for the parts to be tested.

C. **TEST PORT**
Pneumatic circuit output test port, with a fitting for a plastic tube. A small air filter is mounted inside the flange, behind the threaded fitting.

3.10 T2P pneumatic circuit diagram with option -EP



RPv	Manual line pressure regulator
Fr	Flow regulator
Pv	Line pressure
S	Discharge connection
V1	Internal valve
V2	Internal valve
Pr	Relative test pressure
AF2	Internal filter
TEST	Output connection to the test circuit
Staubli	Calibrated leak fitting **[VALID PLUS VERSION ONLY]**

RPv: manual line pressure regulator
The line pressure must be adjusted manually so it corresponds to the value set-up in the current test program.

Fr: Flow regulator
The air flow at the output of the Test fitting may be adjusted manually using the flow regulator

Pv: regulated pressure
The regulated pressure is read by a dedicated transducer and is displayed on a menu page on the screen so as to check the outlet pressure before starting a test.

S: discharge connection

V1
Internal valve, normally closed, open only to admit compressed air during filling.

V2
Internal valve, normally closed, open only during the filling phase (with valve V1 open) or upon completion of the output pneumatic circuit discharge tests (with valve v1 closed)

Pr relative test pressure
Pressure transducer used to measure the relative pressure in the test circuit on the TEST output.

AF2: internal filter
Sintered, disc filter mounted inside the TEST outlet fitting.

TEST
Outlet fitting to test circuit, ring nut, for plastic tube.

STAUBLI
Calibrated leak fitting **[VALID PLUS VERSION ONLY]**

4. USER INFORMATION

The Provaset T2P is an instrument designed for leak tests with pressure decay measurements.

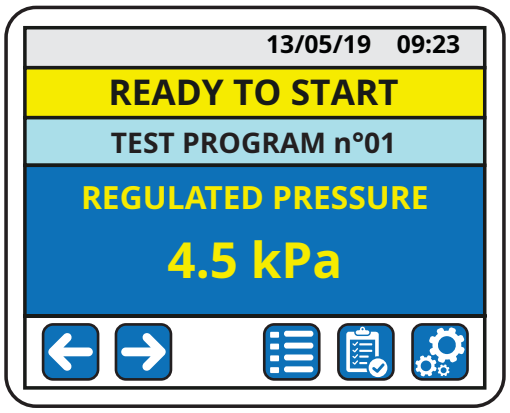
Power on

When the instrument is switched on, the following information appears on the display for a few seconds:

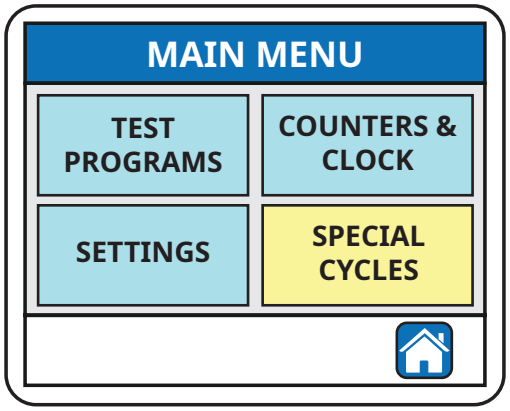
- Tecna Srl logo
- Model and code number of the instrument
- Serial number
- Type of instrument
- Version of the software

The phase lights on the front panel are flashed sequentially and simultaneously, then only the red light keeps on flashing.
The acoustic alarm is activated for a few seconds.
After the power on sequence, the instrument enters a stand-by phase.
If no alarm is present, the instrument is waiting ready to start a new test with the selected active program of test parameters.

5. MAIN MENU

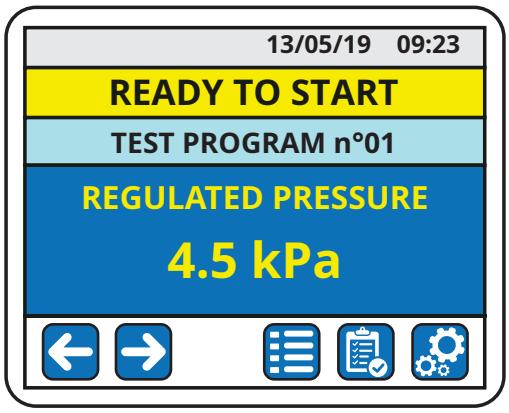


To access the main menu, press the key



The main menu may be used to access to all the programmable functions of the instrument.
Press the desired function box on the touch screen.
An access code is usually required to modify the test programs, the general configurations and the calibration parameters.

Press the key to return to the main menu.



The display shows:

- clock/calendar: state of the clock/calendar (in the line at the top, right of the display), if the electrical power supply is absent for prolonged periods, the message CLOCK ERROR is displayed;
- current test program: number and name of the current test program, which will be executed at START;
- the regulated pressure for the next test.

ATTENTION: Before starting the test, the operator must check that the active test program parameters and the regulated pressure output are safe and correctly set for the parts to be tested.

Press the START button (if enabled) on the front panel to start a new test.

5.1 Touch screen keys for managing display menus

Press the left-hand arrow key to view the information pages and the other menu pages.

Press the right-hand arrow key to view the pressure sensor readings and the other menu pages.

Press the [TEST LOG] key to view the results of the last tests.

Press the [TEST PROGRAM] key to view the parameters for the test program that has been enabled and activated for the tests, and modify them if necessary.

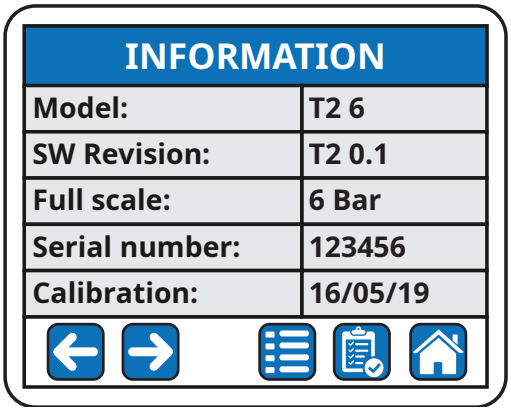
Press the [GEARS] key to access the main menu page for all the programmable functions (test parameters, general settings, records, calibration ...)

Press the modify key to enable modification of the test programs.

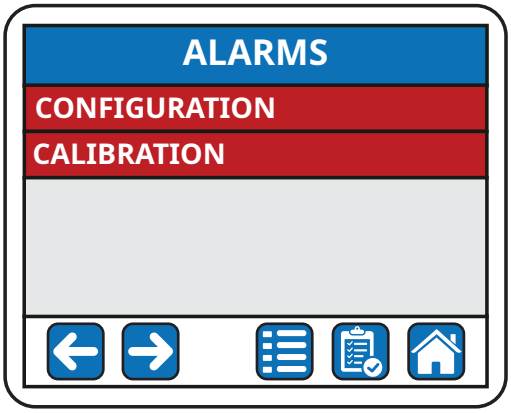
5.2 Information pages display

Some of the base menu pages display useful information for the operator.

To display pages, press the keys

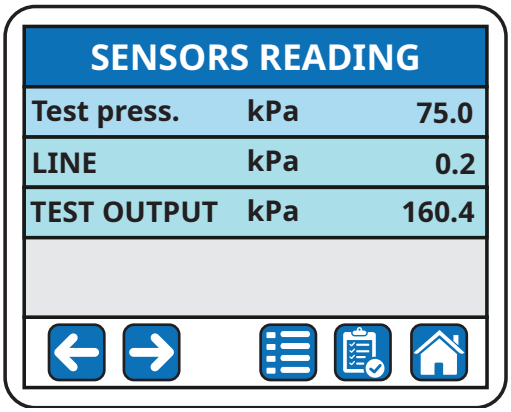


Instrument Information:
Model: instrument code
SW Version: version of the software.
Full scale: full scale limits of the sensors.
Serial: serial number of the instrument.
Calibration: date of the last calibration of the sensors performed by Tecna srl



Alarms page: this page is displayed only if there are any alarms active; for example:
AL. Configuration: reprogram the configuration parameters;
AL. Calibration: repeat the sensor calibration procedure.

> **NOTE:** press on the line where the alarm message is displayed to access a text page containing information designed to help the operator manage the alarm condition.



The page displays the sensor readings.
Test press.: test pressure set-up in the current test program.
Line: internal pressure, regulated by the manual pressure regulator.
Test: test pressure measured on the test component.

5.3 Test programs

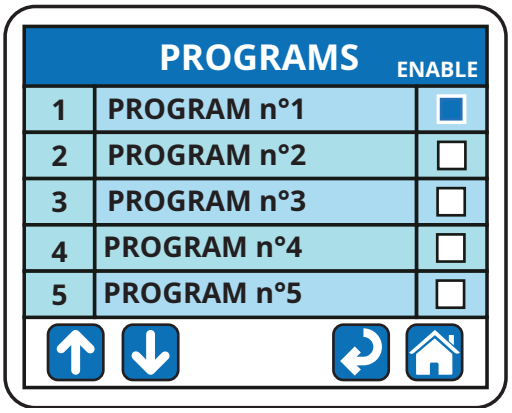
The test parameters are stored in a TEST PROGRAMS archive.

To view the parameter pages, use the  and  keys, and the  key.

To change the parameters, press the  key.

> **NOTE:** the test programs may be written a limited number of times.
> Therefore, any external tools or software (or plc) must respect the maximum limits when writing test programs.
> In particular, we recommend reading the parameters of the program to be written first, and writing only those that are necessary.

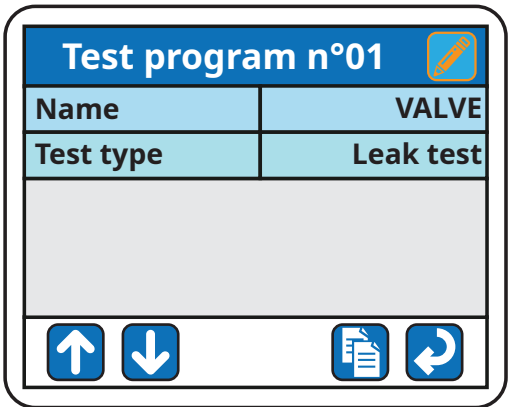
Use the  key to copy a TEST PROGRAM to another.
Each individual test is performed according to the parameters of the corresponding TEST PROGRAM.
At the START test command, the instrument performs the test according to the PRODUCT PROGRAM that has been enabled and activated.



List of available test programs.
The enabled and active test program is indicated in the ENABLE column on the right with a full square.

Enabling and activating a TEST PROGRAM
Press on the box on the right, in the ENABLE column, to select and enable an active TEST PROGRAM; the full square indicates that the TEST PROGRAM has been enabled and activated.

Displaying and changing a TEST PROGRAM
Press on the number or on the name of a TEST PROGRAM to display the respective parameters.



Press the keys to display the test program parameters in sequence.

Press the key to change the parameters.

5.3.1 Test program: name, type of test, mode

First Name
Name of the test program, max.16 alphanumeric characters, may be entered manually.

Type of test: Leak, 2P leak, Normal Blockage, Continuous Blockage (-EP).
Selectable test cycle:
Pressure leak: leak tests under pressure with pressure decay measurement.
Pressure leak 2P: leak tests under pressure with pressure decay measurement in 2P instrument mode.
Normal Blockage: type of test used to check for obstructions in the component being tested.
Continuous blockage [PRESENT WITH -EP OPTION ONLY]**:** type of test to check for obstructions in the component being tested in continuous mode.

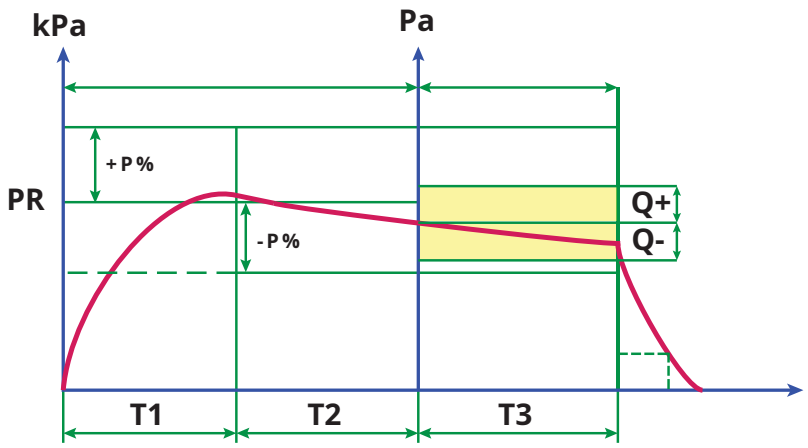
5.4 Leak test: test cycle with test parameters

The Provaset T2P is an instrument designed for leak tests with pressure decay measurements.

5.4.1 Leak test: test cycle

The basic test cycle for leak tests consists of the following phases:
- T1, time required to fill the test circuit at the nominal test pressure;
- T2, time required to stabilise the pressure in the test circuit;
- T3, time required to measure the pressure decay in the test circuit;
- test pressure discharge phase.

Test cycle:



5.4.2 Leak test: test parameters

Filling phase

T1
Filling time, range 0.0: 3600.0 s.
Valves open to allow the circuit to reach the test pressure **PR.**
If **T1** = 0, the test cycle commences immediately following the stabilisation phase **T2,** without opening the internal filling valves; this means that the test component must be filled using an external circuit before carrying out the test;

PR
Nominal test pressure, range 0: instrument full scale value.
This is the pressure value the leak tested is carried out at.

T1/PR
End of filling mode: Time **T1** / Pressure **PR**
The filling phase ends upon expiry of the time interval **T1** (**T1/PR** = TIME) or upon reaching the test pressure **PR** (**T1/PR** = PRESS.).
This mode is used to save time and proceed immediately to the next step (stabilisation time **T2**) as soon as the **PR** test pressure is reached.

Stabilisation phase

T2
Stabilisation time, range 0.0: 3600.0
Time allowed to permit the pressure in the test circuit to stabilise before the measurement phase **T3.**

P%
Pressure tolerance %: maximum % limit of the test pressure, range 0.0: 100.0 %.

P%MAX
The test concludes with the result **FAILED: MAX % PRESSURE** if the limit is exceeded.
For leak tests:

- maximum test pressure P > PR + PR * (P%/100);
- limit applied during all phases **T1, T2, T3**;
- limit not applied if **PR** = 0.

P%MIN
The test concludes with the result **FAILED: MIN % PRESSURE** if the limit is exceeded.
For leak tests:

- Minimum test pressure, P < PR – PR * (P%/100)
- limit applied during all phases **T1,T2, T3**;
- limit not applied if **PR** = 0.

NOTE: The test pressure must also be greater than the pressure decay limit **Q-** within the time interval **T3.**

Measurement phase

T3
Duration of the test circuit pressure decay test at the TEST output,
field 0.0: 3600.0 s

Q+
Maximum increase limit in the test circuit at the TEST output within the time interval **T3;** programming range:
resolution 1 Pa: +/- 9900 Pa (+/- 99 mbar).
An increase in pressure represents a fault condition.

Q-
Leakage limit: maximum pressure decay limit in the test circuit at the TEST output within the time interval **T3;** programming range as for the **Q+** limit, but with negative sign (leak with pressure decay).
Examples: **Q+** = 50 Pa, **Q-** = -10 Pa;
The test is **PASSED** only if the pressure delta within the time interval **T3** remains within the limits **Q+** and **Q-** .

T3/Q
End measurement phase **T3** mode.
The measurement phase ends when the time **T3 (T3/Q** = TIME) expires or when the leak limit Q **(T3/Q** = PRESS.) is reached.
This mode is used to save time and proceed immediately to a new test before the time runs out.

FST
During the test circuit pressure discharging phase.
Range 0.0 : 3600.0 s.

VP [VALID FOR PLUS MODEL ONLY]
Volumetric coefficient for the test volume.
Range 0.0 : 6000.0 cm^3, or (0.000 : 60,000 litres).
Used to calculate the leak rate Q, equivalent to the pressure decay within the time interval **T3** .
Ideally, the volumetric coefficient **VP** corresponds to the test volume at the TEST output (volume of the component being tested + volume of pipes + internal volume of the instrument).

5.4.3 Leak test: Decay rate Q [VALID FOR PLUS MODEL ONLY]

If the coefficient of the test volume, parameter **VP**, programmed in the active test program, differs from zero, the instrument calculates and displays the equivalent leak rate Q, expressed in cm^3/min or cm^3/h.
The leak rate Q is calculated using a formula based on the known physical laws for perfect gases, considering the pressure drop measured during phase time **T3** and the programmed test volume, at a nominal temperature of 0 °C (about 273 °K).

$$Q_{cm^3/min} = \frac{0{,}27 * \Delta P_{mbar} * Volume_{cm^3}}{Tempo\ T3_{min} * Temperatura_{°K}}$$

EXAMPLE: pressure decay (ΔP)=35 Pa (0.35 mbar), volume 31.2 cm^3,
T3 = 5 s =5/60 minutes, temperature= 0 °C (approx. 273 °K):
Q= (0.27 * 0.35 * 31.2 * 60) / (5 * 273) = 0.13 cm^3/min

5.4.4 Leak test: PASSED/FAILED result messages

5.4.4.1 PASSED result messages

PASSED
A test concludes with the result PASSED if the pressure variation ΔP measured during the time interval T3, does not exceed the limits Q+ (pressure increase) and Q- (pressure decay) programmed in the test program.

5.4.4.2 FAILED result messages

Min. PR pressure %
After phase T1, the pressure dropped below the PR%MIN limit compared to the programmed PR test pressure.

Max. PR pressure %
The test pressure exceeded the PR%MAX limit with respect to the programmed test pressure PR.

Over scale pressure
The test pressure has exceeded the maximum full-scale pressure by at least 10%.

Max leak
The pressure decay ΔP, measured during phase T3, exceeded the programmed limit Q-.

Anomaly
the pressure increase ΔP, measured during phase T3, exceeded the Q+ limit.

Max. pressure
Out of range pressure result, MAX PRESSURE ERROR.

Min. pressure
Out of range pressure result, MIN PRESSURE ERROR.

5.5 2P Leak test: test cycle with parameters

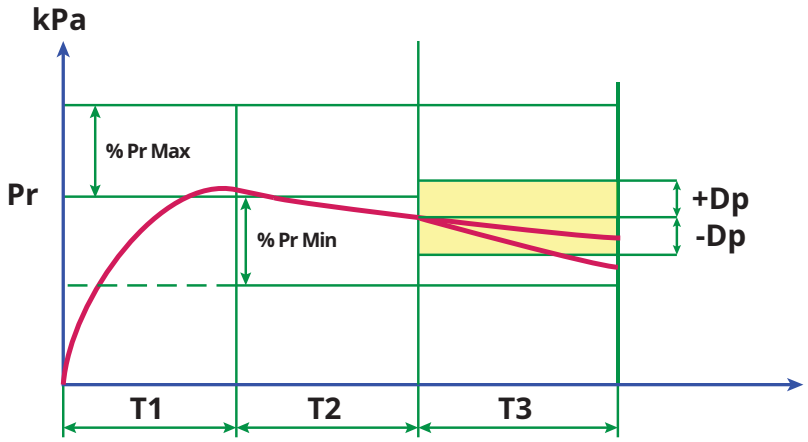
In this configuration, leak tests are executed under pressure with pressure decay measurement in 2P instrument mode.

5.5.1 Leak test: test cycle

The basic test cycle for leak tests consists of the following phases:

- T1, time required to fill the test circuit at the nominal test pressure;
- T2, time required to stabilize the pressure in the test circuit;
- T3, time required to measure the pressure decay in the test circuit;
- test pressure discharge phase.

Test cycle:



5.5.2 2P Leak test: test parameters

T1
Filling time
The time interval T1 starts following a START command: it corresponds to the filling phase, during which the air is fed out of the outlet fitting, so as to fill the test component until it reaches the test pressure Pr.
If the test component is filled externally, the time interval T1 may be set to 0 (zero): when the START command is generated, the device skips the filling phase, initiating the test directly after the time interval T2, without opening the valves.
It is also possible to interrupt the filling phase once the test pressure Pr has been reached, without waiting for the end of the time interval T1, by selecting the three interval test option, Pr/T1-T2-T3, in the configuration parameters.
Filling time, range 0.0: 3600.0 s

T2
Stabilisation time
It is necessary to wait until the elastic parts in the test component have stabilised.
At the end of the time interval T2, if the pressure inside the test component is within the pre-set percentage limits %Pr max and %Pr min, the pressure value is saved as the reference point for the Dp decay limit check at time T3.
Stabilisation time, range 0.0: 3600.0 s

T3
Measurement time
The pressure drop inside the test component is measured.
At the end of the time interval T3, the device saves the test result and displays the decay drop measured at the end of the test.
Measurement time, range 0.0: 3600.0 s

Pr
Nominal test pressure, range 0: instrument full scale value.
This is the pressure value the leak tested is carried out at.

Dp
Pressure delta
This value represents the maximum pressure drop or increase permitted during the time period T3.
The pressure drop is indicated by a minus sign, whereas an increase is displayed with a plus sign.

Pr Max
Max tolerance

Pr Min
Min tolerance

NF
Test phases
T1-T2-T3: three interval leak test
Pr/T1-T2-T3: three interval leak test in which the filling phase is terminated upon reaching the test pressure Pr or the expiry of the time interval T1.

SFP
Discharge mode at end of test
NO: discharge disabled: the test component remains pressurised upon completion of the test;
YES: discharge enabled: the test component pressure is discharged automatically by opening the discharge valve;
MANUAL: the test component pressure is discharged only when the operator disconnects the component from the device, resetting the test result on the home page

5.5.3 2P Leak test: PASSED/FAILED result messages

5.5.3.1 PASSED result messages

PASSED
A test ends with result PASSED if the pressure variation ΔP measured during the time T3, does not exceed the +/- Dp limits set-up in the test program.

5.5.3.2 FAILED result messages

Min. PR pressure %
After phase T1, the pressure dropped below the PR%MIN limit compared to the programmed PR test pressure.

Max. PR pressure %
The test pressure exceeded the PR%MAX limit with respect to the programmed test pressure PR.

Over scale pressure
The test pressure has exceeded the maximum full-scale pressure by at least 10%.

Max leak
The pressure drop ΔP (pressure decay) measured during phase T3, exceeded the programmed limit Dp.

Anomaly
the pressure increase ΔP measured during phase T3, exceeded the programmed Dp limit.

Max. pressure
Out of range pressure result, MAX PRESSURE ERROR.

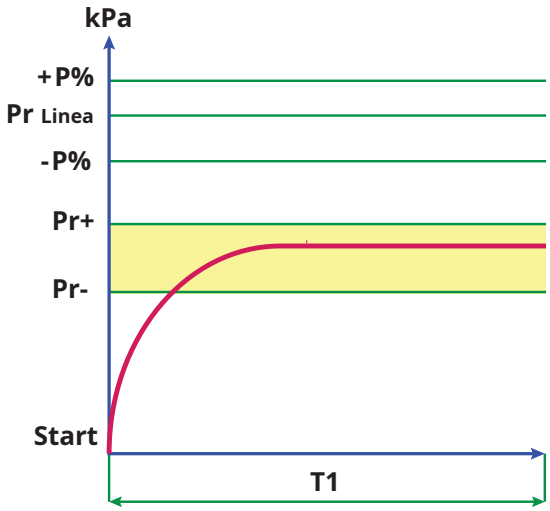
Min. pressure
Out of range pressure result, MIN PRESSURE ERROR.

5.6 Blockage test: test cycle and test parameters

This type of test is used to check that the air passes through the test component correctly by measuring the counter-pressure generated inside the component.

5.6.1 Blockage test: test cycle

Before carrying out the test, the operator must regulate the internal pressure of the instrument manually so that it corresponds to the initial pressure defined by the parameter Pr Line, within the tolerance limit of +/-P% of the line pressure.
When the START command is generated, the outlet valves open, so the actual pressure at the TEST outlet depends on the counter pressure generated in the component being tested during the passage of the air flow.
In order for the component to considered compliant, the outlet pressure should stabilise within the programmed limits Pr+ (upper limit) and Pr- (lower limit).



Pr Line
Reference line pressure for initiating the test.
If the test component pressure is outside the tolerance limits P%, the test will be rejected immediately due to P% line pressure min/max %

P%
Pressure Tolerance %: a new test can only be started if the adjusted pressure is within the programmed limits +/- P% with respect to Pr Line.

T1
Time duration of the normal mode blockage test cycle; range 0.0 : 3600.0 s.
When carrying out the test in continuous mode, the value of T1 is ignored and the test is terminated by a Stop/Reset command.

Pr+
Maximum final pressure: maximum limit of the counter-pressure on the test component; this field may be programmed like Pr line, and must always be Pr+ < Pr line.

Pr-
Minimum final pressure: minimum limit of the counter-pressure on the test component; this field may be programmed like Pr line, and must always be Pr- < Pr+ < Pr line.

FST
During the test circuit pressure discharging phase.
Range 0.0 : 3600.0 s.

⚠ **ATTENTION:** in this configuration it is necessary to monitor regulated pressure (using a pressure gauge, for example) to ensure there are no significant variations during the test.

5.6.2 Blockage test: Test parameters

5.6.2.1 Type of test: Normal Blockage Test

Normal: The result of the test is issued only at the end of the test interval T1;

5.6.2.2 Continuous Blockage test [PRESENT ONLY WITH -EP OPTION]:

Continuous (-EP): the instrument generates a continuous airflow from the TEST outlet fitting.

The test procedure is as follows:

- Connect the test component to the TEST outlet fitting;
- Wait for the pressure to stabilise, followed by the PASSED (pressure within pre-set limits, green light on) or FAILED (pressure outside pre-set limits, red light on and buzzer activated) result

5.6.3 Blockage test: PASSED/FAILED result messages

5.6.3.1 PASSED result messages

PASSED
final pressure within the range, within the programmed limits P+ (maximum pressure) and P- (minimum pressure)

5.6.3.2 FAILED result messages

FAILED: BYPASS > MAXIMUM
Obstruction, final pressure above the Pr+ limit;

FAILED: BYPASS < MINIMUM
Anomaly, final pressure under the Pr- limit;

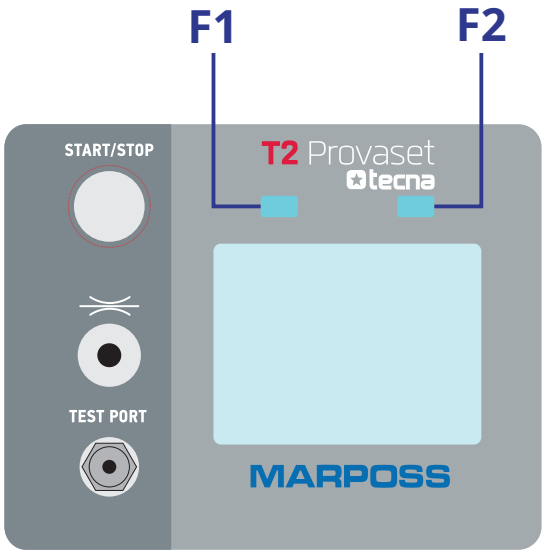
FAILED: Max. PR Line pressure %
Initial pressure above the limit +P%;

FAILED: Min PR Line pressure %
Initial pressure under the limit -P%;

Over scale pressure
The test pressure has exceeded the maximum full-scale pressure by at least 10%.

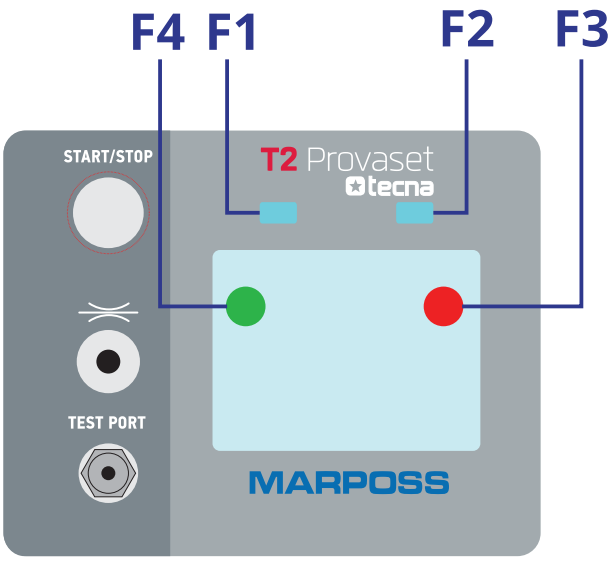
5.7 Test cycle phase lights

The table lists the state of the phase lights for all types of test, with the exception of the continuous blockage test.



PHASE	F1	F2
Stand-by (Power on/Reset)	Light off	Light blinking
Filling phase T1	Light off	Light off
Stabilization phase T2	Light off	Light off
Measurement phase T3	Light off	Light off
Discharge pressure (result PASSED)	Light blinking	Light off
Discharge pressure (result FAILED)	Light off	Light blinking
PASSED result	Light blinking	Light off
FAILED result	Light off	Light blinking
Alarm	Light off	Light blinking

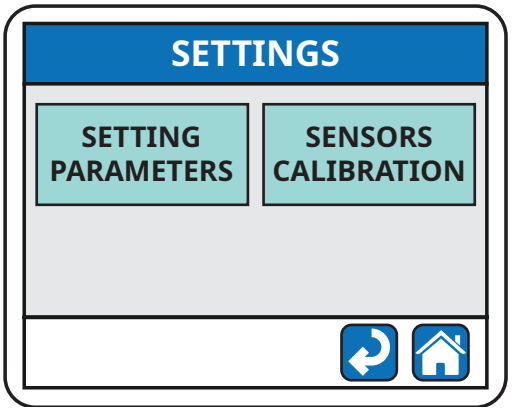
5.7.1 CONTINUOUS PERMEABILITY test cycle phase lights



PHASE	F1	F2	F3	F4	Acoustic signal
Stand-by (On/Reset) - component not connected	Light off	Light on	Light on	Light off	Light off
Result PASSED - component connected	Light on	Light off	Light off	Light on	Light off
Result FAILED - component connected	Light off	Light blinking	Light on	Light off	Light on

6. CONFIGURATION MENU

To access the configuration menu, press the key



The configuration menu includes:

- General configuration parameters;
- calibration procedures for the pressure sensors (see Section page 69).

6.1 General configuration parameters

It is always necessary to enter the Administrator when accessing the menu.
The parameters are divided into groups, which can be accessed by pressing the line corresponding to the group name; for each group, the parameters are listed on the screen with the description on the left and the value on the right; press the box on the right containing the parameter value to modify it; press the up/down arrow keys to scroll through the menu pages.

NOTE: the devices are delivered with Administrator Password=1234.

NOTE: Whenever the operator changes the general configuration parameter settings, he/she must check the previously programmed test parameters in the products and test programs.

NOTE: no automatic checks are performed on the reciprocal compatibility of the programmed parameters; it is the responsibility of the operator to check that the programmed values are not in conflict.

6.1.1 Group: screen & sound

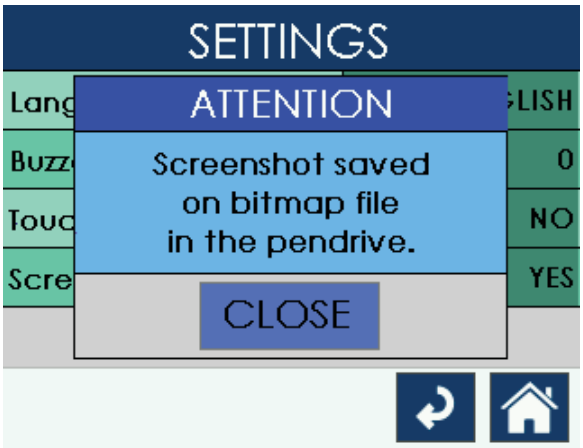
Menu language
Language of on-screen messages (Italian - English)

Buzzer duration
Duration of the acoustic signal in the event of an alarm or a FAILED result, range 0: 60 s.

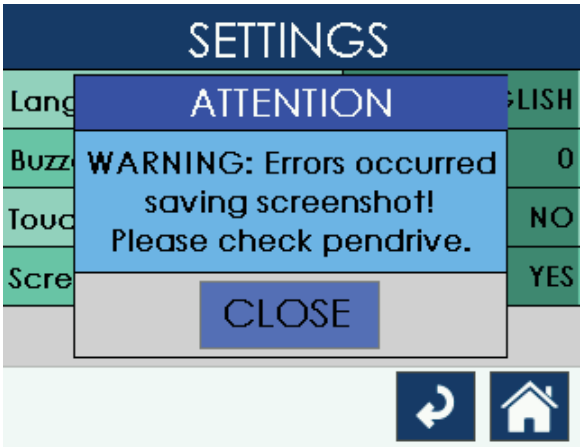
Screen beep
Enable buzzer (beep) on touch screen keys; range: No / Yes.

Screenshot enabled?
It enables the possibility of capturing the current contents of the instrument's display and saving the relative images in * .bmp format on a USB pendrive (only with FW1.0.16 or later).

If the function is active, to capture the current content of the Provaset T2 instrument's display, simply insert a pendrive into the USB port located on the back of the instrument and double-tap the touch-screen panel, while avoiding clicking on any buttons. . As soon as the display image is acquired and saved correctly on the USB pendrive, the following warning window appears:



Alternatively, if the pendrive has not been connected or does not have sufficient free space, the following warning window is displayed:



On the pendrive there will be a folder named as "T2_SCREENSHOT" containing all the acquired images.

ATTENTION: if the screenshot capture functionality is not used, it is suggested to deactivate it

6.1.2 Group: instrument settings

Test program
Active test program selection mode.
PARAMETER: selection from the test program menu (box with square filled).
BCD base 1: choice with digital inputs on the expansion board, counted from 0 (all inputs at zero, test program no. 0 selected, invalid).
BCD base 0: choice with PLC inputs on expansion boards, counted from 1 (all inputs at zero, test program no. 1 selected).

⚠ **ATTENTION:** if no TEST PROGRAM is not selected when mode in BDC base 1 mode, when switching to PARAMETER mode it will be necessary to select the TEST PROGRAM manually.

Start Button
Enable / Disable the button on the front panel.
If the button is disabled, the Start/Reset commands of the tests are managed only by the PLC inputs, the commands on the serial lines or the commands on the Ethernet line.

⚠ **ATTENTION:** Risk of moving parts;
Disable the Start/Stop button on the front panel if the electrical outputs are used to control moving parts.

Start input
It enables, disables or activates the remote control for START input (on input IN-1, see 3.6.4 on page 16 and 3.7.4 on page 24).
If START input item is set to "Ext Start / Stop" then when the TLC remote control is connected, its button behaves as follows:
- if it is pressed and released immediately then it starts the test (if T2 is not already in test)
- if it is held down when T2 is already in test, then it performs a T2 reset.

Instrument name
Programmable name (via instrument or serial/Ethernet lines) used to identify the instrument, max. 16 characters.

DEMO mode?
Demonstration mode or normal operation.
No: Normal operation for testing.
Yes: Demonstration use - tests are simulated automatically but are not performed.

Calibration date
Date the instrument was last calibrated. To be modified only in case of new calibration.

6.1.3 Group: measurement scales

Pressure scale
Test pressure: mmH_2O, mbar, Pa, mmHg, inH_2O, psi, bar, kPa, mH_2O

Leak scale
Pressure decay, pressure delta: mmH_2O, mbar, Pa, mmHg, inH_2O, psi

Seal flow scale
Pressure decay, equivalent leak flow: cm^3/min, cm^3/h

Volume Scale
Pressure decay, equivalent test volume: litres, cm^3

⚠ **ATTENTION:** each time a new measurement scale is selected, the user must re-check the TEST PROGRAM parameters and values.

6.1.4 Ethernet Unit [VALID FOR PLUS MODEL ONLY]

The Ethernet connection configuration parameters should be managed exclusively by the computer system Administrator.
The Ethernet interface may be used for a Modbus TCP/IP connection.
When the web browser is connected to the IP address a page containing a series of general test parameters is displayed.

NOTE: the network protocol used by PROVASET T2P is not encrypted.
Therefore we recommend that, for increased security, the customer takes steps to protect their LAN/WAN networks that are connected to the PROVASET T2P unit (for example, by a separate LAN or VLAN, ...)

IP addr
Local network address.

Net mask
Local network mask.

Gateway
Web network service access address.

6.1.5 Group: password management

Administrator
Administrator access code. This code must always be entered when changing the general configuration parameters and for the sensor calibration procedures.

Modify programs
Access code for modifying or copying test programs; not used if null and void.

Activate programs
Access code for to select the active test program; not used if null and void.

> **NOTE:** when the equipment is delivered the Administrator Password is set to 1234, while the password, which is used for modifying and activating test programs, is set to zero (not used).

6.1.6 Unit: USB slave interface

USB protocol
Communication protocol.
MODBUS: for supervision and data collection with Modbus RTU network
MODBUS 2P: when this option is selected, the T2P emulates modbus protocol of the 2P, with the differences indicated in the T2 modbus manual
CSV TEST: For data collection on terminal in CSV format

NOTE: USB device/slave interface manuals are available upon request.

USB address
Address of the Modbus RTU node for communication on the USB port; range 1:255

6.1.7 Unit: USB host [VALID FOR PLUS VERSION ONLY]

USBH:
Save test data:
NO: disabled
YES: the test data may be saved to a pen drive or other device connected to the USB host connector.

6.1.8 Unit: serial line

LS1: protocol
Communication protocol:
MODBUS: for supervision and data collection with Modbus RTU network
MODBUS 2P: see USB device/slave interface
CSV TEST:for data collection on terminal in CSV format

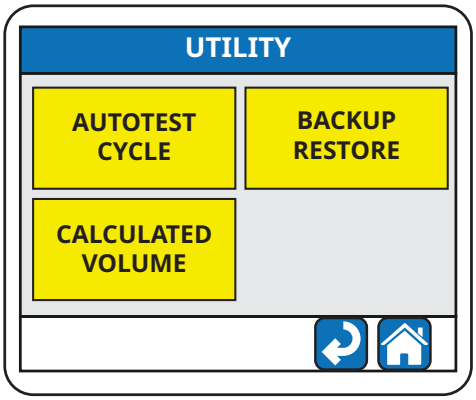
LS1: address
Address of the Modbus RTU node for communication on the serial line.

LS1: type
Serial line type; select from: RS232, RS485.

LS1: baud rate
Baud rate of the serial line; 8 bit format, no parity, 1 stop bit.
Select from: 4800, 9600, 19200, 38400, 56000, 57600, 115200 baud

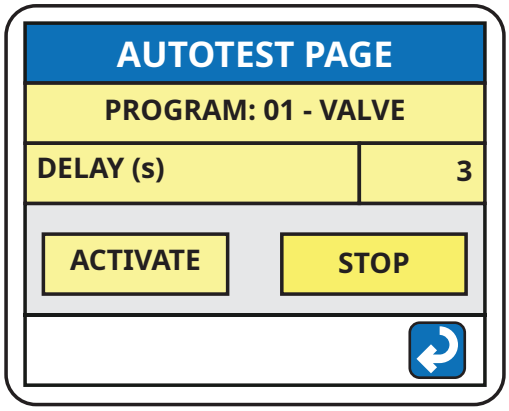
NOTE: Communication protocol manuals are available upon request.

7. UTILITIES



Press the “UTILITIES” key in main menu to access SELF-TEST CYCLE menu pages, the BACK-UP/RESTORE pages and, on the T2P PLUS version only, the CALCULATE EQUIVALENT VOL-UME pages.

7.1 Self-test cycle



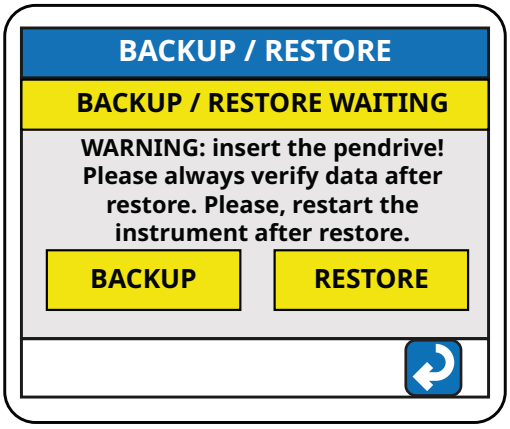
The SELF-TEST cycle is applicable to the various types of test and involves executing the current TEST PROGRAM repeatedly.
To activate this type of cycle, it is necessary to access the SELF-TEST CYCLE menu, press the ACTIVATE key, and then press YES to proceed, or NO to cancel.
At this point, the instrument is ready to execute the current test program repeatedly.
Press the START button to start the SELF-TEST CYCLE.
To stop the cycle, press and hold the STOP/RESET button to reset or access the SELF-TEST CYCLE page and press the STOP key.
The DELAY (s) field may be used to set-up a delay at the end of each test (0-250 seconds)

ATTENTION: before initiating the SELF-TEST CYCLE (and the same applies to all test cycles), the operator must check that the test parameters and the regulated test pressure at the outlet are correct, taking the appropriate precautions in the event of any high pressure values, in order to ensure the test is executed safely.

NOTE: it is important to be aware that, once the test has been concluded, another one will start automatically.

7.2 Backup and Restore

To access the Backup and Restore functions open the UTILITY menu followed by the BACKUP RESTORE menu.



This function may be used to backup programs, products, general parameters, and internal configurations.
When the BACKUP key is pressed, T2P copies the general parameters, programs, products, and other internal configurations of the instrument to the USB pen drive. The folder structure on the pen drive is as follows:

```
T2BAK
└──── <serial number>
      ├──── PROGRAMS
      └──── CONFIGS
            └──── RESERVED
```

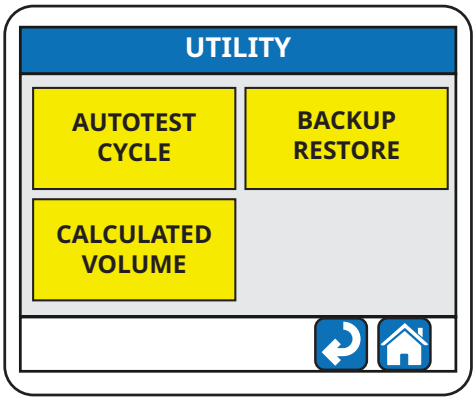
By pressing the RESTORE key, the T2P copies the general parameters and programs from the internal key.

ATTENTION: We strongly recommend that any given back-up only be used to restore the T2P used to create it, and at the same Firmware revision.

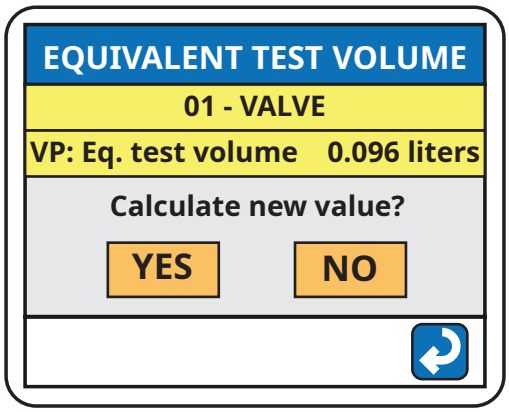
NOTE: the internal configurations backup cannot be used to restore them (the Customer may, however, request these configurations from Tecna in the event that any post-sales assistance is required).

NOTE: it is highly advisable not to remove the pen drive during the backup phase backup.

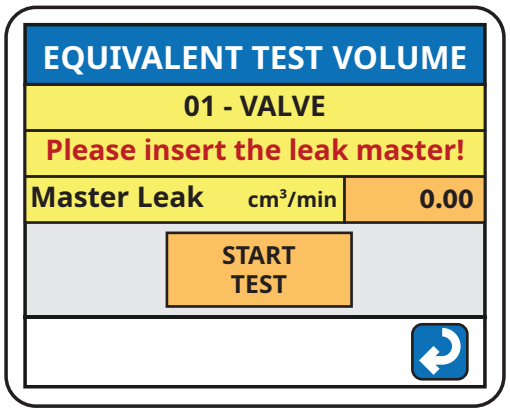
7.3 Equivalent volume calculation [VALID FOR PLUS VERSION ONLY]



This test cycle is only applicable for leak tests for the purpose of automatically measuring and programming the volumetric coefficient **VP** used to calculate the leak rate Q.
Under ideal conditions, the volumetric coefficient **VP** corresponds to the volume of the test circuit at the TEST output.
The test cycle requires the use of a leak master or leak simulator (E.g. Tecna LTC).
Press the CALCULATE EQUIVALENT VOLUME key to proceed.



The test cycle is performed using the test program parameters.
The volume indicated corresponds to the value of the volumetric coefficient **VP** already programmed in the test parameters.
Confirm by pressing the [YES] key to proceed.



The menu page displays:

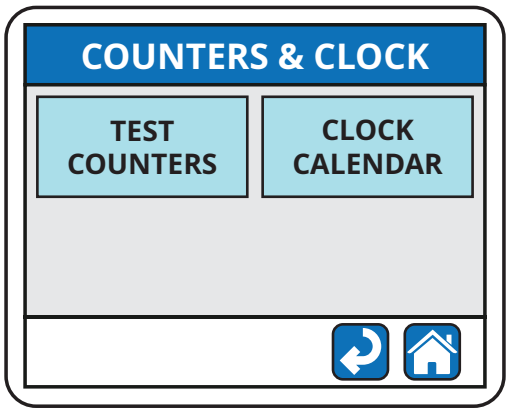
- The name and number of the test program;
- the leak Q (cm^3/min or cm^3/h) required to carry out the test cycle.

Connect a leak master to the test circuit.
If the leak master does not correspond to the expected Q value, program the current value of the leak applied (press directly on the number in the box on the right).

The leak master can be inserted at any point on the pneumatic circuit, as a bypass on the tube connected to the TEST output or on the component being tested.
Tecna Srl can supply calibrated leaks to the user's specifications, produced using quick-release fittings that can be inserted into the STAUBLI RB03 type watertight socket on the front panel.

WARNING: The leak rate Q of the leak master must be certified at the **PR** test pressure set-up in the test program.

8. PART COUNTER/CLOCK

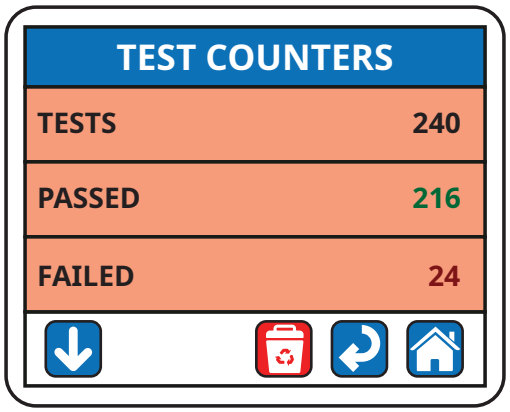


Press the “Part counter and clock” key in the main menu to access the partial and total part counters and time/date settings menus.

8.1 Part counter

Press the part counter key to view the partial and total part counters.

8.1.1 Partial part counter



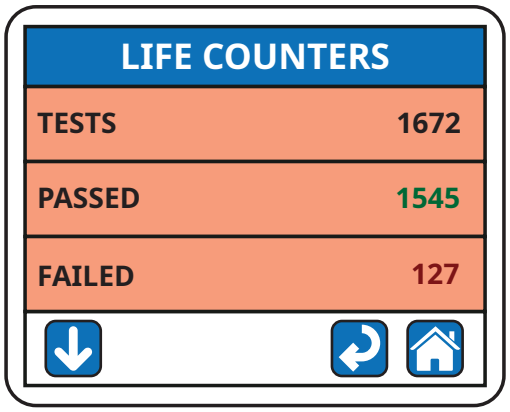
At the end of each test, the instrument updates the partial counters:

No. of TESTS: total number of tests carried out since the last reset.
OK: total number of tests carried out with the result PASSED since the last reset.
FAILS: total number of tests carried out with the result FAILED, since the last reset.

The counters can be reset manually by pressing the key.

Press the key to display the total part counter.

8.1.2 Total part counter

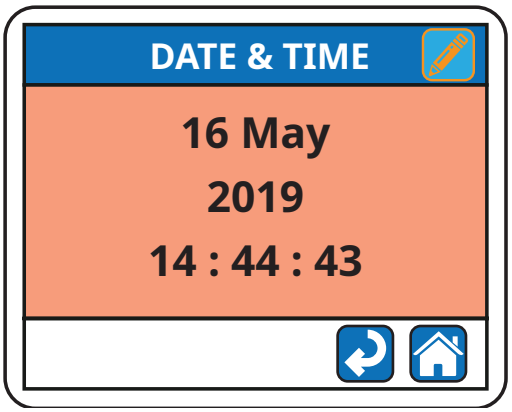


At the end of each test, the instrument also updates the total counters, which cannot be reset; these counters indicate the working life of the instrument.

No. of TESTS: total number of tests carried out
OK: total number of tests carried out with the result **PASSED**.
FAILS: total number of tests carried out with the result **FAILED**.

8.2 Clock / calendar

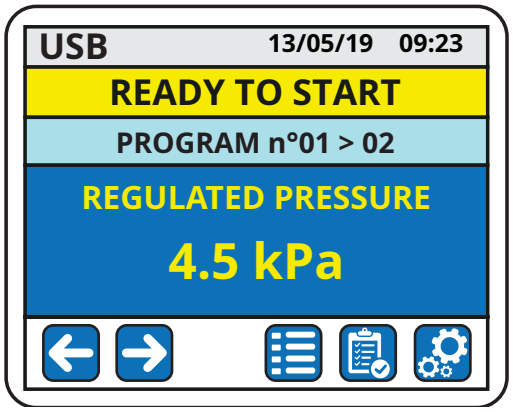
The clock and calendar functions are used to record the date and time of the tests performed for data collection on the serial line.
When the instrument is switched off, the clock is powered by the charge accumulated in a super- condenser, which can keep it running for about 7 days.



Press the  key to enable the date and time modification function.

9. SAVE TEST DATE TO PEN DRIVE [VALID FOR PLUS VERSION ONLY]

Provaset T2P is equipped with a type A USB Host port on the rear panel, which can be used to save test data to a pen drive.
Before saving the test data to the pen drive, this function must be enabled by accessing the T2P CONFIGURATION - GENERAL PARAMETERS - USB HOST menu (select YES to enable date to be saved to the pen drive). See Configuration Menu pag. 54
If a pen drive is connected to the T2P port, the message **USB** appears in the bar at the top of the display.



The status of the pen drive is indicated by the colour of the message USB displayed in the top bar of the T2P display in the top left corner:

USB message displayed in black, the pen drive is not enabled for data saving, enable the T2P for this function - see
USB message displayed in green, the pen drive is enabled for data saving

To save the test data to the pen drive, proceed as follows:

- Insert the pen drive into the USB port on the rear panel
- The message **USB** appears in the bar at the top of the T2P display.
- Press the START button on the front panel to perform a test
- Once the test is complete, allow approximately one minute for the test data to be written to the pen drive before removing it from the connector

WARNING: damage to the pen drive and loss of data;
the pen drive may be damaged if it is removed during the writing phase, with the consequent risk of losing the collected data.

WARNING: date and time error during data collection.
The date and time of the tests are important information for data collection; incorrect date and time values can render the collected data unusable.
See Configuration Menu pag. 54

9.1 Format of data recorded on the pen drive

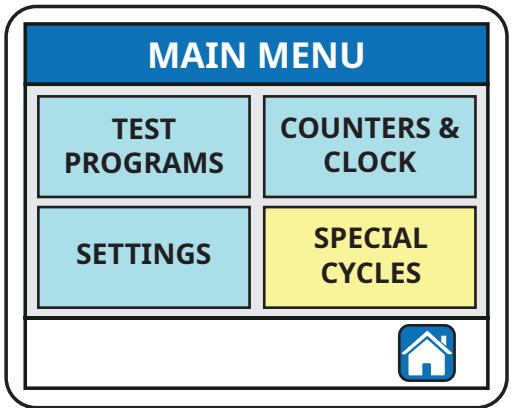
When a pen drive is inserted, a data file in CSV format file is created, which is compatible with all types of spreadsheet (e.g. Excel).
The test data (which may refer to tests carried out on different dates and more than one T2P) are saved in a single CSV file.
File structure specifications:

- Standard ASCII coding;
- the first row of the file contains the column header for the spreadsheet;
- the lines of each test end with the characters (carriage return) + (line feed), corresponding to the characters ASCII 13 and ASCII 10;
- the recorded fields are separated by the character (;), corresponding to the character ASCII 59;
- numerical fields use the full stop (or point) character (full stop, or point), corresponding to the character ASCII 46, as a decimal point.

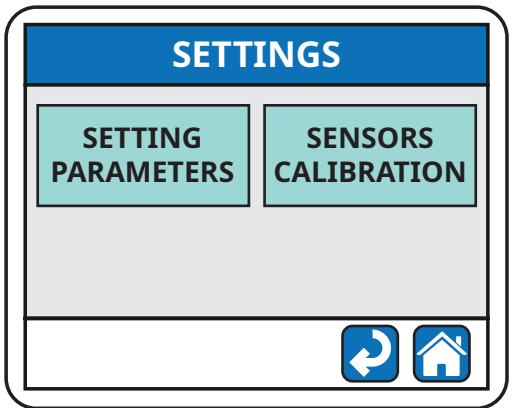
10. CALIBRATION OF PRESSURE SENSORS

WARNING: The sensors must be calibrated by authorised and technically competent personnel, with certified measuring instruments, following the instructions carefully.

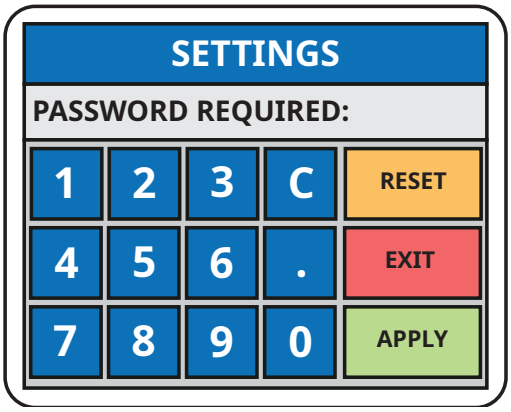
NOTE: Calibration interval: it is advisable to check the pressure calibration at least once a year; the manufacturer offers a periodic calibration service at its premises or at the Customer's premises.



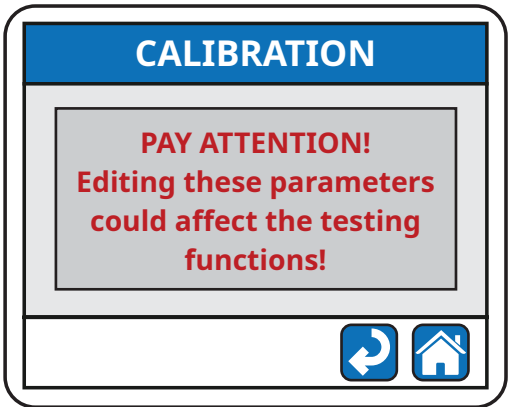
Press the SETTING button to access the "SENSOR CALIBRATION" menu.



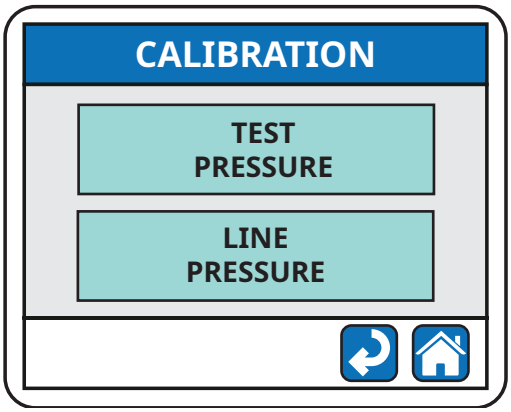
Press the "SENSOR CALIBRATION" key.
To access the menu it is necessary to enter the administrator password.



Enter the administrator password and press the APPLY key.



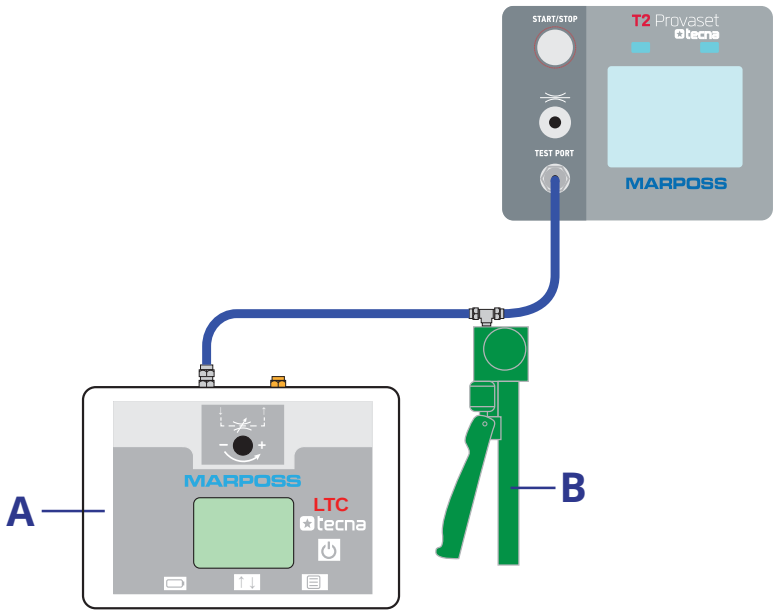
Press the message on the screen:
CAUTION! editing these parameters could affect the testing function.



Select “Test pressure” of “Line pressure”

10.1 Calibration of test pressure

The relative pressure is the pressure in the component being tested, in relation to the ambient pressure, in the phases of filling, stabilisation, measurement.
Calibration procedure:



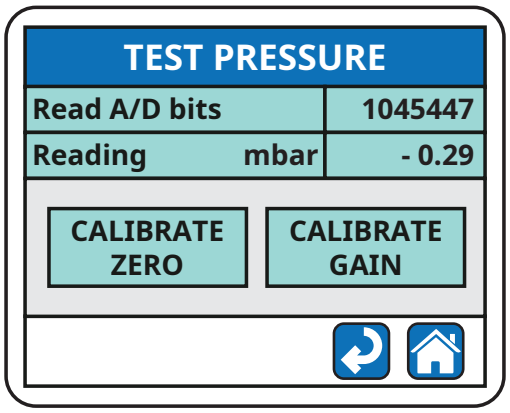
1. Switch on the equipment and wait at least 10 minutes for the pressure readings to stabilize;
2. Access the CONFIGURATION menu followed by the SENSOR CALIBRATION menu;
3. Enter the Administrator password;
4. Pay attention to the message that appears; consult the manual;
5. Press the message area to open the calibration page;
6. Select the "Test pressure" calibration menu;
7. Connect the described instruments to the equipment as shown in the figure.

A. Digital pressure gauge (e.g. LTC **Tecna)** , with full scale value compatible with the test pressure; resolution at least 0.1 mbar, accuracy 0.2% FS.

B. Pressure source, capable of generating full scale pressure; may be a precision pressure regulator, but a manual pump with micrometer regulator and pressure relief valve is preferable.

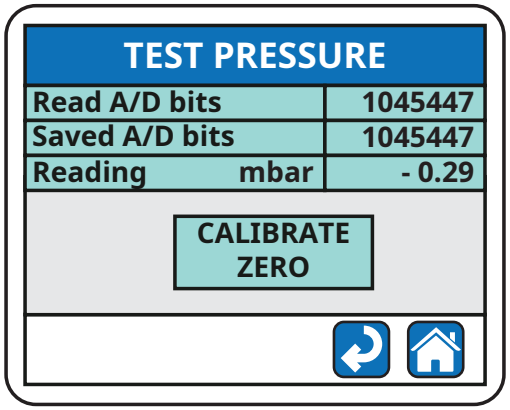
NOTE: Using an external pressure source.
Initially, when accessing the calibration procedure, the internal valves are closed, therefore an external source must be used to generate the test pressure.

The digital pressure gauge is used as a reference sample.



To verify the calibration of the instrument, change the pressure with the external source and compare the pressure measurement of the instrument with the measurement of the digital reference standard pressure gauge.
Carry out the check over the entire pressure measurement range, at regular intervals, from zero to full scale, and then from full scale to zero.
Choose zero or gain calibration (GAIN).

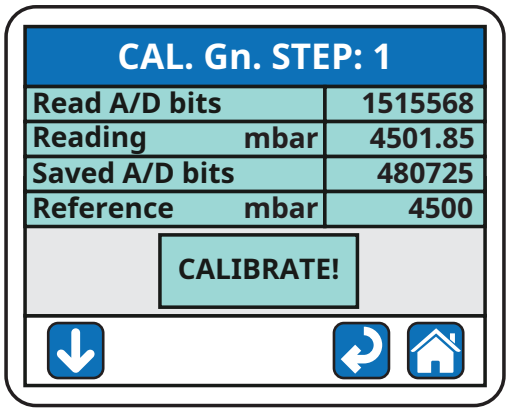
10.1.1 Calibration of test pressure “zero”



To adjust the test pressure to the "ZERO" value, proceed as follows:

1. The TEST outlet fitting must be free at ambient pressure to ensure the zero reading;
2. Open the discharge valve on the manual pump or disconnect the tube from the TEST fitting;
3. Press the ZERO CALIBRATION key to request zero calibration and confirm by pressing the YES key again, or exit by pressing the NO key.

10.1.2 Calibration of the "gain" for the reading of the test pressure



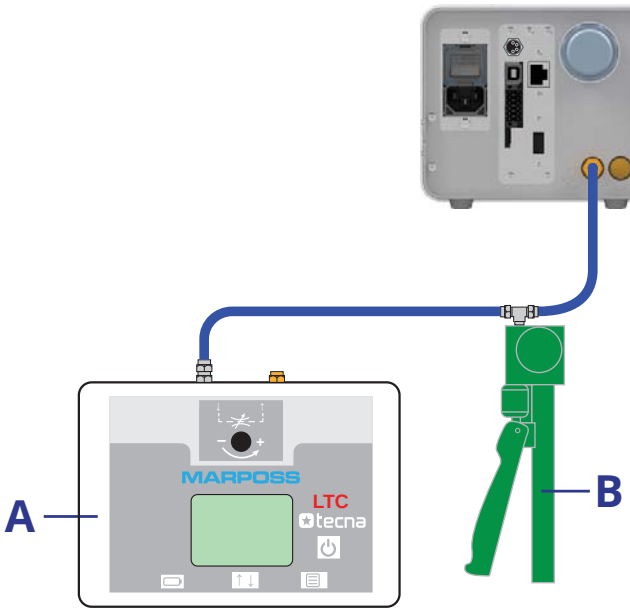
Gain calibration for pressure reading (sensor amplification) can be performed in steps, maximum 10, from zero to full scale pressure.
Proceed as follows for the adjustment:

1. Connect the manual pump and the digital sample pressure gauge to the TEST outlet fitting;
2. Press the GAIN CALIBRATION button to display the calibration page;
3. The calibration step is indicated in the upper line; in the example: CAL. Gn. STEP 1;
4. On the menu page, set the parameter “V. Sample" to the desired pressure for the calibration step and generate the corresponding pressure;
5. The pressure measured by the digital reference pressure gauge must be equal to the value programmed in the “V. Sample" parameter indicated on the menu page;
6. Adjust the pressure or change the parameter “V. Sample" as necessary, so that they are equal;
7. Press the CALIBRATION key, then confirm by pressing the YES key, but only if the pressure reading on the digital pressure gauge is the same as the value programmed in the parameter “V. Sample";
8. Press the Down Arrow key to continue to the next step;
9. For each calibration step, the reference pressure value (“V. Sample” parameter) must be greater than the previous step, increasing the pressure at each step, from zero to full scale;
10. The calibration procedure concludes only once 10 steps have been completed or, if the “Sample V.” pressure value is set to zero in one of the calibration steps, in which case, all the subsequent calibration steps are reset and, hence, ignored.

WARNING: To avoid damaging the pressure transducer, never exceed the instrument full-scale pressure rating.
A maximum overpressure of 10% is permitted.

10.2 Calibration of the line pressure

The line pressure corresponds to the Provaset T2P equipment air supply pressure.



Proceed as follows for the adjustment:

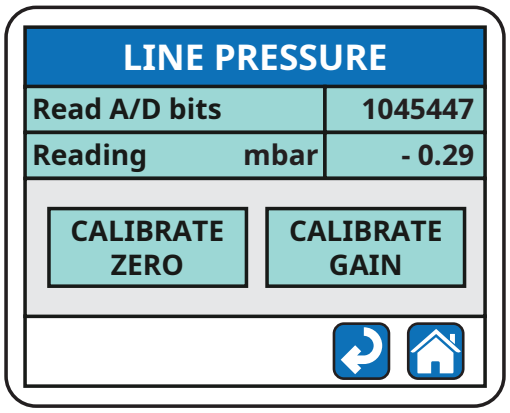
1. Switch on the equipment and wait at least 10 minutes for the pressure readings to stabilize;
2. Access the CONFIGURATION menu followed by the SENSOR CALIBRATION menu;
3. Enter the Administrator password;
4. Pay attention to the message that appears; consult the manual;
5. Press the message area to open the calibration page;
6. Select the "Relative pressure" calibration menu;
7. Connect the described instruments to the equipment as shown in the figure.

A. Digital pressure gauge (e.g. LTC **Tecna)** , with full scale value compatible with the line pressure; resolution at least 0.1 mbar, accuracy 0.2% FS.

B. Pressure source, capable of generating full scale pressure; may be a precision pressure regulator, but a manual pump with micrometer regulator and pressure relief valve is preferable.

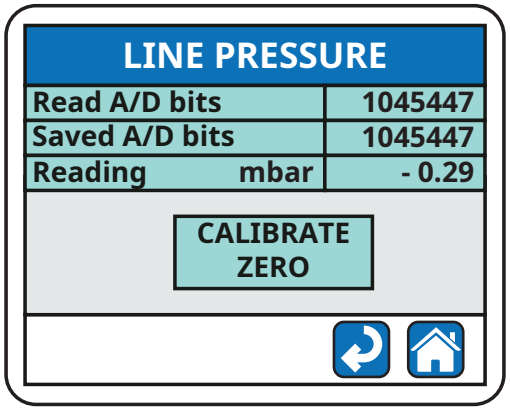
NOTE: Using an external pressure source.
Initially, when accessing the calibration procedure, the internal valves are closed, therefore an external source must be used to generate the test pressure.

The digital pressure gauge is used as a reference sample.



To verify the calibration of the instrument, change the pressure with the external source and compare the pressure measurement of the instrument with the measurement of the digital reference standard pressure gauge.
Carry out the check over the entire pressure measuring range, at regular intervals, upwards from zero to full scale, then downwards from full scale to zero.
Choose zero or gain calibration (GAIN).

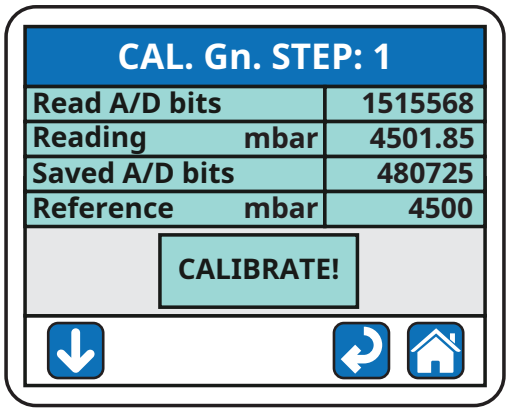
10.2.1 Calibration of line pressure “zero”



To adjust the line pressure to the "ZERO" value, proceed as follows:

1. The air supply fitting must be free at ambient pressure to ensure the zero reading;
2. Open the discharge valve on the manual pump or disconnect the tube from the air supply fitting;
3. Press the ZERO CALIBRATION key to request zero calibration and confirm with the YES key again, or exit with the NO key.

10.2.2 Calibration of the line pressure “gain”



Gain calibration for pressure reading (sensor amplification) can be performed in steps, maximum 10, from zero to full scale pressure.
Proceed as follows for the adjustment:

1. Connect the manual pump and the digital sample pressure gauge to the air supply fitting;
2. Press the GAIN CALIBRATION button to display the calibration page;
3. The calibration step is indicated in the upper line; in the example: CAL. Gn. STEP 1;
4. On the menu page, set the parameter “V. Sample" to the desired pressure for the calibration step and generate the corresponding pressure;
5. The pressure measured by the digital reference pressure gauge must be equal to the value programmed in the “V. Sample" parameter indicated on the menu page;
6. Adjust the pressure or change the parameter “V. Sample" as necessary, so that they are equal;
7. Press the CALIBRATION key, then confirm by pressing the YES key, but only if the pressure reading on the digital pressure gauge is the same as the value programmed in the parameter “V. Sample";
8. Press the Down Arrow key to continue to the next step;
9. For each calibration step, the reference pressure value (“V. Sample” parameter) must be greater than the previous step, increasing the pressure at each step, from zero to full scale;
10. The calibration procedure concludes only once 10 steps have been completed or, if the “Sample V.” pressure value is set to zero in one of the calibration steps, in which case, all the subsequent calibration steps are reset and, hence, ignored.

🔔 **WARNING:** To avoid damaging the pressure transducer, never exceed the instrument full-scale pressure rating.
A maximum overpressure of 10% is permitted.

11. FIRMWARE UPDATE

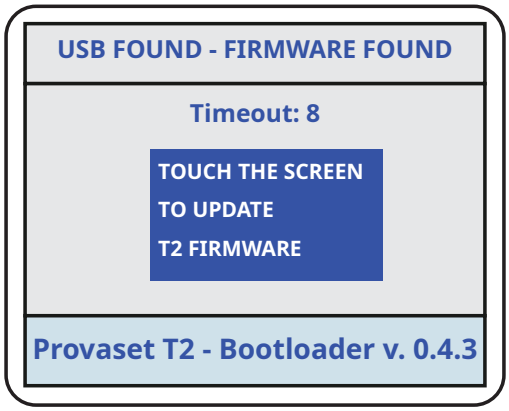
NOTE: Before updating the firmware, take note of all the test programs and general configuration data.

Tecna provides the file **t2fwupd.bin** for use when updating the firmware.

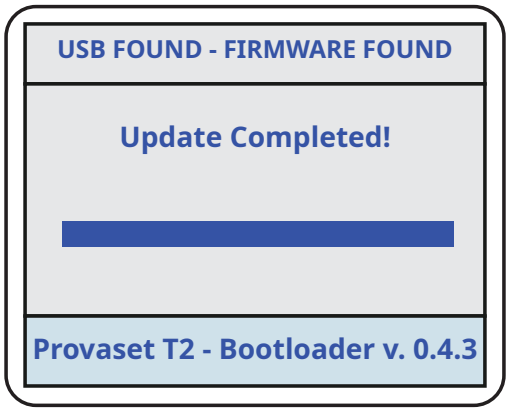
Firmware update procedure

- Download the file **t2fwupd.bin** and copy it to a pen drive within the root directory
- Check that the T2P switch is in the off position (0) and then connect the T2P to the mains power supply.
- Insert the pen drive into the USB Host port on the rear panel of the T2P
- Push the T2P switch to the ON position (I).
- Press the button 

that appears on the T2P display to perform the update.



If the firmware update has been completed successfully, the message UPDATE COMPLETED appears on the T2P display.



NOTE: Once the update phase is completed and before carrying out tests, check that the test programs and general configuration data correspond to that previously noted before the Firmware update.

12. ALARMS

If there are alarms active, a new test cannot be started.
If a test is in progress, it is automatically terminated if an alarm occurs and the result of the test is not acquired, including the marking, if included.

AL. TEST PARAMETERS:
Data memory alarm: the test parameters are not valid; check the active program test parameters and reprogram them if necessary.

AL. CONFIGURATION:
Data memory alarm: the configuration menu parameters are not valid; check the menu parameters and reprogram them if necessary.

AL. CALIBRATION:
Data memory alarm: the pressure sensors calibration constants are not valid; repeat the calibration procedure.

AL. PRESSURE OVER SCALE:
Disconnect the compressed air supply, discharge the pressure in the test circuit.

ATTENTION: In the event of out of scale pressure, conduct a safety procedure to manually depressurise the pneumatic test circuit pressure and the component under test.

AL. PRESSURE DISCHARGE
Pressure not discharged at the end of the test: test in progress not completed; to start a new test it is necessary to reset the test in progress (for example by pressing the Start/Stop key for 2 s).

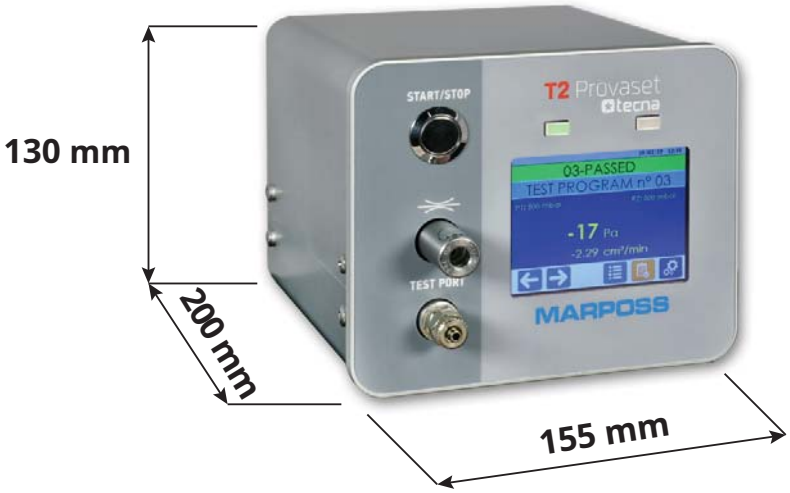
If a new test cannot be started due to an alarm, the alarm type is displayed on a red background.
The active alarms are displayed on a dedicated page of the base menu, which can be accessed by pressing the  key.

13. TECHNICAL SPECIFICATIONS

13.1 Technical data

Mains power supply		100 - 240 V~ 50 - 60 Hz , 15 VA
Fuses		T 630 mA, 2 fuses 5 x 20 mm
Class		I
Environmental conditions	**Temperature**	5 - 50 °C
	Relative humidity	80% RH max
	Ambient pressure	700 hPa - 1100 hPa
Air pressure supply		from 3.0 bar up to 10 bar max
Air supply quality		ISO 8573-1
Test pressure	**Class 0.5 % FS, maximum resolution 1 Pa (0.01 mbar):**	**Test pressure range**
	T2P2	0.05 - 2 Bar
	T2P6	0.1 - 6 Bar
Internal circuit volume		3 cm^3
Leak master connection	**Quick connector:**	Staubli RBE03
Case	**Materials**	Anodized aluminium
	Size	155 x 130 x 200 mm
	Weight	4.50 Kg
Auxiliary power supply output +Vx	24 Vdc, 300 mA max	
	Self-resetting fuse, output not isolated	
Serial line USB 2.0	USB type B connector, 5 Vdc; isolation, 50 V max	
Serial line RS232/RS485	5 Vdc for RS485 signals	
	+/-12 Vdc for RS232 signals; isolation, 50 V max	
PLC digital inputs	24 Vdc, 3 mA max	
	Conforming to IEC 61131-2; isolation, 50 V max	
PLC digital outputs	24 Vdc, 0.7 A max	
	Conforming to IEC 61131-2; isolation, 50 V max	

13.2 Dimensions, weight



Weight: 4.50kg

DECLARATION OF CONFORMITY

CE

Manufacturer and distributor	Tecna Srl
Address	Via Statale Sud 115, 41037 Mirandola (MO) Italy

declares that the product (s)

Line	Provaset T2P
Model	T2P2, T2P6
Description	Pressure decay leak tester.

complies with the following directives and standards:

ELECTRIC SAFETY	
Directives	**2014/35/EU** of 26 February 2014 “low voltage (LT)”
Standards	CEI EN 61010-1:2013 "Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1:
ELECTROMAGNETIC COMPATIBILITY	
Directives	**CE 2014/30/EU** of 26 February 2014 “electromagnetic compatibility (EMC)”
Standards	CEI EN 61326--1:2013 and subsequent amendments “Electrical equipment for measurement, control and laboratory use - EMC requirements Part 1: General requirements”
DISPOSAL, WASTE AND HAZARDOUS SUBSTANCES	
Directives	CE 2011/65/EU of 8 June 2011 “restriction of the use of certain hazardous substances in electrical and electronic equipment “ CE 2012/19/UE of 4 July 2012 “preventing the creation of waste electrical and electronic equipment (WEEE)”

Eng Giulio Bignardi

Mirandola,26/06/2020

General Manager Tecna Srl

14. WARRANTY

This warranty is valid for contracts between Tecna Srl and companies and/or professionals holding VAT number (B2B) and only for the Client to whom the transport document (DDT or accompanying invoice) is issued by Tecna Srl.
Tecna Srl guarantees its products for 12 (twelve) months from the date of delivery against manufacturing defects and defective components.
The delivery date shall be that indicated on the transport document (DDT or the accompanying invoice) issued by Tecna Srl at the time of delivery to the customer or to the carrier assigned to deliver the equipment.
The terms of this warranty do NOT cover spare parts and/or consumables which are subject to wear and tear.
The initial duration of the warranty covering the instrument as a whole shall also apply to any parts that may be replaced during the warranty period, regardless of when they were replaced.
Only Tecna srl is authorized to perform repairs on the instruments under warranty: any intervention by unauthorized personnel, or tampering with the warranty seal, shall invalidate said warranty.
Warranty repairs shall be carried out at the Headquarters of Tecna Srl.
Any requests for repairs at the customer's site shall be evaluated by Tecna Srl on an ad hoc basis, and, in case of acceptance of the request, the transfer expenses (travel hour tariff, travel costs and out of office costs, call fee) shall be invoiced according to the current price list.
During the warranty period, parts and/or components that malfunction as a result manufacturing defects, defective components and/or improper assembly of parts shall be replaced or repaired free of charge.

The evaluation on whether to proceed with a replacement or a repair shall be at the sole discretion of Tecna Srl.
The hours of work required for warranty service will also be provided free of charge.
The customer, following written authorization from Tecna srl, shall hand over the equipment in its original packaging, to the courier sent by Tecna srl for pick-up. The freight will be paid by Tecna Srl but will be charged back to the customer if the necessary maintenance does not fall within the terms of this warranty.

The following are excluded from the warranty:

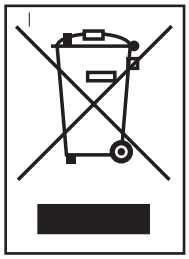
- consumable parts that are subject to wear and tear, or which may require replacement due to the normal use of the instrument during the warranty period such as, but not limited to: valves and/or their valve stems, pressure and/or flux sensors, dirt filters, printer ribbons, batteries etc.;
- damage caused during transport, due to wrong or improper installation, improper handling, carelessness or incompetence, tampering by unauthorized persons and any other causes not attributable to Tecna Srl;

- damage arising from the use of the instrument in environmental conditions outside the specifications indicated;
- damage arising from the use of compressed air that has not been filtered, dried or de-oiled (where required) as indicated in the user manual supplied with the instrument;
- damage arising from the use of the instrument without the air filter (where required) mounted at the compressed air inlet, or with a dirty and/or worn-out filter;
- damage arising due to accidents or unforeseeable incidents, such as, but not limited to: fire, flood, earthquake, weather events (e.g. lightning), strikes, acts of vandalism, riots, social disorder, theft etc.;
- damage or malfunctions due to irregularities or anomalies in the mains supply (blackouts, power surges interference, etc.) or any other local power equipment;
- damage resulting from the misuse, repairs or maintenance activities performed by unauthorized personnel or use of non-original materials, damage due to use of corrosive materials for cleaning or otherwise that may damage the mechanical, electrical or electronic parts;
- damage or malfunctions caused by the installation of programs, software or operating systems or parts thereof or virus attacks that may damage or interfere with the operation of the operating system and software management of the instrument, in particular, but not limited to, installation via USB pen drives, Ethernet network or through other interconnecting systems;
- in general, all the damage caused by the Customer or personnel authorized by him to operate the instrument, and which is attributable to incorrect use of the instrument and/or against the instructions received or written in the instruction manual supplied with the instrument.

In all the above cases, the warranty does not apply and the repairs arising from such damages shall be quantified and billed according to the current tariffs.
The applicability or otherwise of the warranty shall be at the sole discretion of Tecna Srl.
Tecna Srl may not be held liable for eventual costs or damages caused by the machine downtime or for any direct or indirect damages resulting from the incorrect operation of the supplied products or their use.
Any disputes arising from the execution or interpretation of this warranty shall be resolved exclusively by the Court of Modena.
All disputes shall be resolved in accordance with Italian law.

Revision 01/01/2015 Tecna Srl

15. USER INFORMATION EUROPEAN DIRECTIVE 2012/19/UE



This product conforms to European Directive 2012/19/UE.
This appliance bears the symbol of the barred waste bin. This indicates that, at the end of its useful life, it must not be disposed of as domestic waste, but must be taken to a collection centre for waste electrical and electronic equipment, or returned to a retailer upon purchase of a replacement.
It is the user's responsibility to dispose of this appliance through the appropriate channels at the end of its useful life.
Proper differential collection, and the subsequent recycling, processing and environmentally compatible disposal of waste equipment avoids unnecessary damage to the environment and possible related health risks, and also promotes recycling of the materials used in the appliance.