Blister tester
BT100

Blister tester BT100 used to test for the cohesion of packed strips, blisters and small sachets containing tablets, granulates, and so on. The instrument is used to test the quality of the packaging process and to check that the seals enclosing the product are perfectly intact. BT100 find the smallest holes andimperfections in blister packs and other semi-rigid product packaging.

There are two types of BT100 available:

- **BT100 stand alone type**
  – with integrated vacuum pump
- **BT100 integrated option**
  – an external vacuum feeder (source)

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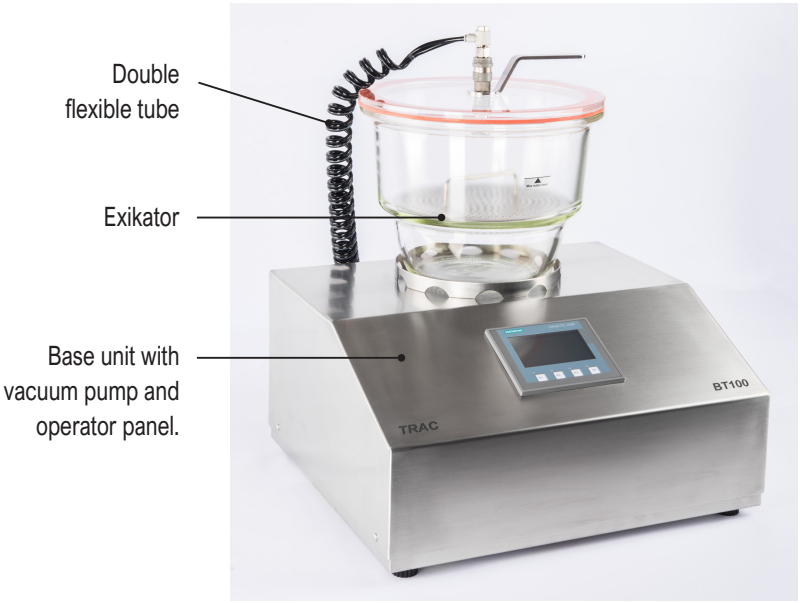
IMPORTANT NOTES

	Employers and supervisors should ensure that this instruction manual or its contents are communicated, or available, to all persons who operate, clean, maintain or work in the proximity this unit.
	The unit must be unplugged from the mains supply before commencing any maintenance work.
	Never run the blister tester if the flexible tube is not connected to the exicator lid and the lid is not properly positioned on the exicator.
	To avoid pressure regulation instability, never overfill the exicator.

1. Introduction

The blister tester is a benchtop unit, used for sample testing of the multi-cavity blisters sealing. The tester exposes water-submersed samples to a vacuum for a pre-defined amount of time. If a blister is sealed correctly, then water will not get in contact with tablets in blister cavities. In case of a bad blister, water comes in contact with tablets, which dissolve, causing a visual indication of a bad blister.

Main blister tester components are:



1.1 System overview

BT100 is designed as a two-piece unit. A base unit is made of stainless steel and has all active parts built-in. The exicator (a glass bowl) is normally standing on the base unit. The exicator lid is connected to a base unit with two pneumatic tubes. One tube is used for a vacuum pump connection and the other for a pressure sensor connection.

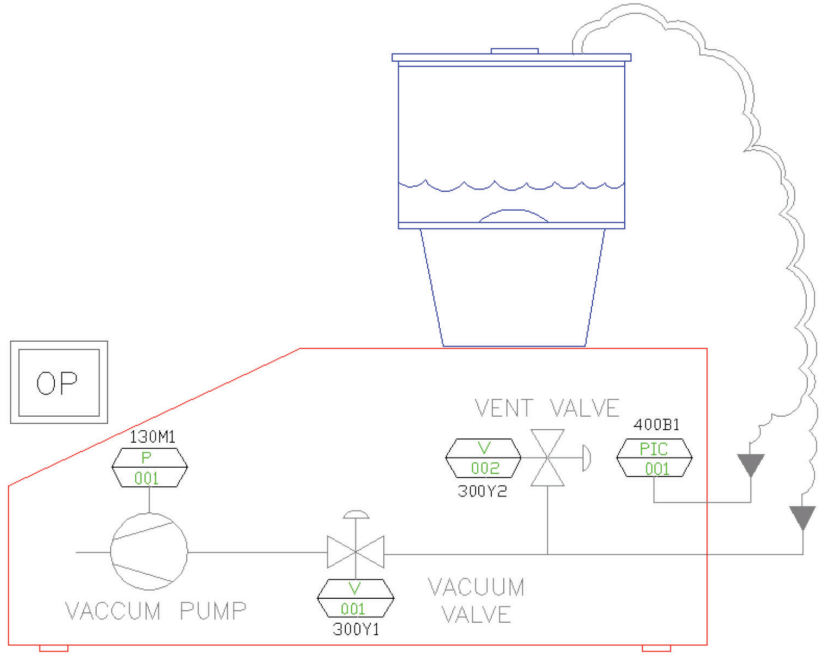


Figure 1 Piping and instrumentation diagram of BT100

1.2 Operator interface

BT100 has a built-in 4” touch screen operator panel, which is located on the front of the unit. It allows the operator to monitor unit operation at all times. Figure 2 shows the main screen of the BT100 operator panel.

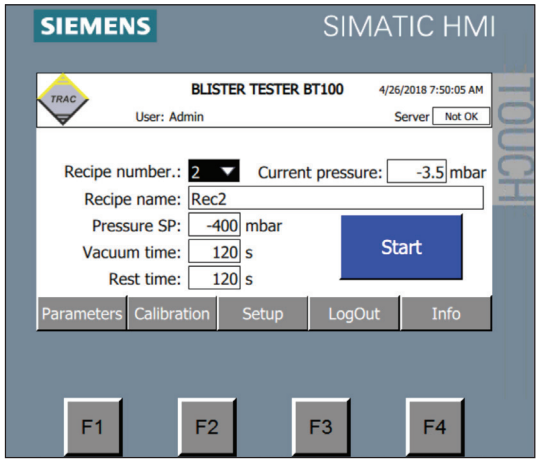
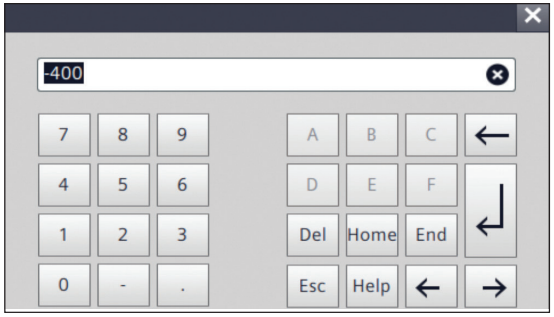


Figure 2 BT100 operator panel

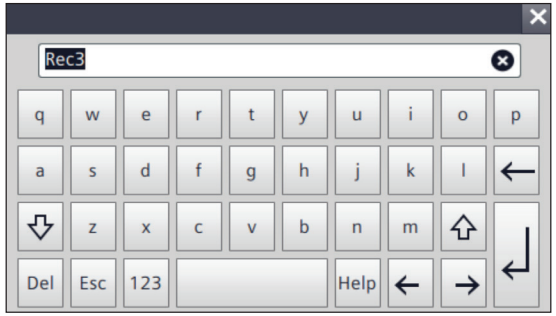
1.2.1 Data entry

A screen keyboard is available for data input. The screen keyboard is displayed as soon as the user touches the data entry field on the operator panel.

Numeric data entry fields use the following keyboard:



Alphanumeric data fields use the following keyboard:



1.3 Environmental conditions

BT100 can operate under the following conditions:

Parameter	Range & Unit
Temperature	10 – 35 °C
Relative humidity	10 – 80 % without condensation
Air pressure	1080 to 660 hPa

2. Unit limitations

2.1 Vacuum pump operation

BT100 has a built-in dry vacuum pump, which has a limitation of maximum 10 start-ups per hour. BT100 software prevents too many start-ups of the vacuum pump, providing the user keeps BT100 ON at all times (main switch in position 1). This is achieved by keeping the vacuum pump running for the minimum set time, which cannot be lower than 6 minutes. This means that the pump will run for 6 minutes or more every time it is turned on.

2.2 Exikator water level

The exicator water level must not be higher than the marking on the side of the exicator. Proper vacuum regulation is not guaranteed if the water level is higher than is marked on the exicator.

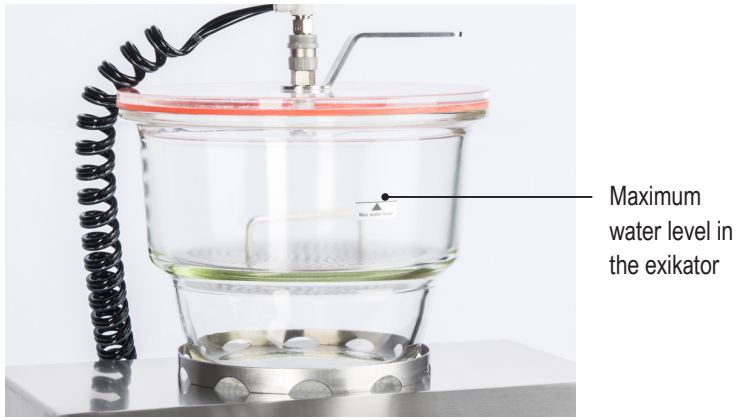


Figure 3 Exikator maximum water level

3. BT100 specifications

Parameter	Range & Unit
Weight without packing	25 kg
Display type	LCD STN
Display active area	5.7"
Display resolution	320 x 240 pixels
Contrast control	Yes
Input unit	Resistive analog touch screen
Supply voltage	230V /50Hz
Power consumption - active	300W
Power consumption - standby	30W
Fuse	Built in power socket. Replaceable.

3.1 Main BT100 connections

All connections for BT100 are located on the back of the unit as seen in Figure 4.

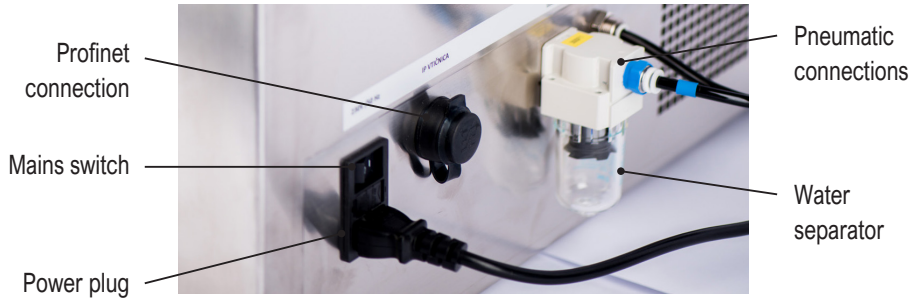


Figure 4 BT100 back view

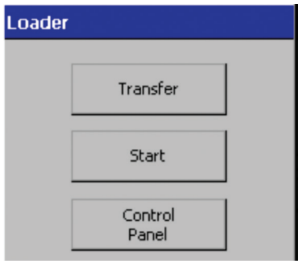
Procedure for connecting the double pneumatic tube:

- The pneumatic tube marked with blue (shorter tube) must be connected to the water separator (also marked with blue)
- The pneumatic tube without mark (longer tube) must be connected on the pressure sensor

4. User interface

4.1 Start-up sequence

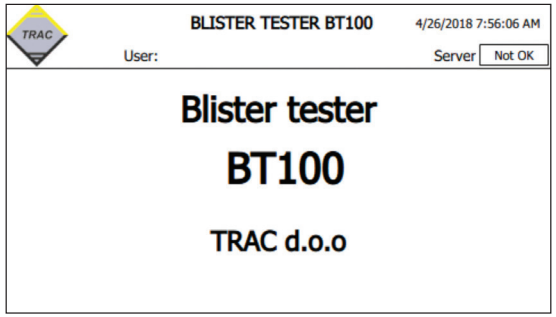
The BT 100 is turned on by an ON/OFF switch, located on the back of the unit. The unit is ON when the switch is in position “I”.
BT100 goes through a booting procedure during the first few seconds after turning unit ON. A boot message is visible on the OP during this time, followed by the system screen for about 3 sec.



This screen automatically disappears after 3 seconds and the start screen appears.

4.2 Start screen

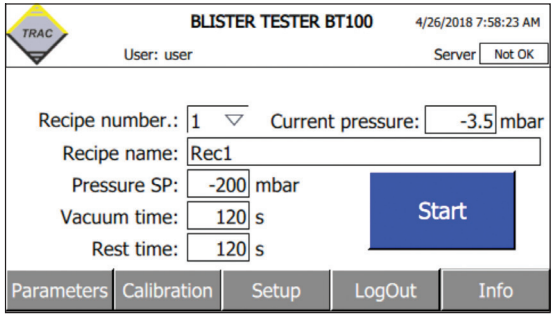
The start screen is visible for a few seconds only during boot-up sequence.



The start-up screen automatically disappears after a few seconds and the Main screen appears.

4.2.1 Main screen

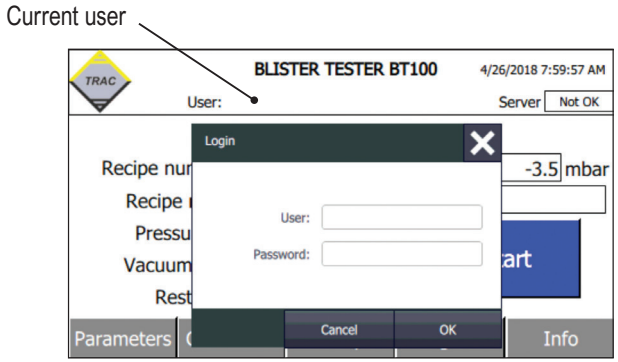
The start-up screen is followed by the main screen as shown below:



All BT100 functions are started from the main screen.

4.3 LogIn screen

The login screen becomes visible when the user selects the function which requires user authentication or if the current user’s rights are not sufficient for the selected function.



The user must enter Username and Password. The currently logged in user is visible in the status part of the screen.

4.4 <Start> button

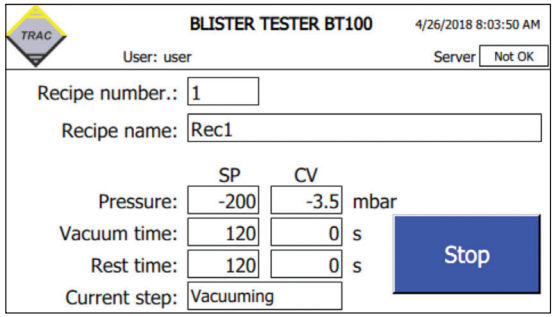
<Start> button is used to start an individual test.

4.4.1 Vacuuming cycle

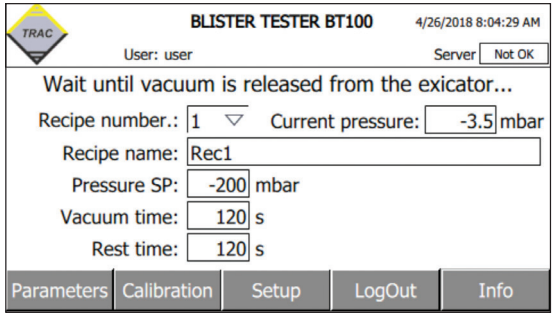
The vacuum cycle has two steps:

- Vacuum set-up step
- Vacuuming step

The following screen is shown during the vacuum set-up step:

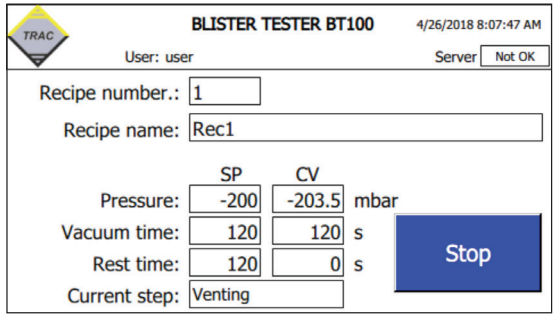


When required, the vacuum is reached, BT100 starts to show the effective vacuum time as seen below:



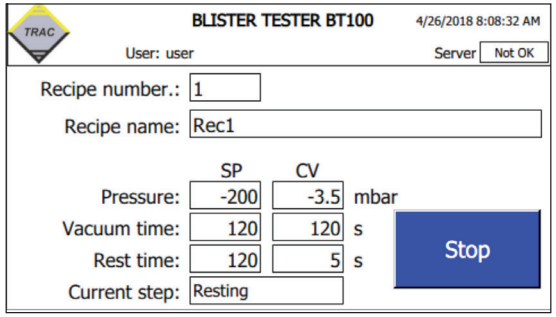
The vacuuming cycle ends when the current vacuum time reaches the set-point vacuum time. The exicator venting cycle starts automatically. The vacuum is released from the exicator during this cycle.

4.4.2 Venting cycle



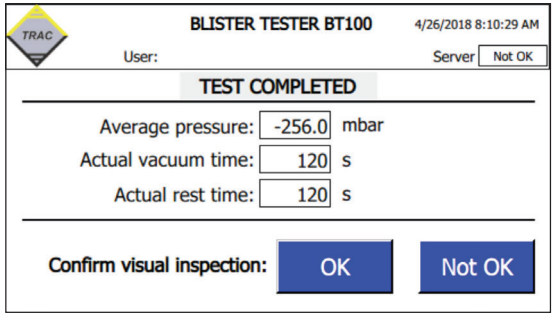
4.4.3 Resting cycle

Venting is followed by the so-called resting cycle, which allows blisters to stay in the water for the pre-defined amount of time. Rest time current value (CV) is incremented every second during the resting cycle.



A report screen becomes visible at the end of th resting cycle.
At the end of the resting cycle, a buzzer beeps 5 times. Until visual inspection is not confirmed, buzzer beeps 5 times every 15 minutes.

The operator must open the exicator and visually inspect tested blisters and confirm the “TEST COMPLETED” screen by either pressing <OK> or <Not OK> button.
The <OK> button is pressed if the visual inspection of the blisters shows no leakages.
The <Not OK> button is pressed if the visual inspection of the blisters shows one or more leakages.



A report trigger is set when operator confirms the “TEST COMPLETED” screen and BT100 returns to the Main screen.

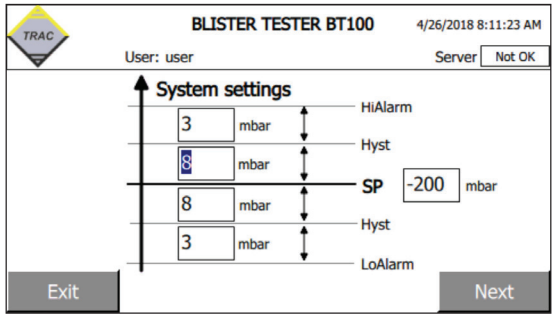
Report data includes the following:

- Batch number as entered by the operator
- Start date/time of the test
- Operator name
- Set test vacuum
- Set vacuum time
- Set rest time
- Average pressure
- Test result: OK /Not OK as entered by the operator

4.5 <Parameters> button

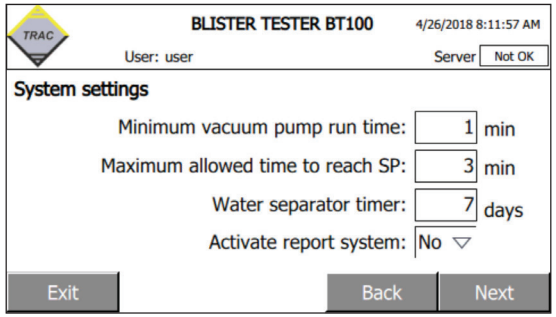
BT100 has several parameters, which can be adjusted according to customer needs. All parameters are organized in two screens and are password protected.

The first parameter screen appears when the user presses the <Parameters> button in the Main screen:



This screen is used to set required test vacuum, regulation hysteresis and alarm limits. Values can be changed by tapping on the individual input field.

<**Exit**> button returns to Main Screen.
<**Next**> button shows the second parameters screen:



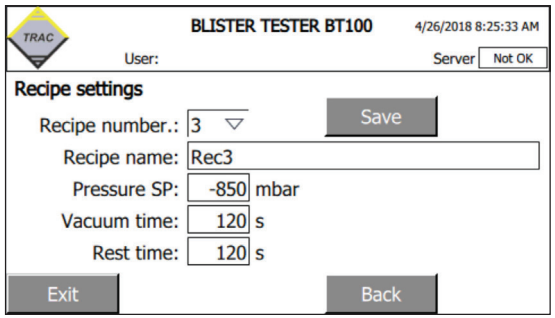
<**Exit**> button returns to Main Screen.
<**Back**> button returns the previous screen.

System setting description:

Parameter name	Description
SP	Required vacuum set point, expressed in mbars
Hyst	Hysteresis around the set point, which is used for vacuum regulation. No valves are active as long as the current pressure is within limits SP+Hyst and SP-Hyst. Vent valve will activate as soon as the current pressure in the exicator becomes lower than SP-Hyst. The vacuum valve will become active as soon as the pressure in the exicator rises above the SP+hyst
LoAlarm	This parameter defines the maximum allowed pressure drop below the SP before an alarm is generated.
HiAlarm	This parameter defines the maximum allowed pressure rise above the SP before an alarm is generated.
Minimum vacuum pump run time	This parameter defines how long the vacuum pump runs every time it is switched ON. The purpose of this parameter is to prevent too many vacuum pump ON/OFF cycles, especially if tests are performed frequently.
Maximum allowed time to reach SP	This is alarm value for reaching required set point. An alarm is generated if required vacuum setpoint is not reached within time specified by this parameter.
Water separator timer	Set number of days to display warning: “Check water separator”
Activate report system	Activate/Deactivate report system If “Yes” is selected, then before start of vacuum test, user has to enter batch number. At the end of test, report is generated. Storing of data into database is not part of this system. If “No” is selected, then the batch number is not entered and the report is also not generated before the start of the vacuum test.

4.5.2 Recipe settings

Venting is followed by the so-called resting cycle, which allows blisters to stay in the water for the pre-defined amount of time. Rest time current value (CV) is incremented every second during the resting cycle.



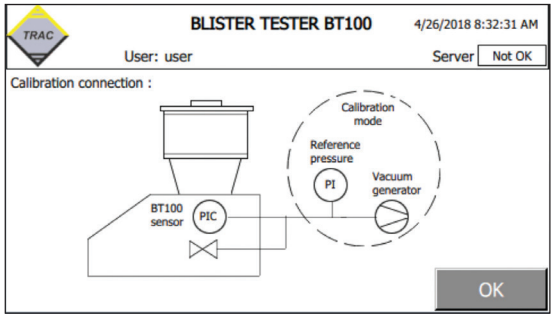
<**Save**> button saves set data into selected recipe.
<**Exit**> button returns to Main Screen.
<**Back**> button returns the previous screen.

Recipe setting description:

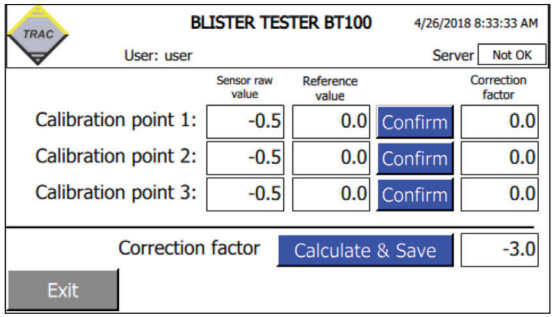
Parameter name	Description
Recipe number	Recipe number selection
Recipe name	Enter recipe name (max. 30 characters)
Pressure SP	Required vacuum set point
Vacuum time	Required vacuuming cycle time
Rest time	Required resting time

4.6 <Calibration> button

The internal pressure sensor in BT100 must be periodically calibrated (12-month cycle). This is done by pressing the **<Calibration>** button on the Main screen. Calibration is password protected. Only users with high enough rights can execute calibration. Calibration schematic is shown on the screen when the <Calibration> button is pressed. The purpose of this screen is to remind the user how to connect BT100 for calibration.

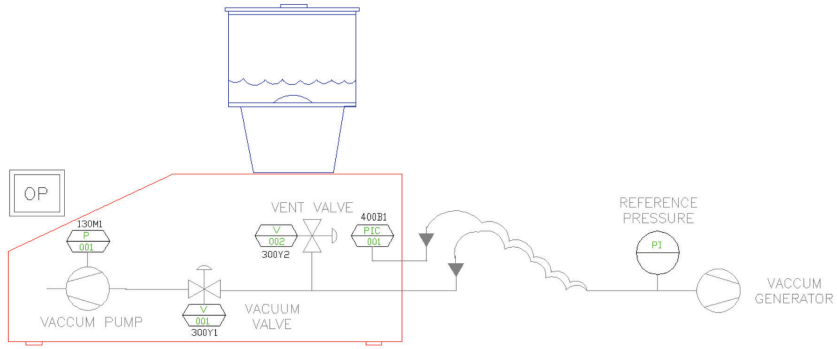


<OK> button shows main calibration screen as follows:



4.6.1 Calibration procedure

1. Connect the reference vacuum generator as shown on the diagram below:



2. Enter Calibration Point 1 pressure as adjusted on the reference unit.
3. When reference pressure stabilizes at the value entered in “Reference value” field, press <Confirm> button for the selected calibration point.
4. A correction factor is calculated immediately.
5. Repeat steps 2-4 for calibration point 2 and 3.
6. At the end of calibration press the <Calculate & Save> button to calculate a single correction factor. This factor is used for error compensation of the internal pressure sensor.

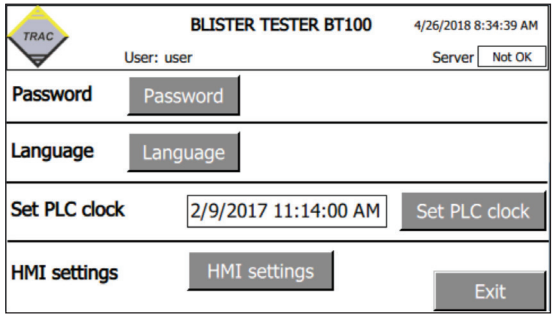
Recommended calibration points are (-100.0, -400.0, -800.0 mbar)

<Exit> button returns to Main Screen.

4.7 <Setup> button

<**Setup**> button is used for the following:

- Managing users and their rights
- Language selection
- Adjust OP clock and synchronize PLC time with OP time
- Exit from HMI application and adjusting HMI settings



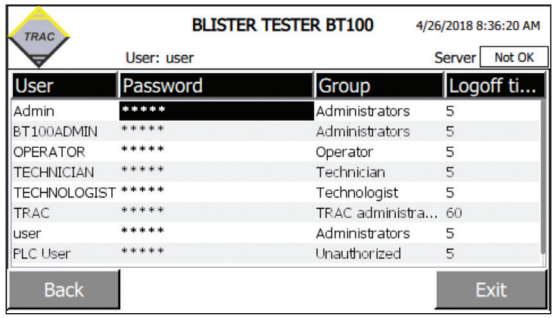
<**Exit**> button returns to the Main screen.

4.7.1 Adjust contrast

Press repeatedly <Decrease> or <Increase> button to adjust screen contrast.

4.7.2 Password management

<**Password**> button shows the user management screen as shown below. Only a user with administrator rights can access this screen.



<**Home**> returns to the Main screen
<**Back**> returns to the previous screen (Setup screen)

The following parameters can be set for each user:

- User name
- Password
- User group
- User log-off time in [min]

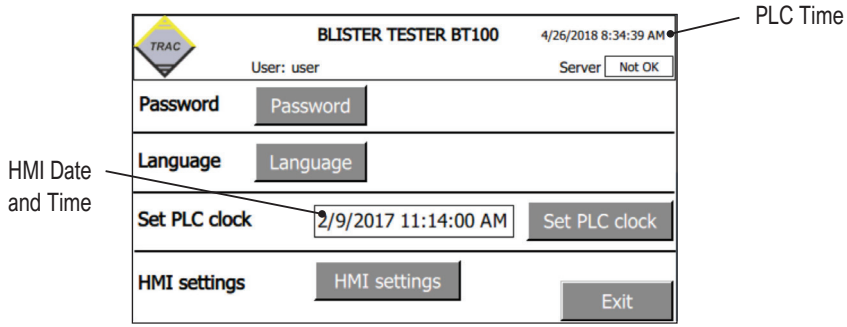
To add a new user, press empty field on the bottom of the “User” column.

4.7.3 User rights

	User groups					
Function	**Unauthorized**	**Users**	**Operator**	**Technician**	**Technologist**	**Administrators**
Parameters				✓	✓	✓
Calibration					✓	✓
Set PLC clock				✓	✓	✓
Passwords						✓
Vacuum test	✓	✓	✓	✓	✓	✓

4.3.4 Set PLC clock

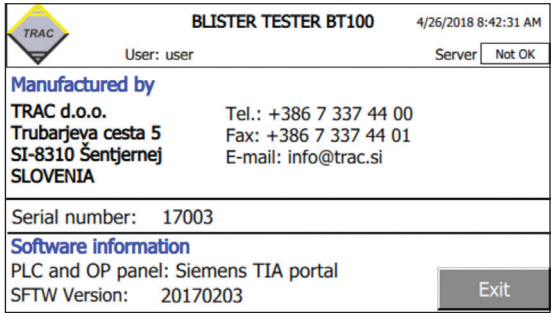
Adjusting PLC clock:



1. Click on the Date/Time field and enter correct date and time
2. Press <**Set PLC clock**> to update PLC date and time.
   A new adjusted time must be visible in the upper right corner of the HMI.

4.8 <Info> button

<**Info**> button shows manufacturer information and current software version.



<**Exit**> button returns to the Main Screen.

BT100 Limited Warranty

TRAC warrants its products are free from defects in material and workmanship. Subject to the conditions and limitations set forth below, TRAC will, at its option, either repair, replace or give a refund for any product that prove defective by reason of improper workmanship or materials. Repaired or replacement products will be provided by TRAC on an exchange basis and will be either new or refurbished to be functionally equivalent to new. Any refunds given will be at the current value of the product at the time the warranty claim is made.

This limited warranty does not cover any damage to this product that results from improper installation, accident, abuse, misuse, natural disaster, insufficient or excessive electrical supply, abnormal mechanical or environmental conditions, or any unauthorized disassembly, repair, or modification.

This limited warranty also does not apply to any product on which the original identification information has been altered, obliterated or removed, has not been handled or packaged correctly or has been sold as second-hand.

This limited warranty covers only repair, replacement or refund for defective TRAC products, as provided above. TRAC is not liable for, and does not cover under warranty, any loss of data or any costs associated with determining the source of system problems or removing, or servicing TRAC products.

Be careful - This warranty excludes any 3rd party software, connected equipment or stored data.

Terms

TRAC product is covered by this warranty for a period of **ONE year** from the date of purchase BT100, which is mentioned on the original invoice.

Procedure

The procedure for dealing with any warranty claims and handling of goods can be obtained by contacting us directly.