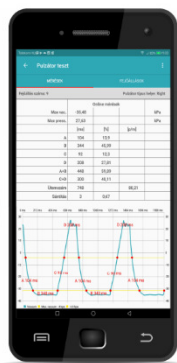


milkingo



User manual



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www.dairypulsatortester.com

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1. Brief description of the Dairy Pulsator Tester (DPT) instrument and application

The DPT is a diagnostic tool based on experiences gathered for decades in dairies, which measures the pressure in the pulsating system and in the vacuum system. Besides the generation of profit, the purpose of dairy farms is to achieve a proper milk production, which could be accomplished only with properly operating milking machines. As indicated by our experiences, many farmers do not know the operating parameters of their own milking equipment. This is why they are not able to check the equipment, although the profitability depends largely on the proper functioning of the equipment.

The primary objective of the developers of this equipment was to create a tool, by means of which it would be possible to reveal the operating deficiencies of the milking machines, and in this way to eliminate the risk of teat inflammations and other teat problems caused by the milking machines. By using our device the range of tools of the dairy farmers is extended, with the help of which they would be able to improve their farms and extend the capability of profit generation.

The DPT is a system consisting of a measuring instrument and an application run in a mobile tool, they can be used only together. With the use of Bluetooth data communication system the measuring instruments forwards the measuring data to the application, which displays, records and evaluate the data.

The system has a number of unique properties, which facilitate the simple and convenient use:

- Reasonable price of the DPT measuring equipment, which makes sure that the controlling software can be operated on your device. Such device could be a smart phone or tablet machine working with an Android/IOS operating system.
- Real time displaying of measured data with graphs, which the help of which an instant impression can be obtained about the nature of the problem. In this way the information you get from the diagrams is more extensive relative to the case when only numerical data are displayed.
- The measured data are automatically stored in your user account from your device if internet link is available, so you can have access to the data any time.
- It is not necessary to bother with downloading through cables in order to save the measuring data in a computer. You can evaluate the measuring data on your mobile device, and you are able to send even in the form of a report to the desired location via e-mail. You can observe the date on your computer after opening your user account.
- If you are not certain about the reason of the problem on the basis of the measurements, then you can ask help directly from us through the application in order to identify the possible reasons of faults.
- Can be used at pressurized dairies also. (For more information in chapter 5.1. "Creating a dairy")
- Regularly improved and updated software.
- Long battery life.
- Convenient design, low mass and size, you can put the instrument even in your pocket.

2. Safety precautions

- Never forget that animals could behave unpredictably when people stay close to them.
- Make sure that no injury is caused to yourself or to other people when using needle for the measurement.
- Be aware of the risk of slipping when making measures while standing on wet or dirty floor.
- Keep the instrument at level above the measuring points as much as possible, so that liquid could not get into the sensor of the instrument. The warranty does not cover faults caused by liquid in the sensor.
- Electrostatic charge or discharge may cause fault in the equipment. People having no proper training in this respect should not be allowed to open the case of the DPT instrument.
- Use the instrument exclusively with safety neck strap, which breaks away in case of loading.

3. DPT measuring equipment

3.1. Hardware specifications

Operating temperature:	5-55 °C
Measuring range:	±100 kPa
Measuring accuracy:	± 0.1 kPa, ±4 ms
Sampling rate:	250 measurement/sec
Calibration:	No calibration of the instrument is necessary before the measurement
Power supply:	Lithium ion battery 930 mAh, 3.7V
Charging:	Through USB B connector, with 5V-1A charger
Communication link:	Bluetooth 4.0 (BLE)
Bluetooth identification of the equipment:	Dairy Tester
Protection class:	IP54

3.2. Connecting points and user interface of the DPT measuring equipment



3.3. Declaration of conformance

It is declared that the measuring instrument Dairy Pulsator Tester manufactured by Milkingo Ltd. complies with the following directives:

- Trade name: Dairy Pulsator Tester
- Model: DPT01
- Manufacturer: Milkingo Ltd.

FCC (USA)

Part 15C:2015 + MPE FCC 1.1307 RF Exposure (Bluetooth)

Part 15C:2015 + MPE FCC 1.1307 RF Exposure (802.15.4)

IC (Canada)

RSS-102 (MPE) and RSS-247 (Bluetooth)

RSS-102 (MPE) and RSS-247 (IEEE 802.15.4)

ETSI/CE (Europe)

EN 300 328 V2.1.1 (Bluetooth)

EN 300 328 V2.1.1 (802.15.4)

EN 62479:2010 (MPE)

Draft EN 301 489-1 V2.2.0 (2017-03)

Draft EN 301 489-1 V3.2.0 (2017-03)

EN 55024:2010 + A1:2015

EN 55032:2015 + AC:2016-07

EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013

Japan MIC

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3.4. Contents of the DPT measuring equipment package



- Dairy Pulsator Tester instrument
- Artificial teat plugs having size according to ISO standard
- Silicone hose with filter
- Silicon hose connector with T fitting
- Instrument neck strap with safety buckle
- Carrying case with foam insert

3.5. Switching on the measuring equipment

The equipment can be switched on by pressing the button **POWER** once. A flashing blue LED at the **Bluetooth** icon indicates that the equipment is on and ready for coupling. The equipment can be switched off by pressing the button again, upon which the blue LED stops flashing. The flashing of blue LED also ceases, as soon as the Bluetooth data link is established.

IMPORTANT! The equipment would not switch off automatically, so it has to be switched off after use.

3.6. Charging the measuring equipment

Connect the equipment to the USB B charging cable. The chargers of many telephones are suitable for charging the equipment. Check the charging voltage before use on the name plate of the charger. 5 V charging voltage is necessary for charging the DPT measuring equipment, and the current shall be at least 1A.

A red LED designated Chrg (CHARGE) starts to light upon connecting the equipment that indicates that the charging cycle has started. The full charging could take 6-8 hours, and the charging process can be interrupted any time. The completion of the charging cycle is indicated by LED going off.

NOTE: The DPT package does not contain charger in order that the load on the environment could be mitigated and that the price of the product could be kept low. You can order a charger from our web shop if you need one.

4. DPT application

4.1. Installation

Find the DPT application in the Google Play Store or App Store, and press the installation button. For exact match please use the keyword: **dairy pulsator tester**




<https://play.google.com/store/apps/details?id=hu.codevision.pulsatortester&hl=en>

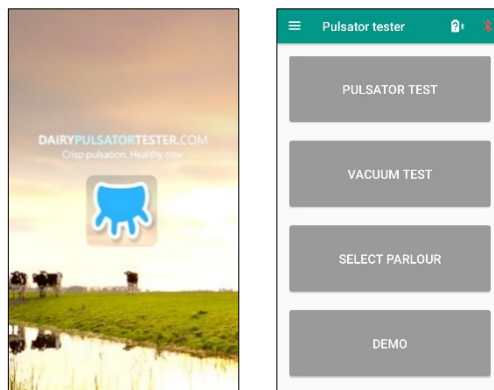


<https://apps.apple.com/hu/app/dairy-pulsator-tester/id1491310704?l=hu>

4.2. First use, initial steps

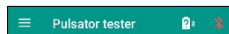



You can start the application by pressing the icon  on the device after a successful installation. The screen image shown below will appear when you first enter the application. In this case the application is in *DEMO* mode.



Log in screen

The following icons are on the header.




You can access the menu by pressing the icon  on the left side. The two icons at the right show whether the measuring equipment is connected, and they provide information about the charging status

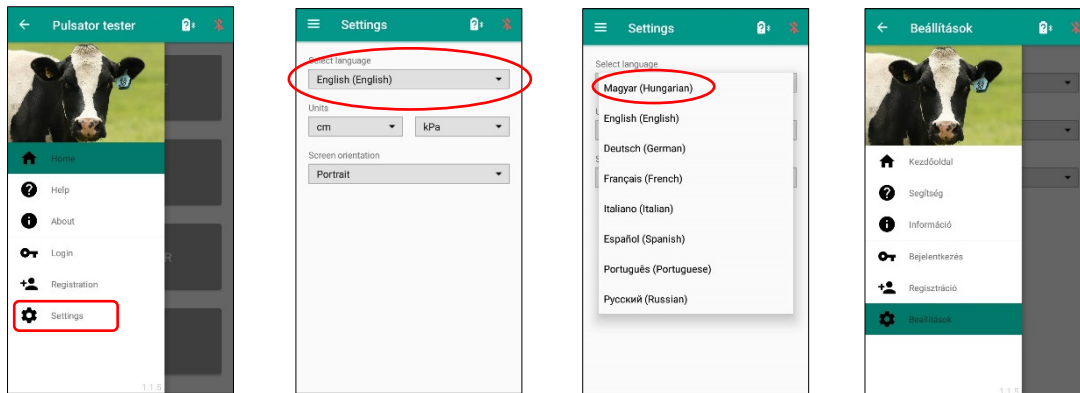


For more information see the chapter 4.5. "Connecting the DPT measuring equipment through Bluetooth link".

The system uses the English language by default. If you wish to use the program with another language, then the language can be set according to the following procedure.

Access the left menu bar by pressing the icon .

Select the menu item **Settings**, then the screen shown below will appear. Open the **Select language** drop-down menu and select the desired language, e.g. the Hungarian. The screen shown below The **Menu** will appear already in the Hungarian language after selecting the language and pressing the icon



Setting the language

4.3. DEMO mode

You can watch a video after pressing the button **DEMO**, which provides information about the DPT system and its operation.

DEMO: internet link is necessary in order to have access to the video.


A dairy has to be selected first in order to have access to the other functions of **BEMUTATÓ** (DEMO) mode. Press the button **SELECT PARLOUR** and select Demo parlour.

Previously uploaded measurements can be viewed by pressing the buttons **PULSATOR TEST** and **VACUUM TEST**. More information on the measurements are available under the chapter 5.4. "Process of the pulsator test measurement" and 5.5. "Process of vacuum test measurement".

NOTE: In **DEMO** mode it is not possible to perform measurements or to connect DPT measuring device.

4.4. Registration

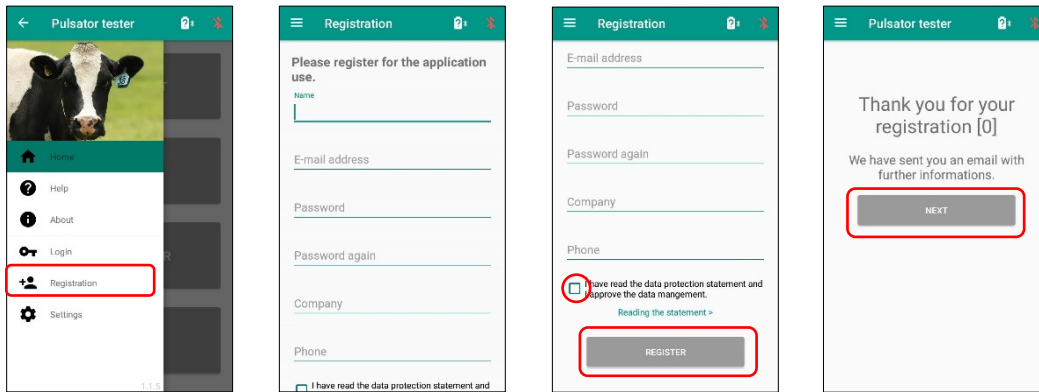
In order to be able to access all the functions of the DPT application and to connect DPT measuring device it is necessary to register the program, during the process of which You create your own user account also.

Internet link is necessary for making the registration. Establish an internet link, press the icon  and select the menu item **Registration**. Enter your data through the shown interface, read and accept the data protection statement, then press the button **REGISTRATION**.

Log in to your user account corresponding to the specified e-mail address, then click on the link given in the received e-mail message to confirm that you are the one who made the registration.

By this procedure you have successfully registered in the DPT system. Now you are ready to make connection to the DPT measuring device and to carry out measurements.

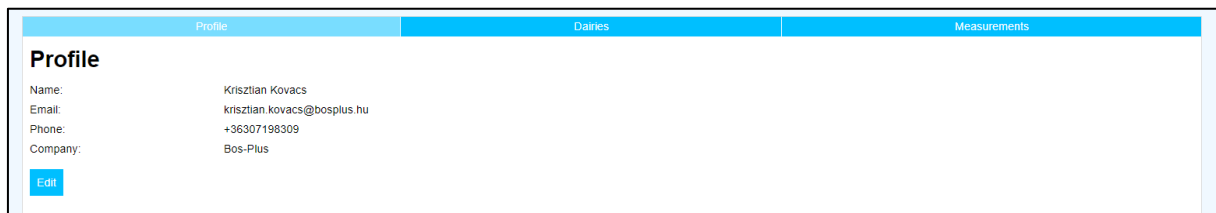
NOTE: it could take a while until the account is activated after registration.



Registration and creating a user account

Your account will be accessible also through the internet, if you open the page. You can log in with your data specified during the registration. Then you can edit your data after clicking on the profile tab and pressing the button **EDIT**. Press the button **SAVE** to save the changes.

You can manage your measurements and the dairies too on the same interface. More information is available in chapters 5.1. "Creating a dairy" and 5.10. "Uploading the measuring report from the user account".

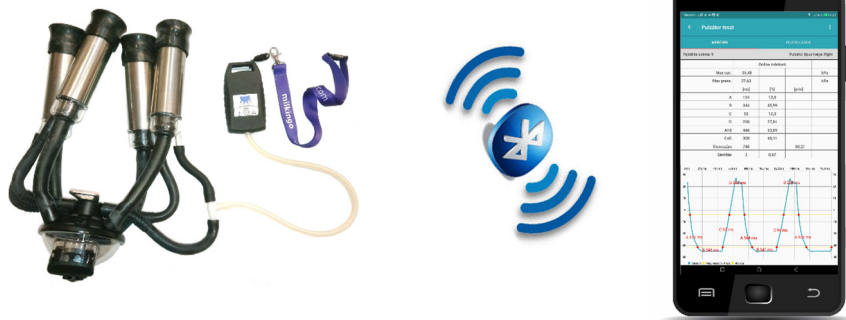


4.5. Connecting the DPT measuring equipment through Bluetooth link

Switch on the DPT measuring equipment. As soon as the equipment is on and is ready for coupling, a blue LED starts to flash above the Bluetooth icon. If this would not happen, then refer to the chapter 6. "Maintenance and troubleshooting" in order to resolve the problem.

Activate the possibility of Bluetooth link on the device running the application in the Android operating system.


IMPORTANT! The coupling is NOT made in the Android operating system, because the equipment does not use standard Bluetooth link! If you have enabled the Bluetooth communication on the device, then no further operation is necessary in the Android system. You have to carry out further steps of the coupling with the application.



Bluetooth link among the elements of the DPT system

Start the  DPT application.

Register the DPT application before coupling the Bluetooth equipment. More information is available about registration under the menu item [Registration](#). Registration is necessary only once. Use your user data specified during registration. Make sure that you are logged in to your user account.

Press icon  and select menu item *Settings*, and then press button *DEVICE CONNECT* and wait until the DPT measuring equipment appears in the list. The list shows all the accessible Bluetooth equipment. The Bluetooth identification of the DPT equipment: **Dairy Tester**.

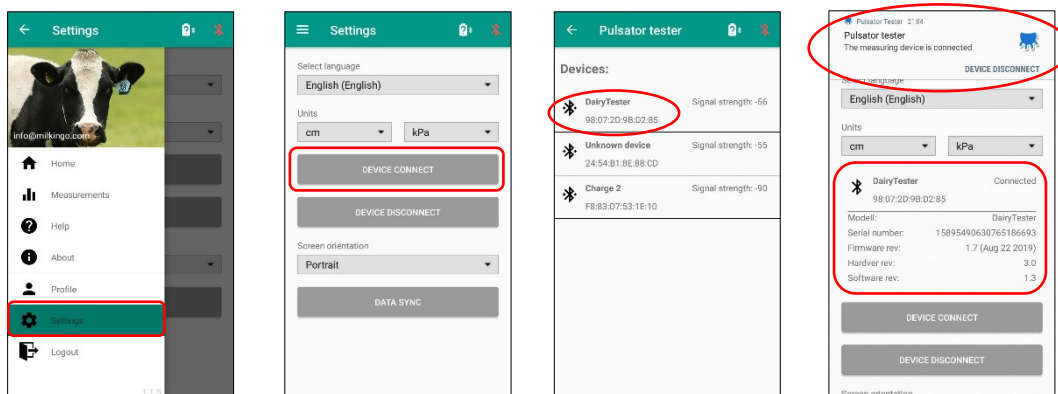
NOTE! Depending on the device the search process could last up to 20-40 seconds!

Select the *DairyTester* from the list.

Now the connected equipment and its identifications are shown in the Setting page. At the same time the system provides the information that the DPT tester is connected to our equipment in a message opening from the upper information zone. The connected status will be indicated by an icon at the upper left of the information zone after the message has disappeared.

If you return to the starting page, then the icon at the right upper corner also indicates that we are connected to the DPT measuring instrument, and we can check the charging status of the battery of the equipment also.

NOTE! Remain within the action radius of Bluetooth (8-12 meters), otherwise the link might break.



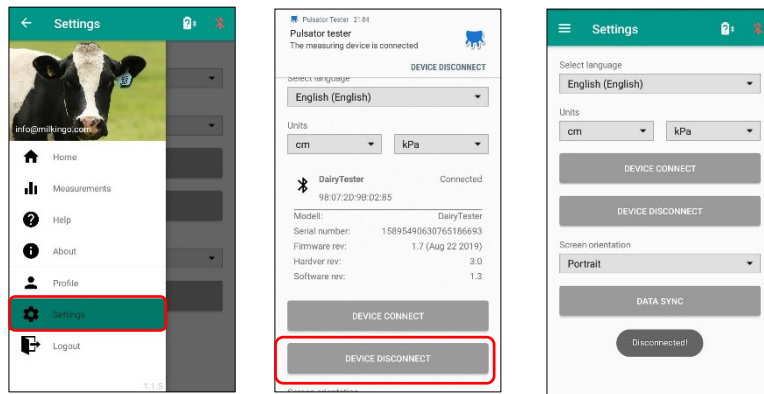
Establishing the Bluetooth link

4.6. Ceasing the Bluetooth data link

The data link can be ceased in the modes described below:

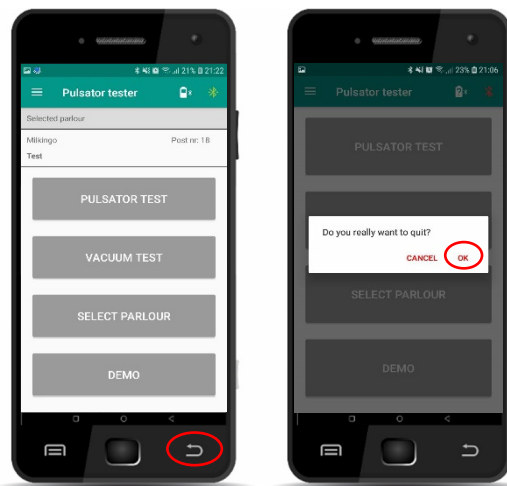
a) The Bluetooth data link with the DPT measuring instrument may be interrupted by pressing the button **DEVICE DISCONNECT** in the menu item **Settings**. Now the data link ceases to exist, and the LED of the Bluetooth link on the DPT measuring equipment starts to flash, thus indicating that it is ready to make coupling again.

If you wish to use the DPT system again later, then you shall carry out the coupling procedure again. More information can be found about that in the chapter 4.5. "Connecting the DPT measuring equipment through Bluetooth link".



Disconnecting the Bluetooth link

b) If you wish to terminate the data link for concluding the use of DPT system, then the most convenient mode to do this is to press the back button of the device repeatedly until you get to the starting screen. If you press the back arrow again, then the program asks whether you really want to exit. Press the OK button. With this method you have closed the DPT application and disconnected the Bluetooth link from the measuring equipment at the same time.



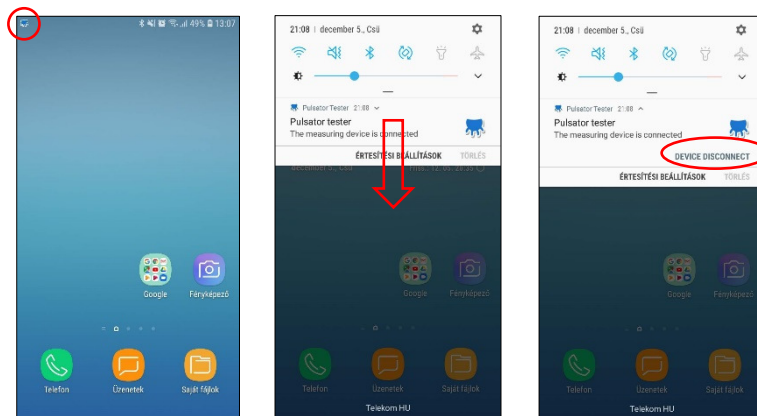
Exit from the application

If you exit in the mode described above, and you start the application again later, then the data link will be automatically restored with the DPT measuring equipment that was coupled earlier, if it is turned on and is located within an accessible distance.

c). If you put the application among the programs running in the background, then the program will still run although the program seems to be closed, and the coupled device remains in data link too. In this case you might have the impression that the DPT device is turned off. Actually, the DPT measuring instruments consume more energy because of the existing data link, and therefore it is exhausted more quickly. In order to be able to avoid such situation an icon of the DPT application at the top information zone of your mobile device will indicate that the system is still maintains the link.

In this case the most convenient way of disconnecting the Bluetooth link is as described below, if you do not plan to make further measurements.

Open the information panel of your smart equipment, then display the function **DEVICE DISCONNECT** by sweeping downwards in the message row of the PulsatorTester. Press the button. Now the data link is interrupted, and the DPT measuring instrument may be switch off as described above.



Disconnecting the equipment with the use of messages

This function is accessible any time during the use.

5. Using the DPT system

From here on we consider the DPT measuring instrument and the application as parts of a single system, assuming that the system is ready to operate, it is registered and the coupling has been made.

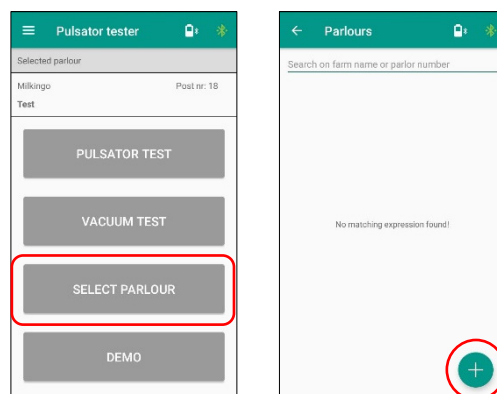
5.1. Creating a dairy

In order to be able to perform measurements it is required to create a virtual dairy in the system first. This is important, because the measured data would be associated with this dairy. The created dairy contains lots of useful information about the dairy. These pieces of information are also included in the measuring reports. If you share the report with someone or ask advice from experts, then you can support the establishment of accurate diagnosis with useful information.

If you are an expert dealing with dairies who has to take measurements at a number of locations, then the useful information and data necessary for your work are conveniently collected at a single location in a structured and retrievable manner.

Also, the DPT system creates measuring points in numbers corresponding to the set dairy, which will be used during the measurement.

For creating a dairy, you need to press the **SELECT PARLOUR** button on the main page of the application. The list of dairies will be empty on the shown page when you first use the device. Press the mark „+“ at the right lower page to be able to create a new dairy.



Creating a parlour

Enter the data of the parlour in the appearing page corresponding to the displayed fields.

Name: Enter the name of premises, farm or dairy, which is suitable for identification.

Number of posts: enter the number of milking stalls

Brand: manufacturer of milking machine, type, etc.

Type: select from the drop-down list according to the design of the milking stalls. The following options are available.

- Parallel
- Bucket
- Swing-over
- Rotary
- Herringbone

Milkline type: select from the drop-down list. The following options are available.

- Lower
- Upper

Pulsator type: select from the drop-down list. The following options are available.

- Pneumatic
- Hydro
- Electrical

Pulsator brand: enter the type of pulsator. (Manufacturer, type designation)

Double pulsation pipe length: specify the average length of hoses (cm).

Liner code: enter the design of the used teat cup liner. Select from the drop-down list. The following options are available.

- Rectangle
- Triangle
- Round

Liner type: Specify the manufacturer and type designation by which it can be identified unambiguously.

Pulsation distributor type: Identify how the double pulsator hose is branched at the collector

Operation type: select it from the drop-down list. The following options are available.

- Normal
- Dynamic

NOTE: In pressurized dairies the pressure at the side of the teat cup connecting to the pulsator may vary not just between the maximum vacuum level and the atmospheric pressure, but in excess of the atmospheric pressure, producing an overpressure.

Pressure cut threshold: Use this option of setting, if you wish a phase calculation and evaluation not in line with the standard, specifying the pressure level where the phases are to be separated from each other.

NOTE: This option is offered only if you have selected the Dynamic option for vacuum type.

Press the button **CREATE** after entering the data. Now the application has created the dairy and it returns to the list of dairies. The newly created "Test" dairy can be seen now.

Entering the data of dairy

Dairy may also be created at the internet interface of your user account. For this purpose open the page <http://dpt.milkingo.com/login> and log in with your user data.

Click on the tag **Dairies**, then press the button **New dairy**.

Fill in the empty fields as described above, then press the button **Save**. Now a new dairy is created.

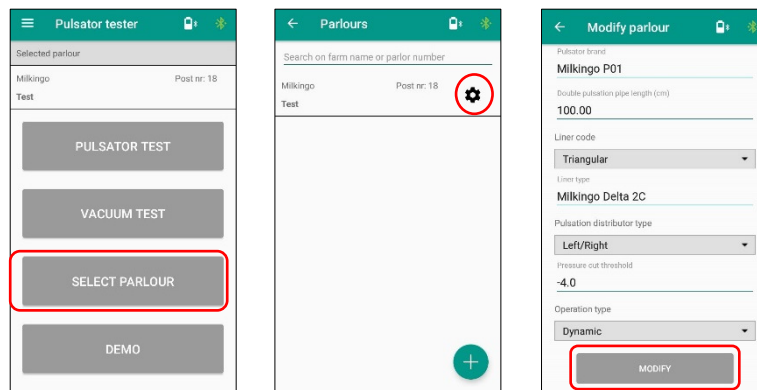
The screenshot shows the 'Dairies' profile page with three tabs: Profile, Dairies, and Measurements. Under the 'Dairies' tab, there is a 'New dairy' button highlighted with a red box. Below it, various parameters are listed, such as 'Parlor number: 18', 'Puls. kind: BP1', 'Dairy type: Normal', 'Milk pipe type: Alsó', 'Puls. type: Elektromos', and 'Vacuum type: Normál'.

This screenshot shows the 'Dairies' form with various input fields and dropdown menus. The 'Mentés' (Save) button is highlighted with a red box. Other buttons like 'Cancel' are also visible. The form includes fields for Name, Number of parlors, Formation, Puls. kind, Puls. type, Dairy type, Milk pipe, Vacuum type, and Pulsator cut threshold.

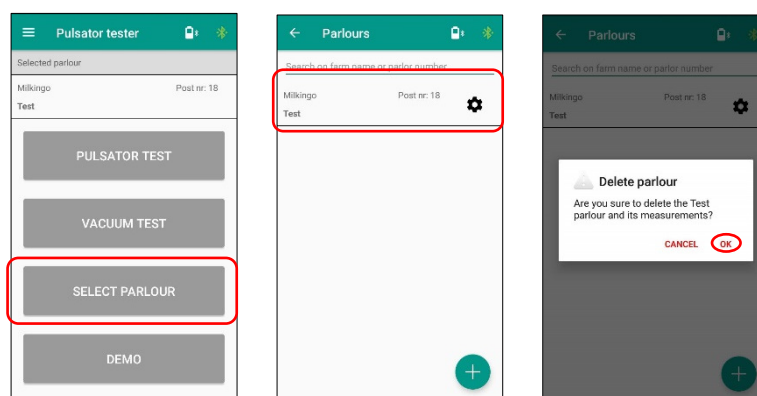
Creating a dairy at the internet interface of the user account

5.2. Modification, deleting parlour

Select the parlour to be modified from the list, then press the gear symbol next to the selected dairy. Now the dairy parameters listed in the above chapter appear. Enter the values to be modified, then press the button **MODIFY**.



Modifying the selected dairy



Deleting a parlour

If you wish to delete the existing dairy from the list, then keep the given dairy button depressed until a prompt appears asking to confirm the deletion. Then select the OK button, if you really want to delete the dairy.

5.3. Connecting to the milking machine

In order to be able to perform a pulsator test it is necessary to connect the DPT measuring equipment to the appropriate points of the milking machine. All the accessories necessary for this purpose are available in the Milkingo DPT set.

Connect the free end of the silicon pipe having T fitting to the pneumatic connector of the measuring instrument and connect the end with T fitting between the short milk line and the milking cup as shown in the figure below.



Connecting the DPT measuring instrument for measuring with pulsator

The measurement can be made during the milking as well as without milking. In the latter case use the artificial teat plugs from the set for closing the cups (not shown in the image).

Connection may be established to a number of points of the milking machine/system in case of vacuum test, if the system has the appropriate locations for connecting.

The value of vacuum may be measured directly in the cup lining or in the milk pipe. This could be done by penetrating the cup lining or the milk pipe with a needle connected to the measuring instrument.

The liquid filter included in the set shall be used if the measurement is made in an environment where liquid could be present. The filter is capable of holding a small amount of liquid, so that the liquid could not get into the instrument. Therefore, the condition of the filter shall be checked on a regular basis. Replace the dirty filter before performing the subsequent measurement.

IMPORTANT!

- Never forget that animals can behave unpredictably when people stay close to them.
- If you perform measurement during milking, then use a longer silicon pipe, or fix the instrument to the cup, so that you can keep a safe distance from the animal.
- If you use needle for the measurement, the take care not to cause injury to yourself or to other people.
- Be aware of the risk of slipping when making measures while standing on wet or dirty floor.
- Keep the instrument at level above the measuring points as much as possible, so that liquid could not get into the sensor of the instrument. The warranty does not cover faults caused by liquid in the sensor.
- Use the instrument exclusively with safety neck strap, which breaks away in case of loading

5.4. Process of the pulsator test measurement

With this measuring procedure it is possible to check the operation of the pulsator as the essential component of the milking machines at each milking stall of the dairy with the phases corresponding to the ISO standard.

Connect the DPT measuring instrument to the desired measuring point. More information is available in the chapter 5.3. "Connecting to the milking machine".

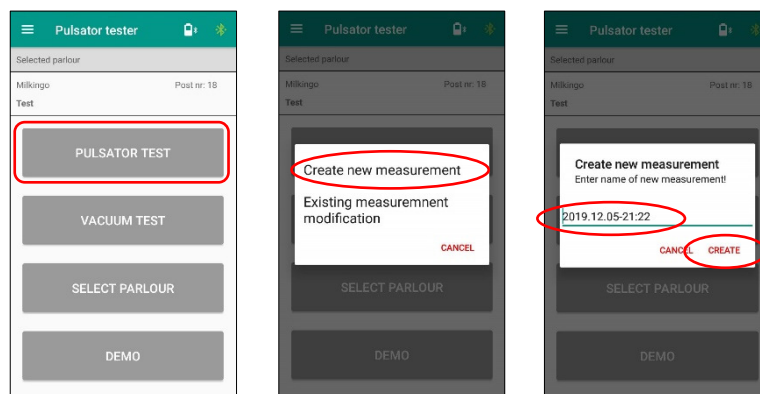
Make sure also that the DPT measuring unit has a data link to your smart equipment and that the DPT application was started. More information is available in the chapter 4.5. "Connecting the DPT measuring equipment through Bluetooth link".

The pulsator test may be started by pressing the button **PULSATOR TEST**. A window appears after pressing the button, in which you may select the possibility of starting new measurement or resume the existing one.

In this case select the option **Create new measurement**. If you chose the option of modifying the Existing measurement, then you can find a previous measurement, which can be resumed or modified.

An identification name shall be assigned to a new measurement, so that it could be identified later. The system automatically names the measurement on the basis of the actual date and time. You may choose to modify the name or assign an entirely different name.

After entering the name of the measurement press the button **CREATE**.



Creating a pulsator test

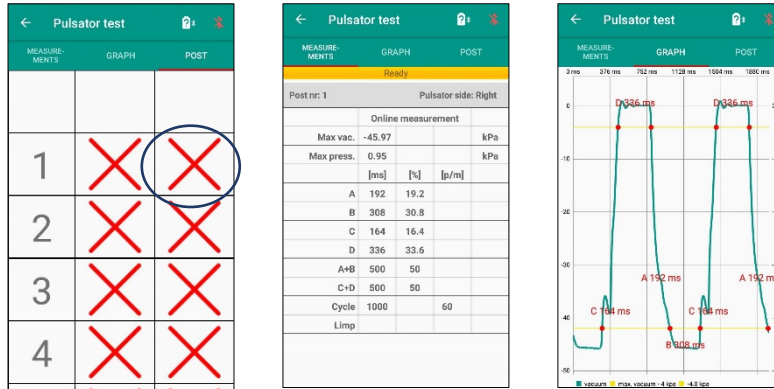
Now you are ready to start the measurement. The measuring points appear on the display of your mobile equipment marked with red X. The measuring points are organised on the basis of the number of milking stalls and corresponding to the allocation of the two sides of the pulsator hose according to the collector.

Connect the measuring equipment to the milking unit before starting the measurement. More information is available in the chapter 5.3. "Connecting to the milking machine".

Start the measurement by pressing the X corresponding to the actual measuring point.

Depending on the resolution and orientation of your equipment, a tabular and/or graphic interface appears as shown below, where the changing values or the graph shows that a measurement is in progress. The data traffic is indicated by the flashing blue LED on the DPT measuring equipment.

You may alternate between the diagram and the table by shifting the screen to right or left. In case of large displays the screen images are provided with tabs *MEASUREMENTS* and *POST*, which could be pressed to alternate the pages.

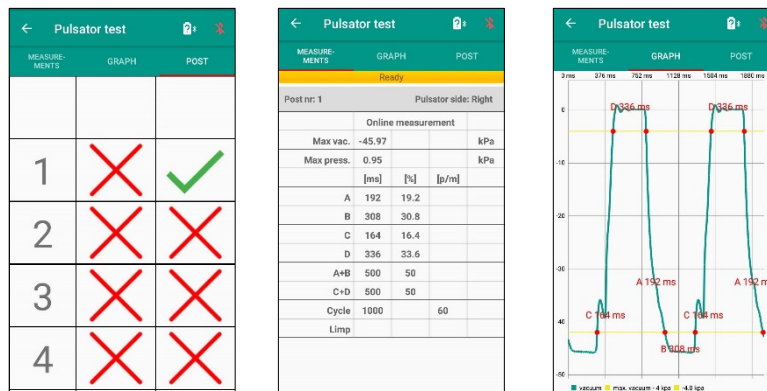


Starting the pulsator test, and images during measurement

The measurement is maintained until a stable result is obtained that can be evaluated. A green check mark appears instead of the red X at the measuring points (*POST*) when the measurement stops.

If the measurement is uncertain (the pulsation is not stable) and it cannot be evaluated, then the measurement will keep on running until we exit. If the measuring point is still marked with red X in such a case, then we can exit the measurement by pressing the back arrow at the left upper corner for returning to the starting page.

You can monitor the measured results continuously during measurement. More information is available on the measured parameters in the chapter 5.6. "Evaluating the measuring results". If you observe



Successful measurement and the measured results

uncertainty in the measurement or see some unusual value, then you can repeat the measurement by pressing the green check mark belonging to the measuring point.

When a measurement is considered successful, then you can proceed to the next measuring point. Now connect the measuring device to the subsequent measuring point and repeat the procedure described above.

NOTE! The pulsator test measurement can be made during milking, as well as when no milking takes place with the use of cup plug. When making the measurement during milking, you have to be careful in the close vicinity of animals because of the risks presented by wet and slippery environment. More information is available the chapter 2. "Safety precautions".

5.5. Process of vacuum test measurement

With this measuring procedure it is possible check the vacuum level at various points of the milking machine.

Connect the DPT measuring instrument to the desired measuring point. More information is available in the chapter 5.3. "Connecting to the milking machine".

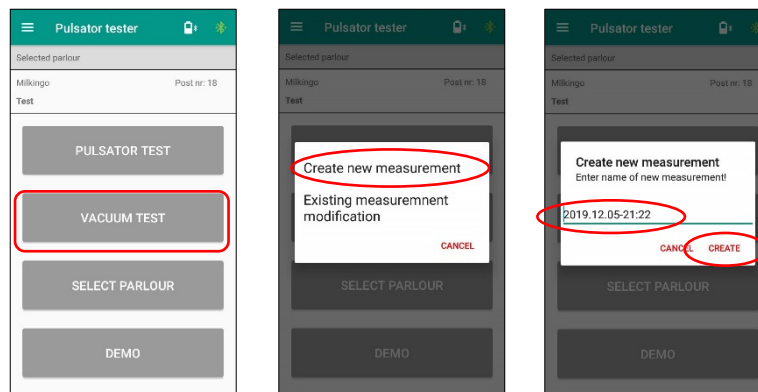
Also, you have to make sure that the DPT measuring unit has a data link to your smart equipment and that the DPT application has been started. More information is available about that in the chapter 4.5. "Connecting the DPT measuring equipment through Bluetooth link".

Vacuum test may be initiated by pressing the button **VACUUM TEST**. In the window appearing after pressing the button you can chose whether new measurement is to be made or an existing one is to be resumed.

Select the option **Creating new measurement** in this case. If you chose the option of modifying the existing measurement, then you will be able to find a previous measurement and you can resume or modify this measurement.

An identification name has to be assigned to a new measurement, so that it could be identified later. The system names the measurement automatically on the basis of the actual date and time. You may choose to modify the name or assign an entirely different name.

Press the button **CREATE** after giving the name of measurement.

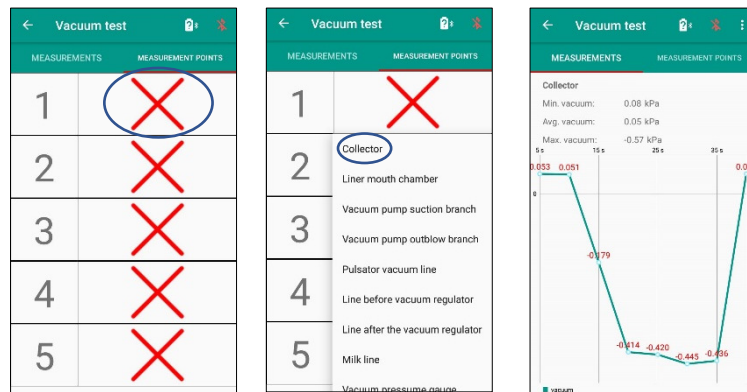


Creating a vacuum test

Then the measuring points appear according to the milking stalls of the selected dairy. Start the measurement by pressing the X corresponding to the milking stall to be measured. Before starting the measurement the system prompts to specify the type of measuring point.

The following measuring points may be selected, which will appear at the evaluation:

- milking collector
- upper chamber of cup lining
- suction branch of vacuum pump
- delivery branch of vacuum pump
- pulsator vacuum pipe
- pipe in front of the vacuum controller
- pipe after the vacuum controller
- various points of milk pipe
- vacuum pressure gauge



Starting the vacuum measurement at the collector, and vacuum fluctuation measured in the milking collector

The results of the various measurements are logged and recorded by the Milkingo DPT application with 5 sec resolution during the measuring period.

5.6. Evaluating the measuring results

The measurements performed by the user are logged in the Milkingo DPT application, and are recorded in our server. In this way you can access the results of earlier measurements for a subsequent evaluation, and then you can make comparisons on this basis. If the same measuring equipment is used by more than one users, then such users can use common registration login identification on various smart tools, so that they have access to the logged results of their respective measurements. It is also possible for the user to have more smart devices, e.g. a mobile phone and a tablet machine, which could be used alternately without the risk of data loss. Many mobile phone users encountered data loss after replacing the device, but this could not be a problem in case of Milkingo DPT, because the database can be synchronized after logging in to the user account with the new device.

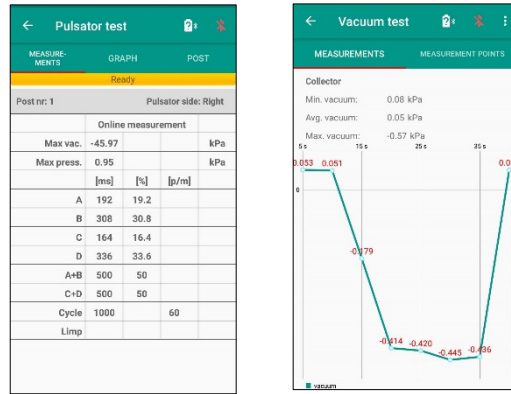
The evaluation of the measurements is easy with the use of the DPT system, because the system automatically performs the evaluation according to ISO, and in addition to that a display of graphs is available. The DPT system calculates the following parameters.

In case of pulsator test measurement:

- Maximum vacuum (kPa)
- Maximum pressure (kPa)
- „A, B, C, D” phases (ms, %)
- „A+B” (ms, %)
- „C+D” (ms, %)
- Pulse rate (p/m)
- Limping (ms, %)

In case of vacuum test measurement:

- Maximum vacuum
- Minimum vacuum
- Average vacuum



Evaluated parameters in case of pulsator test and in case of vacuum test

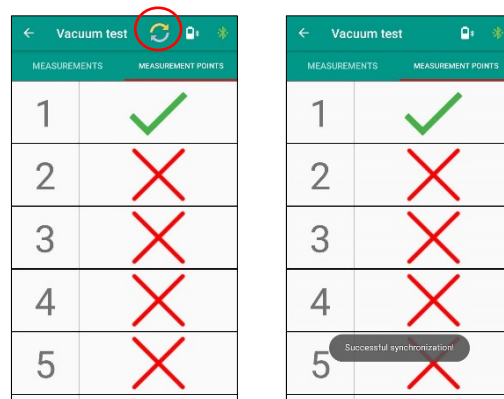
5.7. Synchronizing the measuring data

The Milkingo DPT system synchronizes the data you measured with your user account in order that:


- the measuring results are accessible anywhere and any time
- the measuring results are accessible at any device
- no loss of data occurs in case of replacing or breakdown of the device
- there is no need for downloading through cable, or for awkward operations
- the measuring reports could be shared easily with other people
- etc.

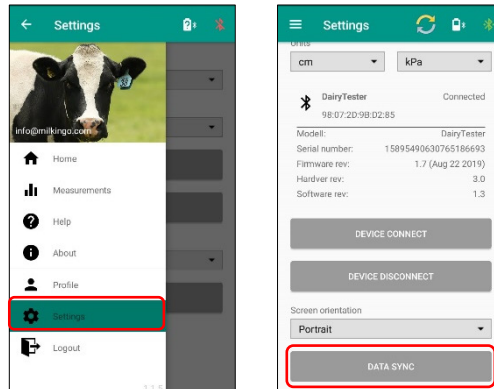
The methods described below can be used for synchronizing the measuring results:

If a successful measurement is completed, an icon  showing a double arrow appears in the header of the DPT application, by pressing of which the measured results are synchronized with your user account.



Synchronizing the new measuring results


If you wish to synchronize measurements on your device, which you measured earlier with other smart equipment, then this can be done as follows: open the application menu  and press the **Settings** button. On the setting page press the button **SYNC DATA**. With this procedure all the results of measurements you ever made and stored in your user account will be available on the actually used smart equipment too.



Synchronizing the measuring results from the user account to the phone

5.8. Viewing the measuring results in the application

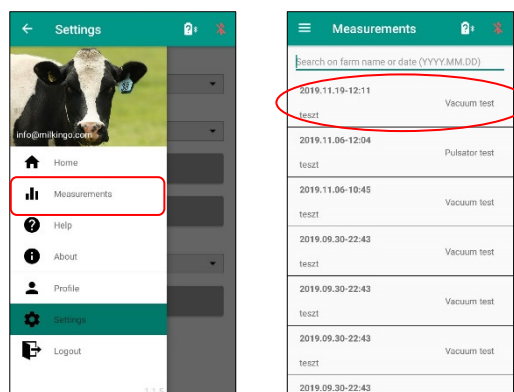
Under the menu item **Measurements** in the Milkingo DPT application you may find all your earlier pulsation and vacuum test measurements based on date and customer name, which are displayed by the system in a simple way numerically or with graphs alike just like in real time of the measurement.

Start the application and open the menu by pressing the icon . Select the menu item **Measurements**.

The shown list contains the measurements already completed. The list includes the measurement in the sequenced of time, but you may search among the measurements with the help of the field at the top row. Search is possible on the following categories:

- date
- name of the measurement
- dairy

The type of measurement appears at the right side of the list.

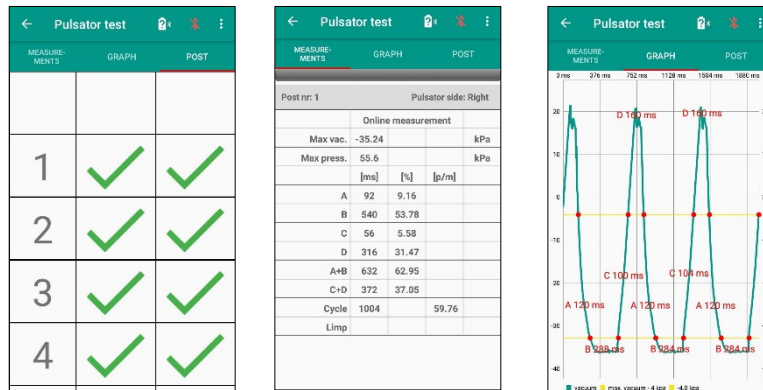


Selecting measuring result from the list

If the selected measurement is a type *Pulsator test*, then the following screen images appear.

First the measuring points can be seen corresponding to the architecture of the dairy. Press the green check mark indicating the milking stall, the measuring results of which you want to see. Now the result belonging to the desired measurement appears. The results could be located on a number of pages depending on the size of the screen. It is possible to alternate the pages by sweeping the screen laterally or by pressing the tags on the upper part. The following screens are available.

- Evaluation with table (ISO parameters)
- Evaluation with diagram
- Measuring points

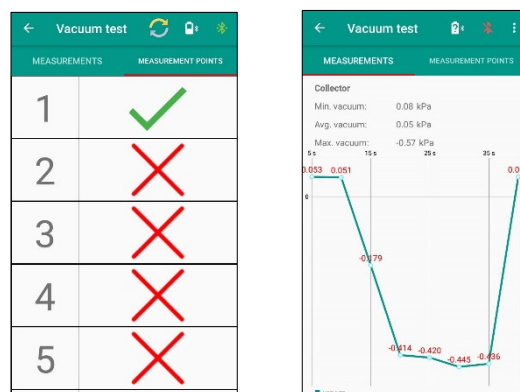


Displaying the measuring results (Pulsator test)

The following screens appear if a *Vacuum test* measurement is selected.

The measurements appear here also with the system identified during the measurement. A green check mark indicates that measurement belongs to the milking stall that can be evaluated.

The data belonging to the measurement will appear in diagram as well as in numerical form when the check mark is depressed.




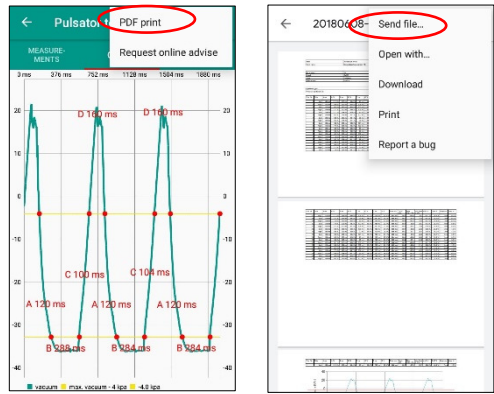
Displaying the measuring results (Vacuum test)

5.9. Preparing measuring report with the help of the application

Start the application and press the icon  to open the menu. Select the measurement menu item.

The shown list contains the measurements already completed. Select the measurement about which you want to prepare a report. More information about the selection of measuring results is available in the chapter 5.8. "Viewing the measuring results in the application".

In the appearing page select the option PDF print after pressing the icon  at the right top corner. The measuring report appears now, which contains the summary of measuring results in tabular form and with graphical display.



Preparing and forwarding measuring report

Besides the possibility of viewing the report the following options are available. You may send the report via e-mail or can share it with the help of any other message-sending application installed on your smart device, and it can be downloaded to your mobile device and you can even print it. A sample report is included in the annexes in the chapter 8.2.

NOTE: The measuring report is generated in the server of the DPT system, therefore an internet link is necessary for your smart device in order that it could appear also in your device. A further criterion is that the desired measurement is synchronized with the server. More information is available about the synchronization in the chapter 5.7. "Synchronizing the measuring data".

5.10. Uploading the measuring report from the user account

Open the page <http://dpt.milkingo.com/login> and log in to your user account with the data specified during the registration process.

Click on the tab **Measurements** in the appearing page. Now a list is shown about the measurements. You can select from the measurements in the search field located at the top of the list.

Select the desired measurement and click on the document icon at the end of the row. Now the report is downloaded to your computer.

Profile	Daines	Measurements
Measurements		
Search		
2018.10.26-15:04	- teszt (47.1689938, 20.182794)	
2018.10.26-14:48	- teszt (47.1689938, 20.182794)	
2018.10.02-17:18	- teszt (47.1689256, 20.1828476)	
2018.10.02-13:12	- teszt (47.1689066, 20.1828718)	
2018.10.02-11:40	- teszt (47.168925, 20.1828309)	
2018.10.01-15:44	- teszt (47.1689183, 20.1828659)	
2018.10.01-14:25	- teszt (47.1689135, 20.1828511)	
2018.10.01-11:51	- teszt (47.1689265, 20.1828609)	
2018.09.28-12:40	- teszt (47.1689083, 20.1828203)	
2018.09.28-11:23	- teszt (47.1689264, 20.1828665)	
2018.09.27-20:09	- teszt (47.1689266, 20.1828608)	
2018.09.27-19:45	- teszt (47.1689266, 20.1828608)	
2018.09.27-19:43	- teszt (47.1689266, 20.1828608)	
2018.09.27-19:35	- teszt (47.1689266, 20.1828608)	
2018.07.27-13:32	- teszt (47.1689477, 20.1828523)	
2018.07.25-15:49	- teszt (47.1689477, 20.1828525)	

The report contains the data of dairy as well as the tabular summary of the evaluation of measurements, together with the graphic display of the measuring data. A sample report can be seen among the annexes in the chapter 8.2.

NOTE: If you do not find the desired measurement among the listed measurements, then the reason could be the fact that your device cannot contact the internet and the measurements have not been synchronized with your user account.

Make sure that your device is linked to the internet in some way and synchronize the data. You may read more about that in the chapter 5.7. "Synchronizing the measuring data".


5.11. Asking help in relation to the measuring result

The development staff members have included the possibility of seeking help in the application with the objective that they could provide assistance to the users for resolving the problems revealed during the measurements. In many cases the recognition of some malfunction is relatively easy. But it is not always easy to arrive at conclusions or to find the reason of the fault.

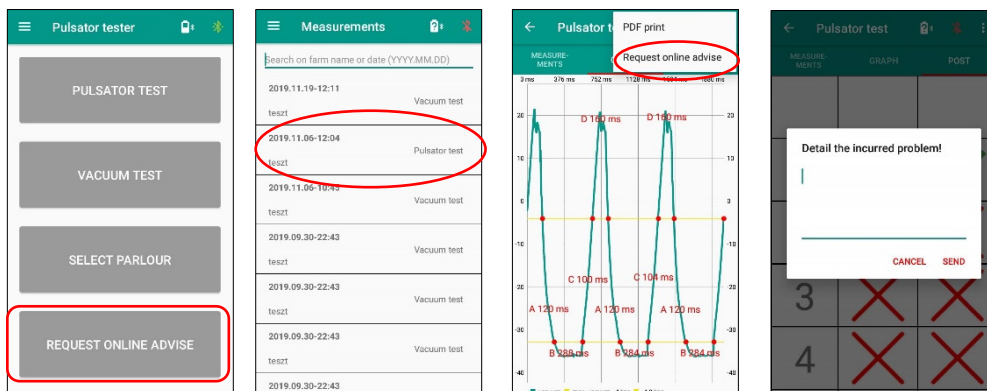
Our company has substantial experience in maintenance and optimization of milking systems. We were able to accomplish improvement many times in the appropriate operation of milking technology, and therefore in the improvement of udder health by eliminating the faults of the operated system, thus ensuring an operation with optimum settings.

The report prepared about the measurement can be transferred to the desired people easily with the application, i.e. to us, and this is the feature of the DPT system which makes the seeking of help easy. This can be done as follows.

Open the list of measurements. Two options are available to reach this, either by the earlier described way in chapter 5.8. "Viewing the measuring results in the application" or by pressing the button **REQUEST ONLINE ADVISE** on the home page.

Select the measurement, in relation to which you would like to get assistance. In the page showing the measuring points open the local menu with the help of the icon  located at the right top corner and press the menu item **Request online advise**. Now a window appears in which you can further clarify the occurring problem by means of text.

Press the button **SEND** after providing the necessary information.



Asking help in relation to an actual measuring result


6. Maintenance and troubleshooting

The DPT measuring instrument is designed in a way, that it does not need special maintenance from the user. However, the use and storage shall be done carefully, so that you could use your device for a long period of time.

- Take care not to allow immersing the device into liquid. The device is not waterproof due to the nature of the measurement. However, it withstands splashing liquid and mild pollution. Remove any dirt from the measuring instrument as soon as possible. Wet or slightly soapy water may be used to remove adhesive dirt.
- Always use filter element during measurements. One filter element is included in the set you bought. You can obtain new filter element to replace worn filter element from an automobile part shop or can order it from our web shop through the link: <https://www.dairypulsatortester.com>
- Keep the measuring equipment in its carrying case when not in use and during transportation.
- If the housing of the device is damaged to an extent that it does not provide protection for the electronic circuitry, then do not use the device any longer, contact us for obtaining replacement parts depending on the damage.

Troubleshooting

Fault phenomenon	Possible reasons	Necessary intervention
The device would not turn on when pressing the POWER button.	The battery is exhausted.	Connect the device to the charger. The red Chrg LED starts to light. Try to switch on the device. If switching on is successful, then the battery was depleted.
I cannot switch off the measuring device.	Measurement is in progress.	Check on your mobile device whether the DPT application is opened among the running applications, and whether any measurement is in progress. If yes, then exit the measurement and close the application.
The application works only in DEMO mode.	Not logged in to your user account.	Make sure that you have registered in the DPT system, and you are logged in to your user account as well. More information is available in the chapter dealing with registration.
Bluetooth link would not establish between the measuring equipment and the mobile equipment.	The Bluetooth function is not enabled on your mobile equipment.	Enable the Bluetooth link in the settings menu of your device. Perform the coupling in the DPT application. More information is available in the chapter 4.5.
	It was connected to another measuring equipment earlier.	Separate the actually connected device and couple it with the desired equipment. More information is available in the chapter dealing with ceasing of Bluetooth link and connecting the DPT measuring equipment through Bluetooth link.
	The DairyTester is not in the list of equipment after pressing the button CONNECT THE EQUIPMENT, although the blue LED of the device is flashing to	In this case exit the application, make sure that the application is closed also in the list of running programs. Then start the application and perform the coupling according to the description in chapter 4.5. Now the equipment has to be included in the list.

	indicate that it is ready for connection.	
My mobile device becomes discharged quickly since I use the DPT system.	Your device is in constant contact with the measuring device.	Make sure that you exited from the DPT application after use, because it might be among the programs running in the background, and in this case the Bluetooth link still exists. This kind of use discharges the battery of your measuring equipment too.
I cannot find my latest measurements among the measurements in my user account.	The measurements are not synchronized with your user account.	Make sure that your device is linked to the internet somehow. Press the icon  to open the menu and press the menu item <i>Settings</i> . On the appearing screen press the button <i>DATA SYNC</i> .

If the above interventions are not successful, and the problem still exists, then contact us at the address info@milkingo.com.

7. Warranty

Our company undertakes 1 year long warranty for the DPT measuring instrument.

It is to be noted, however, that the warranty does not cover faults caused by inappropriate use.

- Damage to device housing because of mechanical effects.
- Liquid gets into the measuring probe.
- Fault caused by using inappropriate charger.

8. Annex

8.1. Frequent faults that can be revealed during the pulsator test measurement

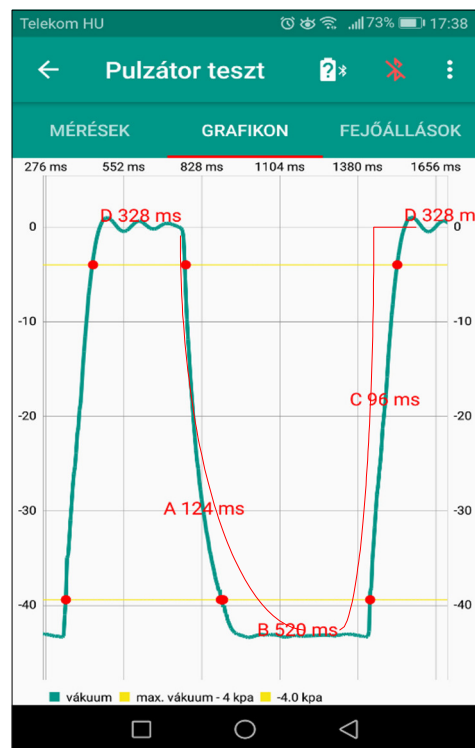
We would like to show the pulsating curves characterizing the most frequent engineering problems that can be revealed during the pulsator test measurement, which could be detected exclusively by measuring with instruments, and not by the traditional "sensory" exploration.

Damaged or cracked double pulsator hose, short pulsator hose

Probably this is the most frequent pulsation fault, the repair of which is the easiest too by the milking staff simply by replacing the hoses, but at the same time its detection is the most difficult. The cracks occur often at hidden locations which cannot be seen, and among the noise conditions of the dairy environment the noise produced by the detrimental air inflow can be heard only if the crack is large. Red lines are used in the figure to mark the deviation of the curve relative to the normal pulsation curve.

Negative effects:

- Shorter B phase, leading to a slower milking due to the slowly building up vacuum and the extended A phase.
- The build-up of atmospheric pressure is faster in C phase, and the resulting excessively long D phase causes the slipping of the teat cup.



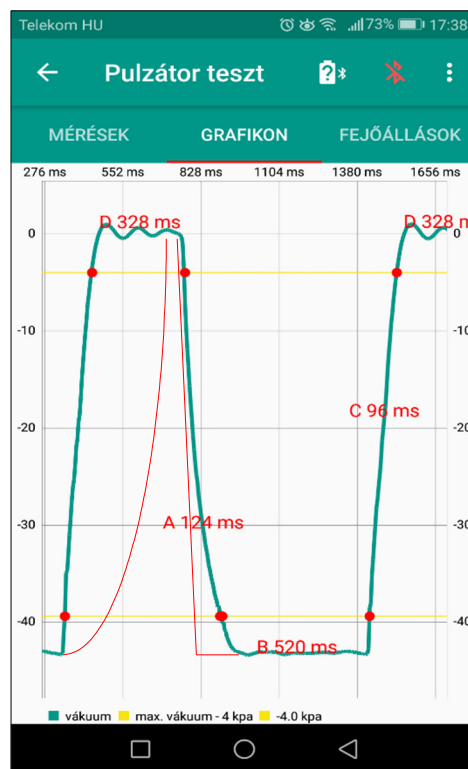
Pulsation curve characterizing a damages pulsator hose

Cracked teat cup liner

If the milking units are provided with PVC or silicon double pulsator hose, then crack can be easily detected visually because of the presence of milk or washing water in the tube. However, it is very difficult to detect it in case of the most frequently used black rubber double pulsator hoses. Red lines are used in the figure to mark the deviation of the curve relative to the normal pulsation curve.

Negative effect:

- B phase extends time of milking due to the faster creation of vacuum in the teat cup liner pulsation space.
- D phase is shortened, so the teat cannot rest during milking, and is exposed to harmful excessive vacuum constantly.
- Leads to "purple" teats by the end of milking which is painfully sensitive when touched.
- Teat inflammation appears at the faulty pulsation side.



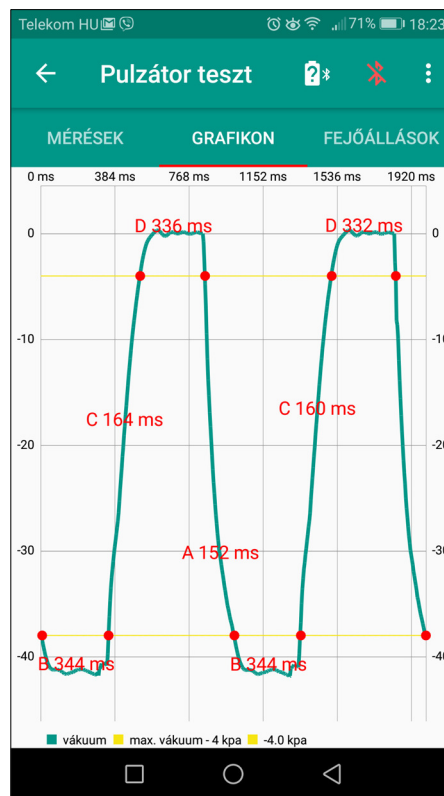
Pulsation curve characterising a damaged teat cup liner

Dirty pulsator vacuum valve

This is practicable undetectable for the milking staff. The efficiency of the pulsator drops significantly.

Negative effects:

- Slowing milking due to the long A phase, which extend relative to the ideal 80-120 ms. Thus the milking time during B phase is reduced.
- Deteriorating udder health condition due the shorted D phase caused by extended C phase.
- Causes teat cup slipping and extra efforts for the milking staff in many cases if it is accompanied by too large pulsation rate.
- The teat cups are kicked off more frequently, the comfort of the cow deteriorates.



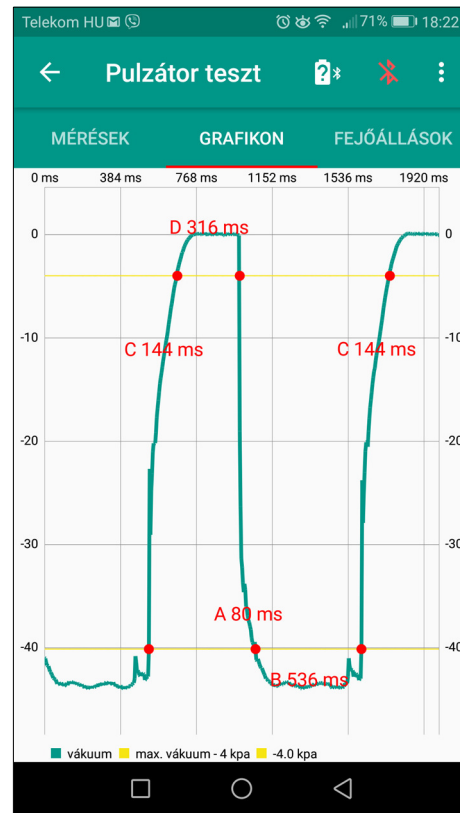
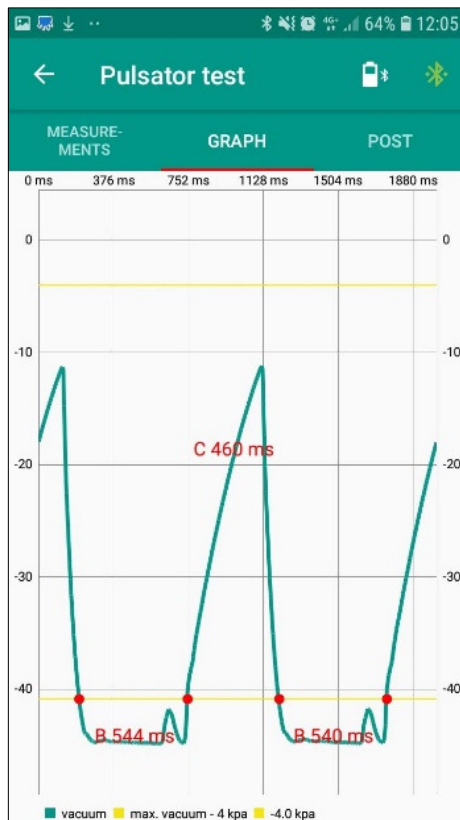
Pulsation curve characterising a dirty pulsator valve

Blocked or dirty pulsator air inlet hole, or dirty air filter

This fault is very difficult to recognise by the milking staff. It may affect independent pulsators which cause unpleasantness to many dairy cattle for a long time and it means a health risk too. The replacement of the central air filter is often omitted, and in this cases the problem occurs all through the dairy or at one side of the milking parlour, and all the pulsators exhibit the same symptoms. The length of C phase extends relative to the ideal values around 100 ms.

Negative effects:

- Deteriorating health condition of the udder due to the shortened D phase caused by the extended C phase.
- The teat cups are kicked off more frequently, the comfort of the cow deteriorates.



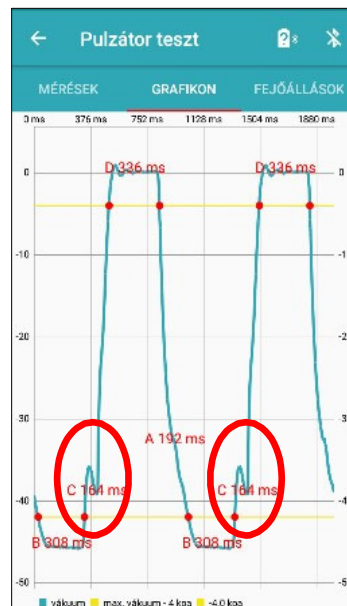
Pulsation curve characterising a faulty pulsator air inlet

Wrong installation of pulsator, connection with restricted cross section

This fault is typically created during the construction or overhauling of the dairy as a result of a simple reason, i.e. that the pulsator cannot be mounted directly on the vacuum line due to designing error or because of the lack of space. Instead, the pulsator is connected to the large diameter vacuum line from a distance through a thinner hose. As a result, no sufficient vacuum capacity is available at the direct connection of the pulsator due to the small connecting cross section and the relatively low pressure level, and an extensive fluctuation can be measured during operation. The other problem is that opposite undesirable pressure change occurs at the intersections of the pulsation curves because of the offset alternating timing of the two pulsation sides, which reduces the efficiency of the pulsation. See the red circles in the figure.

Negative effects:

- Slow milking due to the long A phase, which is extended relatively to the ideal 80-120 ms, therefore the duration of milking in B phase is less.
- Deteriorating health condition of the udder due to the shortened D phase caused by the extended C phase.
- The ideal pulsating rate cannot be set, because the time spent for the transitional A and C phases is too long, i.e. the operation is not effective.



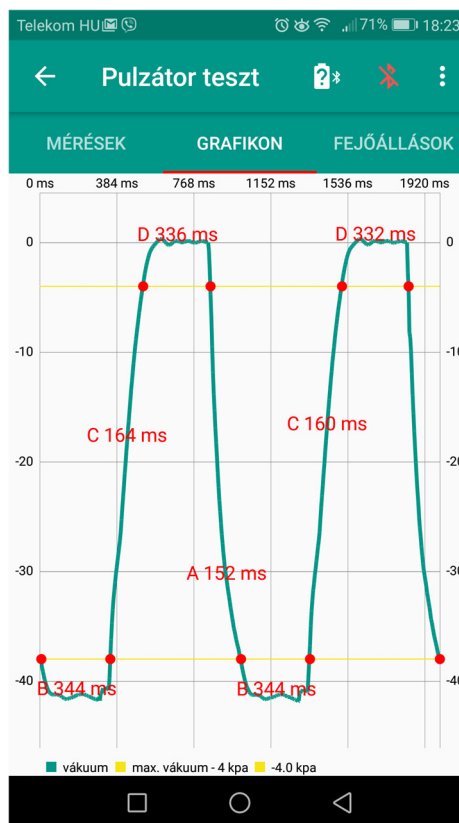
Pulsation curve characterising a wrong installation of pulsator

Too long or too short pulsator hose

The manufacturers usually specify the maximum length of pulsator hose that can be used for the various types of pulsator. The rationale is that the cross section of the valve determines the maximum air delivery capacity of the pulsator. This fault often occurs because of the good intentions of the milking staff members, i.e. they intend to establish conditions, so that the repair of pulsator hose could be done quickly during milking. For this purpose they install longer hose when replacing a faulty pulsator double hose. In this way the most frequent fault, i.e. the cracks at the end of the hose, could be repaired simply by gradually cutting the hose shorter. The figure shows the pulsation curve of too long hose with extended A and C phases. A less frequently occurring fault is the too short hose, which is caused generally by the inadequate design of the dairy. In such case the air volume of the pulsator hose is well below the air delivery capacity of the pulsator.

Negative effects:

- The result is extremely short A and C phase
- Causes unpleasant feeling to the animal during milking as a result of quick change of shape of the teat cup liner



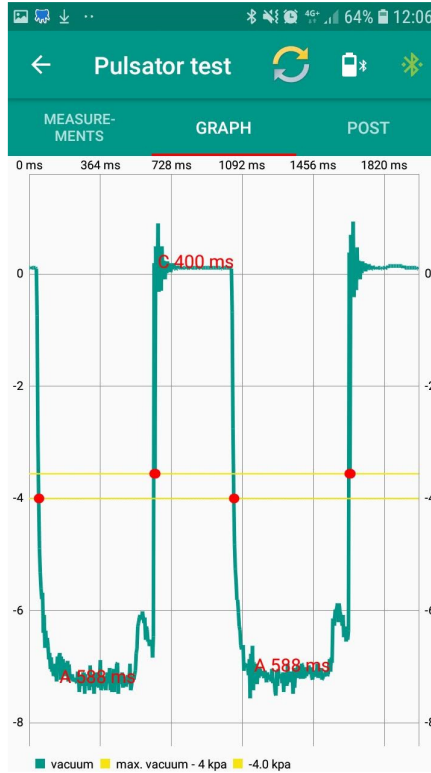
Pulsation curve characterising a too long pulsator hose

No sufficient vacuum

This situation can happen when tremendous leakage exists in the vacuum system. vacuum pump cannot able to recover the deficiency.

Negative effects:

- Teat cups easily slip off
- Milking efficiency highly degraded



No sufficient vacuum

8.2. Sample measuring report

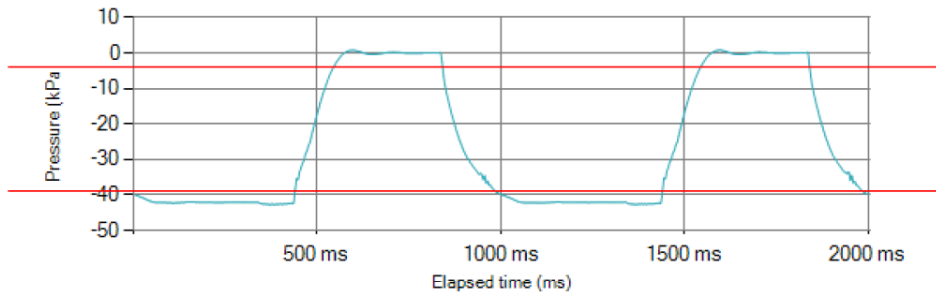
Date:	2019.09.19-13:25	User name:	Toth Robert
Farm name:	Sample Dairy Farm	Company name:	Bos-Plus Kft

Nr. of posts:	26	Pulsator type:	Electric
Brand:	Milkingo	Pulsator brand:	EX100
Type:	Rotary	Liner type:	Round
Milkline type:	Lowline	Liner code:	Milkingo DELTA 1D

Operation type:	Normal vacuum
Pressure cut threshold:	-4.0 kPa

Post Nr.	Side	A ms	A %	B ms	B %	C ms	C %	D ms	D %	Total ms	Cycle cpm	Max. Vac. kPa	Max. Pres s. kPa	A+B %	C+D %	Limp ms	Limp %
1	Left	141 ms	14.1 %	457 ms	45.8 %	104 ms	10.4 %	296 ms	29.7 %	998 ms	60.1	-42.7	0.8	59.9 %	40.1 %	1 ms	0.2 %
1	Right	143 ms	14.3 %	456 ms	45.6 %	92 ms	9.2 %	308 ms	30.8 %	999 ms	60.1	-42.1	0.8	60.0 %	40.0 %	1 ms	0.2 %
2	Left	132 ms	13.2 %	468 ms	46.8 %	88 ms	8.8 %	312 ms	31.2 %	1000 ms	60.0	-42.7	0.9	60.0 %	40.0 %	1 ms	0.2 %
2	Right	135 ms	13.5 %	464 ms	46.5 %	92 ms	9.2 %	306 ms	30.7 %	997 ms	60.2	-42.7	0.8	60.1 %	39.9 %	1 ms	0.2 %
3	Left	136 ms	13.6 %	463 ms	46.3 %	98 ms	9.8 %	303 ms	30.3 %	1000 ms	60.0	-42.6	0.8	59.9 %	40.1 %	2 ms	0.3 %
3	Right	141 ms	14.1 %	460 ms	46.0 %	92 ms	9.2 %	306 ms	30.6 %	999 ms	60.1	-42.2	0.8	60.2 %	39.8 %	2 ms	0.3 %
4	Left	144 ms	14.4 %	453 ms	45.4 %	105 ms	10.5 %	296 ms	29.7 %	998 ms	60.1	-42.6	0.7	59.8 %	40.2 %	4 ms	0.7 %
4	Right	160 ms	16.0 %	441 ms	44.2 %	85 ms	8.5 %	312 ms	31.3 %	998 ms	60.1	-41.6	0.5	60.2 %	39.8 %	4 ms	0.7 %
5	Left	140 ms	14.0 %	460 ms	46.0 %	100 ms	10.0 %	299 ms	29.9 %	999 ms	60.1	-42.8	0.9	60.1 %	39.9 %	1 ms	0.2 %
5	Right	140 ms	14.0 %	459 ms	45.9 %	100 ms	10.0 %	300 ms	30.0 %	999 ms	60.1	-42.8	0.8	60.0 %	40.0 %	1 ms	0.2 %
6	Left	147 ms	14.7 %	456 ms	45.6 %	103 ms	10.3 %	293 ms	29.3 %	999 ms	60.1	-42.3	0.6	60.4 %	39.6 %	3 ms	0.5 %
6	Right	144 ms	14.4 %	456 ms	45.6 %	105 ms	10.5 %	294 ms	29.4 %	999 ms	60.1	-42.6	0.7	60.1 %	39.9 %	3 ms	0.5 %
7	Left	151 ms	15.1 %	449 ms	44.9 %	95 ms	9.5 %	304 ms	30.4 %	999 ms	60.1	-42.1	0.7	60.1 %	39.9 %	4 ms	0.7 %
7	Right	156 ms	15.6 %	448 ms	44.8 %	112 ms	11.2 %	284 ms	28.4 %	1000 ms	60.0	-42.7	0.8	60.4 %	39.6 %	4 ms	0.7 %
8	Left	160 ms	16.0 %	436 ms	43.6 %	106 ms	10.6 %	297 ms	29.7 %	999 ms	60.1	-43.0	0.9	59.7 %	40.3 %	3 ms	0.5 %
8	Right	162 ms	16.2 %	431 ms	43.2 %	104 ms	10.4 %	300 ms	30.1 %	997 ms	60.2	-43.0	0.9	59.5 %	40.5 %	3 ms	0.5 %
9	Left	166 ms	16.7 %	428 ms	43.1 %	132 ms	13.3 %	268 ms	27.0 %	994 ms	60.4	-42.7	0.9	59.8 %	40.2 %	9 ms	1.5 %
9	Right	148 ms	14.8 %	455 ms	45.6 %	92 ms	9.2 %	302 ms	30.3 %	997 ms	60.2	-42.6	0.9	60.5 %	39.5 %	9 ms	1.5 %
10	Left	144 ms	14.4 %	458 ms	45.9 %	92 ms	9.2 %	304 ms	30.5 %	998 ms	60.1	-42.6	0.9	60.3 %	39.7 %	3 ms	0.5 %

Post Nr.	Side	A ms	A %	B ms	B %	C ms	C %	D ms	D %	Total ms	Cycle cpm	Max. Vac. kPa	Max. Pres s. kPa	A+B %	C+D %	Limp ms	Limp %
1	Left	141 ms	14.1 %	457 ms	45.8 %	104 ms	10.4 %	296 ms	29.7 %	998 ms	60.1	-42.7	0.8	59.9 %	40.1 %	1 ms	0.2 %



Post Nr.	Side	A ms	A %	B ms	B %	C ms	C %	D ms	D %	Total ms	Cycle cpm	Max. Vac. kPa	Max. Pres s. kPa	A+B %	C+D %	Limp ms	Limp %
1	Right	143 ms	14.3 %	456 ms	45.7 %	92 ms	9.21 %	308 ms	30.8 %	999 ms	60.1	-42.1	0.8	60.0 %	40.0 %	1 ms	0.2 %

