SCA5600

Somatic Cell Analyzer
Instruction Manual



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1. **Introduction and operation**

1.1 Introduction

1.1.1 The SCA5600 Somatic Cell Detector is designed to determine the number of somatic cells in milk by its conventional viscosity and the measurement time is the time it takes for the test sample to flow through a capillary tube of known diameter.

Notice! The capillary parameters fully comply with the Russian Federation National Standard GOST23453-2014 (diameter 1.5±0.05mm, length 1±0.05mm)..

The detector can be used for milk quality monitoring at dairies, milk collection points and dairy enterprises.

1.1.2 The normal environmental conditions required for equipment operation are as follows.

- Ambient air temperature: 20±5. c
- Relative humidity: 30%-80%
- Atmospheric pressure: 860hPa～1060hPa

1.2 Technical Specifications

1.2.1 The detector complies with the Russian Federation National Standard /national standards (GOST22261, GOST R54077, TU26.51.53-005-70513965-2018) Group 2 requirements and a set of design documents (CD) SAP066.00.00.000, approved in the prescribed manner.

1.2.2 15ml milk flow time, control solution passing through capillary tube: 8.3±0.3 seconds.

1.2.3 The scale of the built-in digital timer/stopwatch of the instrument: from 0.1 to 58.0 seconds. Readability 0.1 seconds.

1.2.4 Determination range of somatic cell number in 1ml of milk (unit: thousand cells/ml): 90 to 1500.

1.2.5 The allowable relative error limit for somatic cell determination in milk: ±5%.

1.2.6 Automatically mix the mixture (rotate the bottle 10 times) before measurement within 30 ± 10 seconds.

1.2.7 Measurement of outflow time range of 15ml of milk mixture passing through capillary tube: 8-58 seconds.

1.2.8 Relative error of milk mixture outflow time (limit of allowable relative error): ±5%.

Note: The measurement error of the milk mixture outflow time is between 0.1 and 8 seconds.

1.2.9 3.6. Warm-up time and set working mode - no more than 10 seconds.

1.2.10 The duration of one analysis: no more than 4 minutes.

1.2.11 Detector continuous working time: no more than 8 hours.

1.2.12 Power supply: AC 85 ~ 264VAC 47~63Hz.

1.2.13 Power consumption: no more than 25W.

1.2.14 Instrument dimensions: 180mm (width) x 175mm (depth) x 255mm (height).

1.2.15 Detector weight: 2.3kg.

1.3 Components of the Detector
1.3.1 Mainframe
1.3.2 Mixing device
1.3.3 Optical gauges/sensors
1.3.4 Glass flask
1.3.5 Power cord

1.4 Operation
1.4.1 Principle of operation
The operating principle of the detector is based on the interaction of Mastoprim reagent (GOST23455-79) solution in milk samples with somatic cells. After mixing milk with Mastoprim solution, the consistency of the mixture changes and becomes more viscous (according to GOSTR54077-2010 Method for determining the number of somatic cells in milk). Depending on the time of flow of the mixture through the capillary tube, the detector displays the outflow time and the number of somatic cells in the milk.
1.4.2. Description of the detector block diagram.
A description of the block diagram is shown in the figure 2.
After placing the aqueous solution of Mastoprim and milk into the flask, the gear motor (2) is turned on and the stirrer (4) begins to rotate at an angle of 90°. After the stirring process is completed, the sample to be measured (3) flows out through the end of test tube(5). When the optical sensor (6) is activated, the timer opens automatically. When sample outflow stops, the timer turns off. The microcontroller (1) converts the sample outflow time into somatic cell concentration and displays it on the indicator. After the mixture has flowed out, the flask and capillary are rinsed with distilled water and the detector is ready for the next measurement.

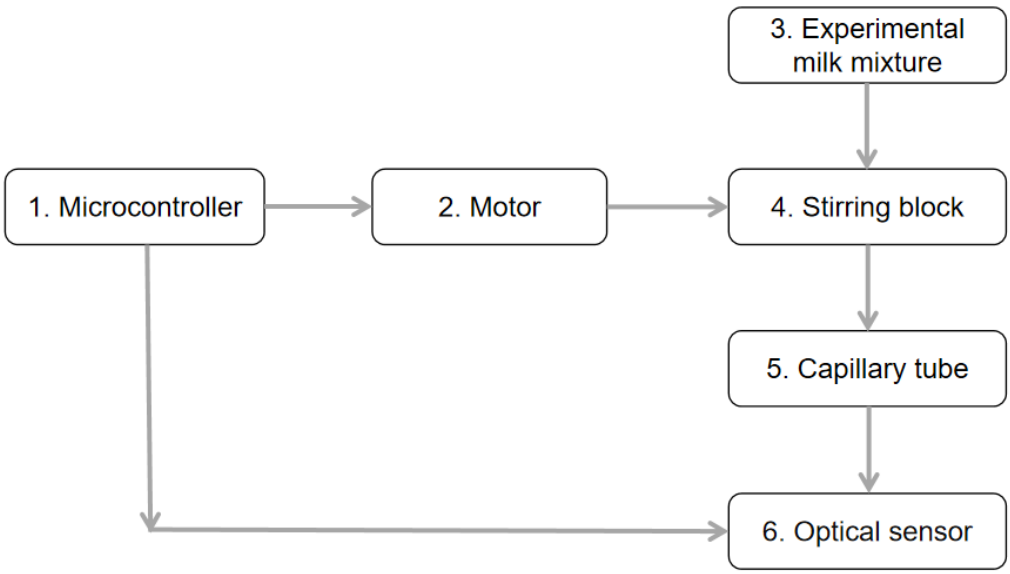


Figure 2

1.4.3 Design of Detector
As shown in Figure 3.

The detector consists of three main units: control unit (1), optical sensor (11), stirring unit (9). The stirring block is fixed on the axis of the motor (14), the electronic unit embedded inside it. The flask is inserted into the stirring unit (9). The optical sensor consists of an optical array of infrared LED groups (11).

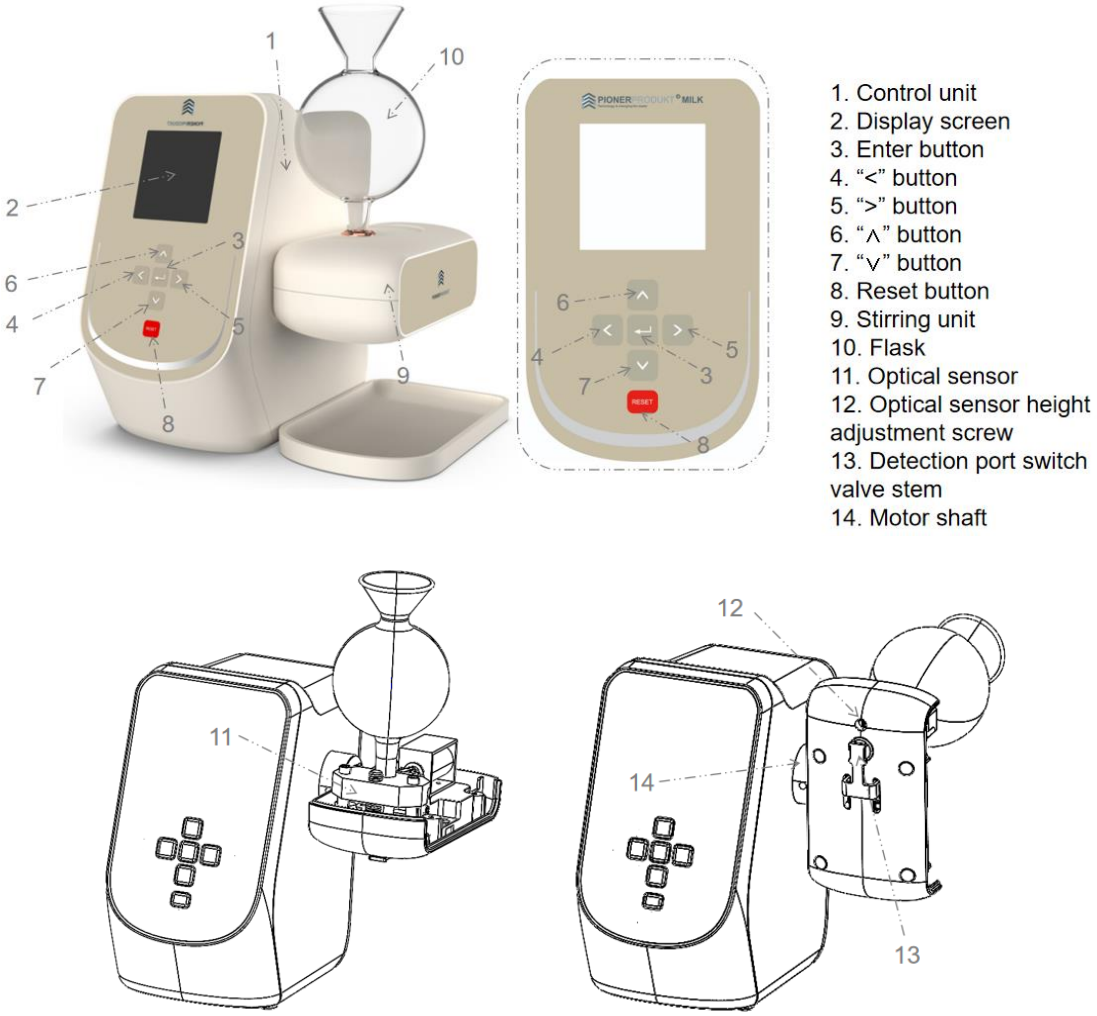


Figure 3

The following controls are located on the front panel: Figure 4

"Enter" button (3)	">" button (4)	"<" button (5)
“∧” button (6)	“∨” button (7)	“Reset” button (8)



Figure 4

2. Operate

2.1 Restrictions

2.1.1 If the instrument reports an error, please stop using it.

2.1.2 Milk samples with an acidity between 16 and 21 cannot be tested.

2.1.3 Expired milk samples cannot be tested.

2.2 Instrument Preparation

2.2.1 After receiving the instrument, you must check whether the packaging is complete. Check the integrity of the equipment against the documentation and packing list, check the external safety seals of the equipment and for mechanical damage.

2.2.2 Study this user manual before starting work.

2.2.3 After placing the equipment on the horizontal working platform, place the plastic container under the stirring block from the entire detector. The edge of the plastic container should not be high and should not overlap the optical sensor.

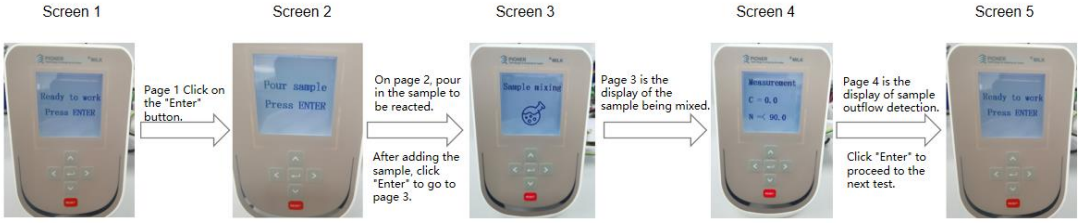
Rinse the flask with warm water and dry it with a blower.

Notice! If the flask is damaged, replace it with a spare flask in time!

Take the stirring block, and insert a flask, making sure that the flask is fitted in place.

Turn on the power

Press the button "Enter". After the acoustic signal, the indicator will show "Pour sample". Press "Enter" and the stirring block turns the flask to the starting position. Pressing the "Enter" button again will indicate "Mixing". The mixing block should rotate back and forth at an angle of 90 and should return to the starting position. This process will be repeated 10 times. After stirring stops, the digital indicator will show "Measuring", followed by "C=0,0; N=<90".



2.2.4 Prepare 100ml of ink reagent as follows: Pour 80ml of distilled water into a measuring cup with a capacity of 100ml and add 30-40 drops of ink reagent with the help of a pipette. Mix the solution well and then add more distilled water up to 100ml.

2.2.5 Use the following method to prepare 100cm³ of Mastoprim solution (concentration 35g/dm³): Put 3.5g of Mastoprim powder into a 100cm³ measuring flask, add 70cm³ distilled water and preheat to 30-35°C, mixing the solution well and cool to 20° C. Then add distilled water to 100cm3 and stir. The solution can be stored for no more than 24 hours at a storage temperature of 10-30°C.

The solution is not allowed to be reused.

2.2.6 The detector needs to be calibrated regularly.

(1) Turn on the detector. After one minute, the message "Standby" will appear on the screen.

(2) Press "Enter" button. After the sound signal, the instrument will display "Pour Sample". Press "Enter" and stir to rotate the flask to the starting position.

(3) Use a 5 or 10 ml pipette to pour 15 ml of the ink solution into the flask.

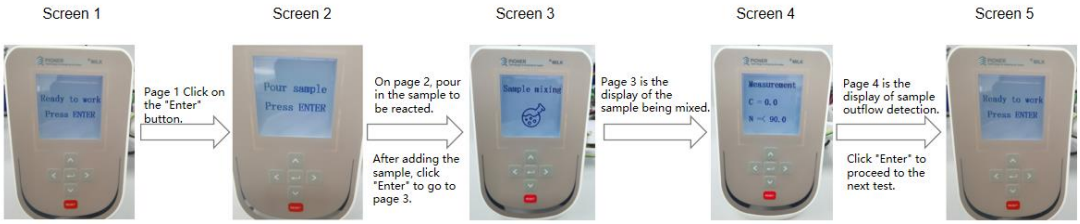
(4) Press the "Enter" button. After the solution flows out through the capillary tube, the detector indicator should show the flow time "8.3±0.3" seconds.

Note:

1) If during calibration test, the indicator shows time 0.0 seconds. This means the solution doesn't have enough ink. Add 4-5 drops of pull-out ink to the prepared solution and repeat the calibration test. Then rinse the flask with distilled water, and finally use a rubber blower to blow air through the flask and capillary tube. After this, clean the flask with distilled water, blow it up with a rubber air bag, wipe the protective glass of the optical sensor thoroughly with a damp cloth moistened with a neutral detergent, and then wipe it gently with a clean dry cloth.

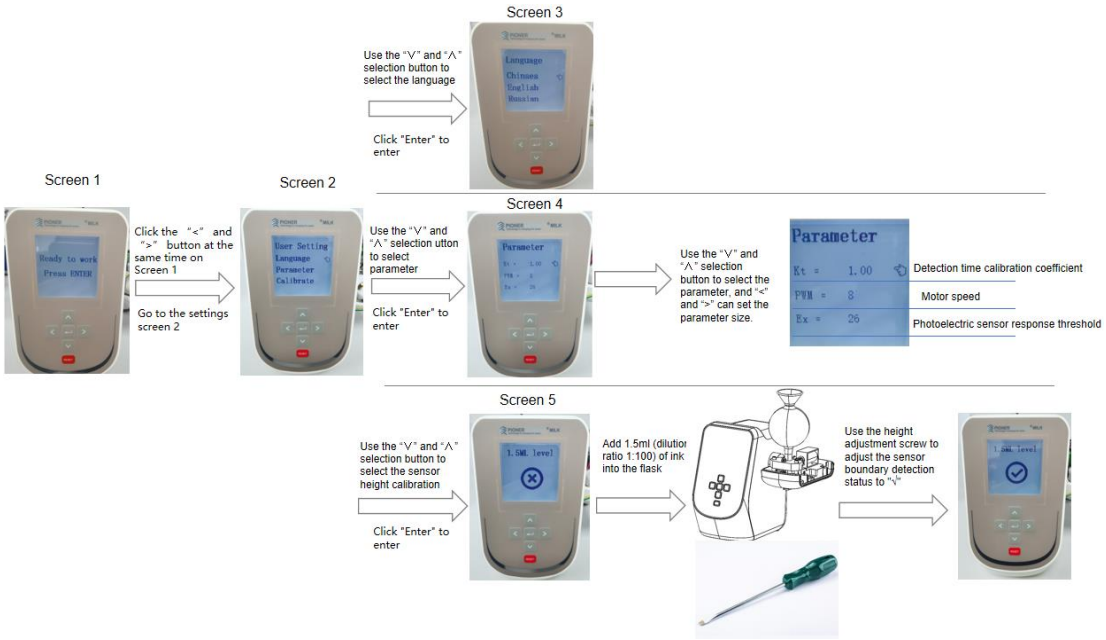
2) If the outflow time exceeds 8.6 seconds, it means that the capillary tube is blocked and needs to be cleaned with fishing line (in device accessories has been provided) and repeat the calibration test.

2.3 Instrument Operation



2.3.1 Switch on the instrument. After the sound signal, the display will show "Ready to work".
2.3.2 Press the button "Enter". After the sound signal, the indicator shows "Pour sample". Press"Enter", the stirring block turns the flask to the starting position. Pour the prepared Mastoprim solution into the detector flask using a 5 ml laboratory pipette. Before pouring the milk sample into the flask, strain it through four layers of gauze and stir. The temperature of the milk to be tested must be (20±2°C). With the help of a 10 ml pipette, pour 10 ml of the milk sample into the flask. To avoid foaming, pour the milk sample into the inside of the flask.
2.3.3 Press “Enter” button. The instrument will automatically mix the milk sample with the Mastoprim solution and the indicator will appear "Mixing" message, the flask completes 10 rotations at 90 degrees.
2.3.4. After the mixing process is completed, the flask is turned over, the milk mixture is ejected through the capillary tube and optical sensor, and the detector’s built-in digital timer is activated. The indicator shows "Measuring" and the current time at which the mixture flows through the capillary tube.
2.3.5. After the instrument stops detecting, the sound signal is activated, and the indicator displays the time for 15ml of milk mixture to flow out through the capillary tube (C) and the number of somatic cells in the milk sample (N).
Notes:
1) If C=58.1; N≥1500 is shown on the indicator and there is enough milk mixture left in the bottle, it means that the number of somatic cells in 1 ml of milk exceeds 1,500,000.
2) If the outflow time/duration is within the range of values given in the table (GOSTR54077-2010), the number of somatic cells in the corresponding range is considered to be proportional to the outflow time/duration.
2.3.6 After completion of the analysis, rinse the flask with distilled water two or three times and blow it dry with air four or five times using a blower.
2.3.7 Press “Enter” button. The indicator will display the message "Pour sample", press "Enter".
2.3.8 For the same batch of samples, take not less than three measurements, discarding the first one. The final value is the average of the last two successful measurements.
The allowable difference between two consecutive measurements of the same milk mixture shall not exceed the following difference (liquid outflow time in seconds):
From 12.0 to 18.0 seconds -1 second; from 18.0 to 25.0 seconds -2 seconds; from 25.1 to 31.0 seconds -3 seconds;
From 31.1 to 37.0 seconds – 4 seconds; from 37.1 – to 46.0 seconds – 5 seconds; from 46.1 – to 58.0 seconds – 6 seconds.
2.3.9 If the difference exceeds the above, rinse the flask thoroughly several times and repeat the test of the milk sample.
After the measurement is completed, disconnect the power supply to the detector and rinse the flask and capillary tube with warm water.
Heat the tap water to 50ºC, dissolve "Reagent-1" in it (1g per 100ml water), and wash the flask and capillary tube with this solution, rinse with warm water; blow the water out with a blower; wipe the capillary tube with a gauze to remove the remaining water.

2.3.10 Device setup operation



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