Digital Mastitis Detector
MILK CHECKER MCM-5L
Operation Manual

AR BROWN

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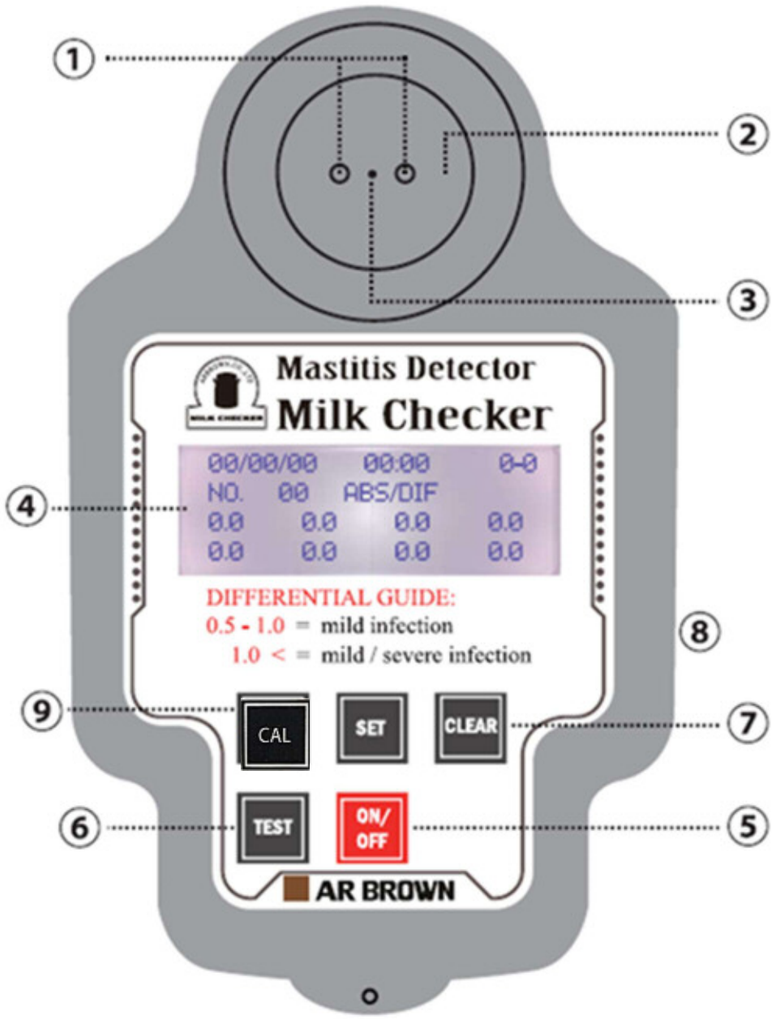
1. Specifications:

Measuring Method:	Measurement of electrical conductivity
Calculation:	Differential E.C. is calculated by microcomputer and automatically calibration.
Display:	Backlight LCD
Measurement Range:	0 – 13mS/cm
Accuracy:	3% ± 1 digit
Automatic Temperature Compensation:	+3 – 40℃ (compensated at +25℃)
Power Source:	Dry cell battery AA x 2 pcs.
Power Consumption:	140 mA (measuring and backlight on)
Dimensions:	91(w) × 149.5(H) × 118(D)mm
Weight:	280 g
Data Communication:	Dedicated USB cable
Real Time Clock:	IC module
EEPROM:	Storage 500 data in device

2. Illustration and Function



1. Small electrode sensor:
   This is built in unit, measuring electric conductivity.
2. Sampling cup:
   It is designed to ease sampling.
3. Temperature sensor:
   Electric conductivity is effective on temperature for both of milk sample, ambient and environmental temperature, but it compensates temperature automatically.
4. Digital Display:
   Absolute electric conductivity of all quarters are displayed in digital simultaneously, then calculates differential E.C. automatically, and also indicates calibrated electrical conductivity.
5. Power button (ON / OFF):
   Press the button first for turning on the power. By pressing it again, power is turned off. If not in operation, the device will turn off by itself after 6 minutes.
6. Measurement button: (TEST):
   Measurement result of four quarters are displayed in one display simultaneously by pressing TEST button 4 times for individual quarter, and then press this button one more time (the 5^{th} time) for calculation of differential measurement result and abnormal quarter
7. Clear button (CLEAR)
   To test next cow, the clear button will erase the previous reading held.
   The data is possible to be cleared by this button.
8. Set button (SET)
   Use this button for various setting.
9. CAL button
   Use for calibration
   In case of data communication to PC and use for various setting.

3. Measurement method

1. When press ON/OFF button, following screen is displayed.

```
MILK CHECKER
     MCM-5L
```

2. After 3 seconds, following screen is displayed.

```
YY/MM/DD HH:MM
     Cow No.xxx
YES:TEST     INITIAL
PC Communication
```

3. When user would like to start measuring, press TEST button and following screen is displayed.

```
YY/MM/DD HH:MM        2-1
No.  1     ABS/DIF
```

*How to change the cow number:

Press Blutooth® button: +1

Press SET button: -1

Press TEST button: fix the cow number

4. ill the sample in sampling cup to the rim and press TEST button (TEST) every time after changing the sample to indicate the result of electronic conductivity.
   Repeat this operation for 4 quarters. After pressing the TEST button 4 times for 4 quarters, press TEST button again for calculation to indicate the differential electronic conductivity as follows.

```
YY/MM/DD HH:MM        2-7
No.  1    ABS/DIF
7.5      6.8      6.4      6.7
1.1      0.4      0.0      0.3
```

Right fore Right rear Left fore Left rear

ABS：

DIF： abnormal quarter will be blinked

After final calculation, press clear button (CLEAR), then back to previous cow number. Press test button (TEST), continue to test next cow.

*Threshold

ABS = Absolute Conductivity / 6.2mS/cm or more
DIF = Differential Conductivity / 0.5mS/cm or more

4. Calibration:

Each unit is accurately calibrated before dispatch. In case of reconfirming or uncertain indication, make adjustment to use KCI solution with 2 levels of concentration with following procedure for automatic calibration.

1. 3.4 MS concentration KCI solution
   After pressing ON/OFF button, press CAL Button immediately and then displays following screen.

```
CALIBRATION          6-0
1.  3.4MS
2.  6.7MS
```

Choose “1. 3.4MS” by pressing CAL button and press the test (TEST) Button.
Pour 30ml of 3.4 KCI calibration solution into sampling cup and press test (TEST) button and calibration done.

In case of calibrating by out of range value solution, displays error message in screen as follows and back to 6-0 screen press CLEAR button (CLEAR).
Pour correct KCI solution again and operate above.

on success

```
CALIBRATION          6-2
3.4MS(0.025MOL)
(150) --- (152)
CALIBRATION 3.4
```

In case of error

```
CALIBRATION          6-2
3.4MS(0.025MOL)
(150) --- ( 52)
CALIBRATION ERROR
```

2. 6.7 MS concentration KCI solution
After pressing ON/OFF button, press CAL Button soon and then displays following screen.

```
CALIBRATION          6-0
1.  3.4MS
2.  6.7MS
```

Choose “2. 6.7MS” by pressing CAL button and press the test (TEST) Button. Pour 30ml of 6.7 KCI calibration solution into sampling cup and press test (TEST) button and calibration done.
In case of calibrating by out of range value solution, displays error message in screen as follows and back to 6-0 screen press CLEAR button (CLEAR).
Pour correct KCI solution again and operate above.

on success

```
CALIBRATION          6-2
6.7MS(0.025MOL)
(240) --> (250)
CALIBRATION 6.7
```

In case of error

```
CALIBRATION          6-2
6.7MS(0.025MOL)
(240) --> (250
CALIBRATION ERROR
```

Be careful with calibration. Sometimes the concentration on the standard KCl solution may not be accurate when the calibration value is not within the accuracy range. In spite of using accurate solutions, unless normal calibration values cannot be obtained, turn off the power once and try above operation again.

[NOTE]:
Use the standard solution which KCl is accurately measured.

5. Threshold:

The threshold values for evaluating abnormal or infected milk by means Milk Checker are as follows. According to Special disease medical guidelines by Mutual Aid Association of Veterinary Japan, as applicable both or either of following conductivity might be risk of mastitis infection in the quarter.

Example:

Absolute Conductivity	6.2mS / cm or more	Abnormal milk
Differential Conductivity	0.5mS / cm or more	Infected

Threshold for abnormal milk based on absolute conductivity values and differential conductivity values between quarters of udder.

Absolute Conductivity value (ms /cm)	Differential Conductivity between quarters	Evaluation
6.2>	0.5>	Normal milk
6.2>	0.5<	Infected milk
6.2<	0.5<	Infected milk (containing low ingredient and physiologically abnormal milk)
6.2<	0.5>	Low ingredient milk or physiologically abnormal milk

Example of normal milk

```
YY/MM/DD HH:MM    2-7
   No. 1    ABS/DIF
   5.3   5.3   5.2   5.4-----ABS (Absolute Conductivity value (ms /cm) )
   0.1   0.1   0.0   0.2-----DIF (Differential Conductivity between quarters
```

Examples of mastitis milk (example 1)

```
YY/MM/DD HH:MM    2-7
   No. 1    ABS/DIF
   5.9   6.1   5.8   6.5 ------ABS (Absolute Conductivity value (ms /cm) )
   0.1   0.3   0.0   0.7 ------DIF (Differential Conductivity between quarters)
```

*ABS value of 6.5 and DIF of 0.7 are abnormal milk which infected mastitis.
The device blinks quarters of 6.5 and 0.7.

Examples of mastitis milk (example 2)

```
YY/MM/DD HH:MM    2-7
   No. 1    ABS/DIF
   5.0   5.3   5.9   5.2 -----ABS (Absolute Conductivity value (ms /cm) )
   0.0   0.3   0.9   0.2 ------DIF (Differential Conductivity between quarters)
```

*All of ABS values are under 6.2, but DIF of 0.9 is abnormal milk which infected mastitis. The device blinks quarters of 0.9.

Examples of low ingredient milk and physiologically abnormal milk

```
YY/MM/DD HH:MM    2-7
   No. 1    ABS/DIF
   6.5   6.3   6.4   6.3 ------ABS (Absolute Conductivity value (ms /cm) )
   0.2   0.0   0.1   0.0 ------DIF (Differential Conductivity between quarters)
```

*all of ABS values are more than 6.2, but DIF values are under 0.5.

DIF (Differential Conductivity between quarters) Values:

*In case differential conductivity values between quarters of udder exceeds 0.4, there if a risk of mastitis. Consult veterinarian.

DIF values	Symptoms	Dealing
0.5~1.0	initial	Elaborate cleaning and dipping udder.
1.0~1.5	Medium	Hand milking and not milking by equipment. Three times milking in a day. (morning, afternoon and evening) Consult veterinarian.
1.5~	Late	Consult veterinarian. Diagnosis and treatment with veterinarian.

[REMARKS]:
When doing tests, check all of 4 quarters. Differential conductivity helps to detect the degree of inflammation. As cow milk electric conductivity varies with breeds, lactation stage or individual cow pathological conditions, it is recommended to interpret the differences in absolute conductivities based on the lowest value of some cow.
It will help to detect mastitis early and properly. Milk Checker is a screening device for the detection of mastitis, confirmation on mastitis and proper treatment should be discussed with veterinarians or specialists.

6. Setting:

1. Real Time Clock (RTC)

   Press the SET button immediately after power-on and following screen displays.

   ```
   SET                    7-0
     1. RTC
     2. System inf.
   ```

   Choose the menu of “1. RTC” by pressing CAL button and press test button (TEST) and following screen displays.

   ```
   SET RTC                7-1
    YY/MM/DD   HH:MM
    17/ 01 / 01    00: 00
   ```

   CAL Button: count up the number

   TEST button: fix the time

   Clear button: high order digit / next entry

3. System inf.

   Press the SET button immediately after power-on and following screen displays.

   ```
   SET                    7-0
     1. RTC
     2. System inf.
   ```

   Choose the menu of “2. System inf.” by pressing CAL button and press test button (TEST) and following screen displays.

   ```
   System inf.            7-0
    Ver. 1.19
      ID: XXXXXXXXXXXX
    EXIT: CLEAR
   ```

   TEST Button: Initialize the calibration value.

   CLEAR Button: back to previous

7. Alert and Error

1. Low Battery: Following screen displays when the battery voltage lowers under 1.8V and and the power is turned off automatically. Also change the new battery.

   ```
                          9-1
        BATTERY LOW
          1.80  V
      CHANGE BATTERY
   ```

2. System Error: Following screen displays when the product has a problem with system and contact the distributors or manufacture.

   ```
                          9-2
        SYSTEM ERROR
           EEPROM
   ```

3. Following screen displays when the product has a problem with RTC (Real Time Clock) and contact the distributors or manufacture.

   ```
                          9-4
        SYSTEM ERROR
            RTC
   ```

8. PC communication:

1. When press ON/OFF button, following screen is displayed.

   ```
        MILK CHECKER
           MCM-5L
   ```

2. After 3 seconds, following screen is displayed.

   ```
   YY/MM/DD HH:MM
         Cow No.xxx
   YES:TEST       INITIAL
   PC Communication
   ```

3. Press CAL button and starting to communication with PC.

   ```
   YY/MM/DD HH:MM         1-5
   PC Communication

   EXIT:CLEAR SW
   ```

   Press CLEAR button, back to measurement display.

9. Maintenance:

1. To rinse sampling cup is necessary once every day after use.
   Do not touch the electrode and temperature sensor with hard object.
   Be careful not to hurt the electrode and temperature sensor which are installed in the sampling cup.
   Do not use an organic solvent such as paint thinner or toluene to clean the display or the body.
2. Rinsing sampling cup with natural detergent and the like necessary after the measurement of colostrum or serve mastitis milk, but not necessary after such as measurement unless soil is heavy.
3. To wipe soil is necessary with soft cloth contained natural reagent.
4. It must not be immersed in water or other liquid.
5. Be careful not to drop it on floor or ground.
6. When dry cell battery is worn out the alarm message is indicated on the display, and the power is turned off automatically. Replace the battery to new one.
7. Contact with the company from you whom you purchased the product when it is damaged.

Caution:

*Do not touch the electrode with a hard object.

*Fill the cup with milk to nearly full to avoid false indications due to frothy milk.

*Be careful not to drop MILK Checker on floor or ground.

*Do not immerse in water or other liquid.

*This device is capable of data communication with a PC, but a dedicated USB cable (sold separately) is required.
Customers who have purchased the USB cable can download the dedicated software from our website.

Manufacture:

ORIENTAL INSTRUMENTS CO., LTD.
1879-1, Kamimizo Chuo-ku, Sagamihara, Kanagawa, Japan, 252-0243

Exclusive distribution:

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