Periodic Checking Method
Orion MET500 milk meter

PERIODIC CHECKING OF APPROVED METERS.
HINTS FOR THE SAMPLE TAKER AND FARMER

June 2020

General
- The periodic checking will be done at least once in every 12 months.
- The testing procedure with water should be carried out with milk meters that are cleaned properly.
- The water test must be done without the sampler connected.
- The system vacuum level must be 40 to 60kPa (equal as used by determine reference).

Reference value
- The "reference value" of the MET500 milk meter is the average of the two measurements with water, found during the testing procedure with water of the installation test or a reference value determined later and are handed over for local support (procedure is described in the installation manual – Milking Test at Dairy Farm, Determine Reference value).

Required equipment (ref. Fig. 1 & Fig. 2)
- Milk hoses with a 15-16 mm internal diameter (refer the Fig.1).
- An air inlet tube of 1.2 mm (supplier: ORION).
- Flow reducer (Flow ca 5.0 kg/min) with a water sucking opening of 3.8 mm (supplier: ORION).
- A shut-off valve (supplier: ORION).
- Calibrated electronic scale (min. accuracy 20 g).
- Some buckets of sufficient capacity (min. 25 liter).
- Some milking pails for the collecting of test water.
- A thermometer (accuracy +/- 1 °C).

Testing liquid
- Potable water should be used.
- Water with a temperature of 25 °C +/- 10 °C.
- Addition of around 50 grams of salt per 20 kgs of water (Salt: NaCl content of 99% or more).
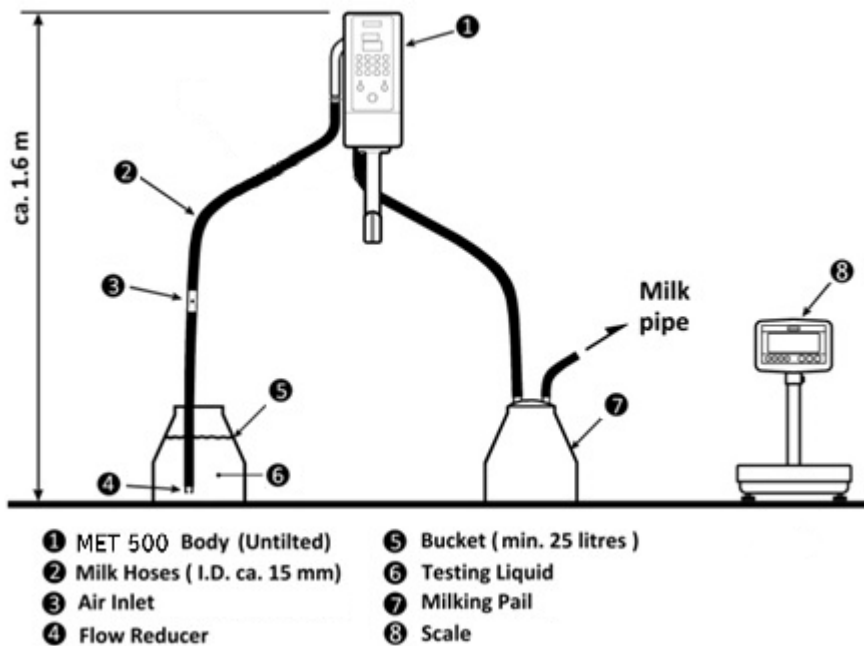
① MET 500 Body (Untilted)
② Milk Hoses (I.D. ca. 15 mm)
③ Air Inlet
④ Flow Reducer
⑤ Bucket (min. 25 litres)
⑥ Testing Liquid
⑦ Milking Pail
⑧ Scale

Fig. 1. Water test.

Secure MET500 at a height of approximately 1.6 meters (un-tilted).

The principle of the test
- Clean the holes of the air inlet and the flow reducer by cleaning needle prior to testing.

    =========== *Procedure* ============
1. Switch on the vacuum pump of the milking system.
2. The vacuum level should be the same (+/- 1kPa) with one is during taking the reference value. Adjust the level, if need. Record the vacuum level.
3. Check and record of the weight of milking pail for receiving the test water prior to testing: the initial weight
4. Prepare for the test as figure 1.
5. To switch on the MET500 in test mode, hold down **<4** and **6>** simultaneously on MET500 keypad and press power button. Then, check the cow # display of the MET500 shows "**tESt**" which means the MET500 is in its test mode.
6. Connect distributor to the milk tap.
7. Press key "START" to start a countdown timer of 2 minutes which is built-in the MET500 and then MET500 starts to suck the test water and measure the weight.
8. At the end of the countdown, ④Flow Reducer needs to be lifted from testing liquid, then remove distributor from the milk tap.
9. Record the reading of MET500 display.
10. Measure the weight of the milking pail with the collected test water and then subtract "the initial weight" from this weight to fix "the collected weight" for the test.
11. Determine the difference in kg between the reading of MET500 display and the collected weight. And record it as the measuring value.

The water may be collected for recycling, but the quantity should be checked each time.

Quality of the observations/measurements
- If the first measuring value deviates 0.1 kg from the reference value: meter = correct.
- If the first measuring value deviates more than 0.1 kg from the reference value, proceed to a

second measuring.
- If duplicate measuring have an average deviation of 0.2 kg or less from the reference value: meter= correct.
- When a meter does not come up to this standard during the periodic checking, proceed to a third or fourth measuring.

Deviating meters
- When the measurements do not come up to the standard, the testing procedure with test water should be repeated after checking the equipment, which may include, among other things, the air flow of the sucking set, tilting of the milk meter body, straightening up, and if necessary, dismantling of the meter.
- If it is still impossible to come up to the standard, the meter should be calibrated/adjusted or replaced.

Replacement or repair of meters
- When meters are replaced or when repairs influence the measurement, the meters are to be tested during the milking, after which the testing procedure with the water test should be carried out twice.
- This water test will then serve as "reference value".

Sampling equipment
- Check the sampling equipment for cleanness and parts.
- See to it that the sampling equipment is stored in a dry place, free from dust.

Hints for the sample taker and the farmer for correct sampling

Before sampling
See to it that:
- The meters are cleaned properly
- The air inlet of the claw is opened
- The sampling devices are assembled correctly
- The sampling devices are connected to the meters in the correct manner.
- All equipment for sampling contains no water residues (carelessness in this matter leads to a too low indication of percentages, especially where the first range of cows is concerned).

Taking the sample
- The display of the meter should always be at zero before starting to milk another cow.
- After the cow is off, to have a good mixing of sampled milk, the sample taker must rotate the "Valve core" of the sampler to let its outlet comes right below exactly to allow an efficient air bubbling for about 10 seconds.
- Just after the mixing, the sampler must take sample immediately.
- After the end of sampling procedure for the cow, the valve core should be handled to drain all of the remained milk in the sampler bottle toward the milk pipe.
- Before starting to milk the next cow (after moving the equipment), the valve core should be handled once again to drain all of the remained milk in the sampler bottle toward the milk pipe.

After sampling
- The farmer removes the sample equipment for a careful cleaning by hand;
- Disassemble the sampler valve mechanisms and clean in a wash sink or vessel.
- The sampling equipment must be stored in a clean, dry place, free from dirt and out of direct sunlight.

Milking Test at Dairy Farm
for ORION MET500 milk meter
DETERMINE CALIBRATION VALUE
DETERMINE REFERENCE VALUE

Determine calibration value

STEP 1.

1. Check the current calibration value of each MET500 milk meter and record it as the initial calibration value prior to the milking test.
2. Collect the milk into the milk bucket via milk meter.
3. Measure the collected milk by a calibrated electronic scale and the measured value is defined as the Reference.
4. Record the observation with the MET500 display reading and the Reference and then calculate the difference between them using the next formula.

$$\text{Difference}(\%) = \frac{\text{Milk Meter reading(kg)} - \text{Reference from the scale (kg)}}{\text{Reference from the scale (kg)}} \times 100$$

5. Take minimal 3 readings per a milk meter and calculate the differences (if the three readings not differ more or less equally it is advised to take more readings).
6. If the average difference is less than or equal to 3% and the average difference of all the milk meters on the farm is less than or equal to 2%, the current calibration of the milk meters are correct. (*)
No further observations are necessary.
It is recommended to determine calibration around ZERO (between -1 and +1%).
7. If the difference can not meet the above mentioned judgment condition, the milk meter (s) involved must be recalibrated and assessed according to STEP 2 and STEP 3.

(*) ICAR guideline / Chapter 11.6.1.1.(ver.2012):
The calibration of the milk meter is considered correct if the average difference is less than or equal to 150 % of the limits for bias (2%) according to table 11.2 and the average difference of all the devices on the farm shall be less than or equal to 100% of the limits for bias according to the table 11.2.

STEP 2.

1. If the difference is exceeding the judgment condition, the milk meters involved must be recalibrated according to the following procedure.

Recalibration Example:

If the Initial calibration value is – 2 and the average difference is – 5%:

– 1 x – 5 = 5

– 2 + 5 = **3**

Result: The corrected recalibration value is **3**.

Input the new value into the milk meter.

2. Record 3 new readings per the recalibrated milk meter and calculate and evaluate the result in the same manner described in STEP 1.

3. If the difference is out of the judgment condition, perform STEP 3.

STEP 3.

1. The milk meter(s) which is failed in STEP 2, 3 more readings must be done and the average difference of six readings will be calculated.

2. The calibration of the milk meter is considered correct if the average difference is less than or equal to 3%.

3. If not, the milk meter is not acceptable and readjustment, repair or replacement has to be done by the manufacturer, after which the above procedure has to be repeated.

Determine Reference Value

1. When meters are installed or replaced or when repairs influence the measurement, the meters are to be tested during the milking, after which the testing procedure with the water test should be carried out twice.

2. The average of the two measurements will then serve as "reference value".

3. When proceeding to periodic checking, the reference values are handed over for support.
   This report includes:
   - Farm information
   - Meter and/or serial #
   - Vacuum level during determine reference value
   - Calibration value
   - Reference value

4. The explanation how to fulfill the water test is described in the document "Periodic Checking Method" with special attention to properly cleaned milk meters, required equipment, test liquid and the principle of the test.

Example (use of ORION "Reference Value Recording Sheet" is recommended):

MET500 No. / serial #	Calibration value	Reading of Display [kg]	Measuring value [kg]	Difference [kg]	Reference value (average of 2 differences) [kg]
12345	-2	10.0	10.32	-0.32	-0.34
		10.0	10.36	-0.36	
06789	0	10.2	10.38	-0.18	-0.17
		10.2	10.36	-0.16	
Remark: Own readings and differences can differ from above due to control board and calibration value.					