THE GLOBAL STANDARD
FOR LIVESTOCK DATA

ICAR Guidelines for periodic checking of the milk meters

MM25W MMSG DeLaval

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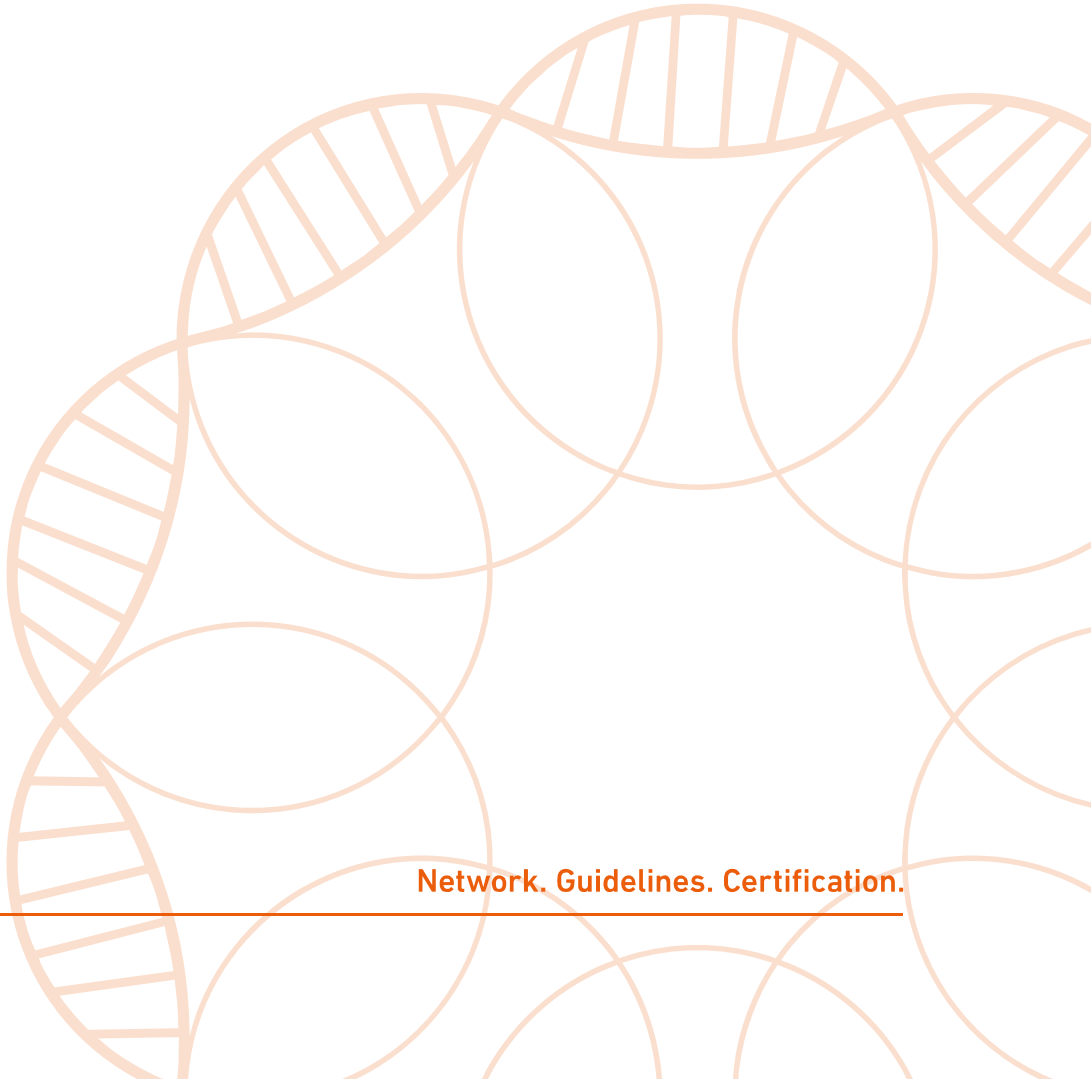

Network. Guidelines. Certification.

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The described procedure applies for all Free Flow meters, however different probes are used for the different Free Flow versions

SCR has proposed a procedure for a routine test consisting several elements. The purpose of this test is to determine whether the FREE FLOW-meter unit still functions as it did in the installation test. If one or more out of the mentioned tests fail, the meter should undergo a new farm test with milk (installation test). Based upon the proposal received and the experiences with the FREE FLOW milk meter in the Netherlands, together with the officials from KOM, a modified routine test for the SCR FREE FLOW meter was developed and validated.

1 Specification of the above-mentioned annual test factors:

a. Optical field integrity test : Test of the FREE FLOW optical field integrity: The FREE FLOW automatically detects abnormal reading if the optical field is damaged (mechanical / optical or electronic). In such a case the FREE FLOW will display a SERVICE message on it's display.

b. Free Flow visual inspection: The milk unit from cluster to Free Flow meters is checked for abnormalities with respect to leakages and so on. An extra level of test is by visual inspection of the FREE FLOW milk channel to detect dirt , protrusions or other abnormalities.

c. Milking parlour parameters: A general visual test of all milking components (milking machine, meter height, milking cluster, air bleeds, broken tubes) to verify there are no big changes or leakages. A new milking parlour, new milking clusters or other big changes, like a change in internal diameter of the long milk tube will result in a new installation test. The installation test has to be performed with milk as described in the installation test procedure.

d. Check of FREE FLOW internal parameters: By using a remote control unit Psion, the FREE FLOW internal parameters that affect the measurement are checked. If by some malfunction the parameters have been changed, these parameters can be restored to the original values. Two important parameters are the sub-software and the bias because they affect the measurement.

e. Flow test using probe: The probe test simulates a milk flow. The FREE FLOW flow reading is compared to the original reading when it was calibrated with milk. If the reading is the same then the optical field and the optical field + milk channel mechanics, transparency and color have all stayed the same so the FREE FLOW still measures the same. **The probe test can not be used to set a new bias to the FREE FLOW, a new bias should be set with milking cows**.

2 Optical field integrity test

The FREE-FLOW milk meter does not have any mechanical or moving parts. The internal software in the FREE-FLOW will alert upon detection of any change that cannot be compensated by the software.

Upon detection of such failures, the FREE-FLOW displays an error message on it's display and the farmer should consult the FREE-FLOW manual for the requested action to take. The testing procedure should be carried out with meters that are cleaned properly, i.e. after a main cleaning cycle of the milking machine.

3 Free Flow visual inspection

The milk unit from cluster to Free Flow meter is checked for abnormalities with respect to leakages, broken tubes, constrictions and so on. The Free Flow measuring channel is visually inspected to detect dirt , protrusions or other abnormalities, which may effect the performance of the Free Flow milk meter.

4 Milking parlour parameters

A general visual test of all milking components (milking machine, meter height, milking cluster, air bleeds, broken tubes) should be carried out to verify that there are no big changes or leakages. A new milking parlour, new milking clusters or other big changes, like a change in internal diameter of the long milk tube, makes it necessary to perform a new installation test. The installation test has to be performed with milk as described in the installation test procedure. The following parameters have to be taken into account : Vacuum level, type op milk cluster, long milk tube diameter, length of milk tube, length of tube between Free Flow meter and milk pipe line, height of Free Flow meter and air inlet (cluster air inlet and leakage). These 5 values represent milking machine parameters that if significantly changed may affect the FREE FLOW bias and therefore the results of the milk yield measurements.

The reference values should be recorded during the installation test and compared to when doing the routine test.

Vacuum level :	If vacuum level changed by more than 2.5kpa since the installation test, the routine test fails. The meters must be recalibrated with milk.
Claw type:	If another significantly different claw is installed, the routine test will fail. The meters must be recalibrated with milk.
Milk tubes:	If the diameter of the milk tubes between milking cluster and the Free Flow milk meter has been changed, the routine test fails. The meters should be recalibrated with milk. If the length of the milk tube between milking cluster and the Free Flow milk meter has been changed by more than +/- 10%, the routine test fails. The meters should be recalibrated with milk. If the milk tube between Free Flow meter and milk pipe line has been changed in diameter or in length, the routine test fails. The meters should be recalibrated with milk.
FREE FLOW height:	The height of the Free Flow meter relative to the cow platform: If this distance has been changed by more then 7 cm, the routine test fails. The meters should be recalibrated with milk.
Air inlet:	Increased air inlets or leakages will cause deviations in the reading of the Free Flow milk meter. If the air inlet has significantly changed by more than 10% compared with the installation test, for example by air leakages along the cluster to the Free Flow milk meter, the routine test fails. The meters should be recalibrated with milk. The air inlet can be observed by visual inspection and

by measuring the air leakage using the methods as described in ISO 6690 – Mechanical tests for milking machines.

5 Check of FREE FLOW internal parameters

Each FREE-FLOW meter has the following reference values.

Optical channel:	Two values that should be measured using a test probe. The reference values are measured upon initial parlor calibration and saved for subsequent periodic checks. It is imperative that the SAME probe is used for the initial and periodic checks.
Bias-Factor:	One value that is used to fix the measured FREE FLOW bias.
Sub-Software:	This number represent the algorithm used by the FREE FLOW to compute the yield. It is set when installing the FREE FLOW and must remain constant.

By using the Free Flow remote control unit, the FREE FLOW internal parameters are checked. These values are written down on the routine test form (annex 2). If by some malfunction the parameters have been changed, these parameters must be restored to the original values. If not, the meters should be recalibrated with milk.

6 Principle of the test

a. Switch OFF all FREE FLOW-units

b. Turn ON the FREE FLOW units and monitor each FREE FLOW display. Numbers will appear on the display and finally the FREE FLOW will display P-UP. Only 2 of the 3 last numbers displayed are used here. For example if upon power up the FREE FLOW displays the following :

2

A01

151

F100

D444

2141 : Sub-Software

688

1000 : Bias-Factor

P-UP

then only the values 2141 and the 1000 are used to write down on the form. The last number (1000) is the Bias-Factor. The 2141 is the Sub-Software identification. Because the numbers are displayed for only a short time, it is necessary to turn On and if each FREE FLOW -meter individually.

c. If the Bias-Factor or the Sub-Software values are not the same as the ones recorded during the installation test, the FREE FLOW-meter fails in the routine test.

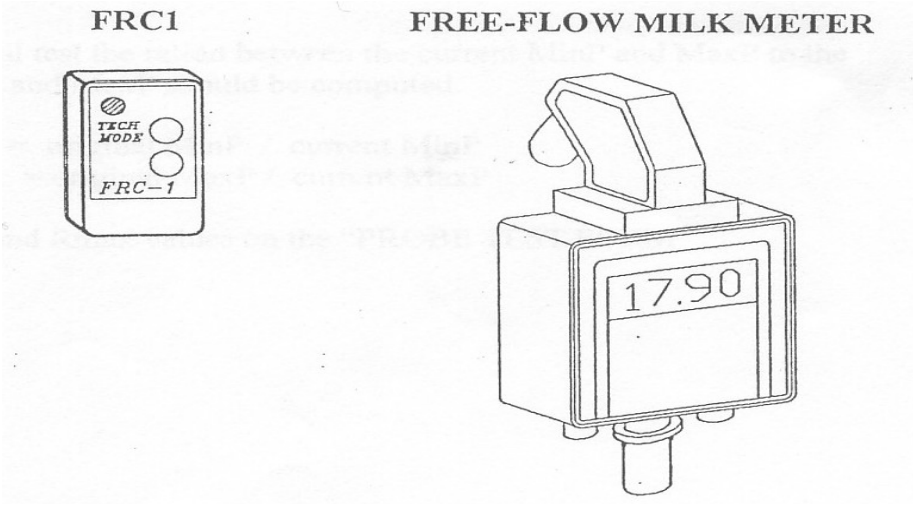

Figure 1. Remote control to check Free Flow internal parameters.

In cases where the Bias-factor or the Sub-software has been changed (not allowed however) for some reason, there are two possibilities:

a. Restore the original values using a technician level remote control.
b. Recalibrate with milk.

7 Probe flow simulation test

The probe test is simulating a milk flow. The FREE FLOW flow reading is compared to the original reading obtained during the installation test. If the obtained value is the same, then the optical field and milk channel characteristics, transparency and color have all stayed the same, so the FREE FLOW still measures the same as during the installation test.

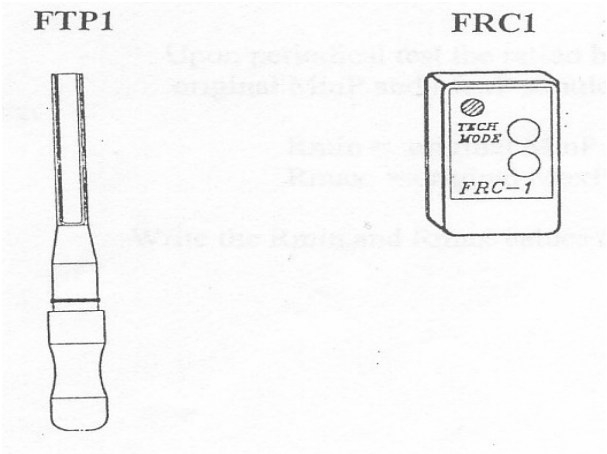

Figure 2. The probe FRT1 and remote control FRC1.

For this test, a probe (FRT1) and the remote control unit (FRC1), are required.

The FRT1 probe has several optical properties that simulate a milk flow. In the test mode, the FREE FLOW meter displays the milk flow that is generated by the probe. The probe fits in the interior measuring channel of the FREE FLOW meter. The probe should be cleaned before usage and as the probes are not perfectly identical, the same probe should be used

during the routine testing. The probe belongs to the milking parlour and should be stored under good conditions on the farm, preventing pollution and/or mechanical damage. Such will effect the test results.

The FREE-FLOW remote control is needed to set the FREE FLOW meter to the technician mode. This technician mode is necessary to perform the routine test with the probe. No special maintenance is needed for the FREE FLOW meter prior to the routine test procedure.

a. Set all FREE-FLOW units to technician mode using the remote control

b. Wash the test probe GENTLY using any soft soap. Dry the probe afterwards

c. Verify all FREE FLOW-channels are dry and clean

d. Wait 10 minutes to verify all units are perfectly stable. If some FREE-FLOW units an **Hxxx** message show, wait until it disappears. The **Hxxx** message imply that the FREE-FLOW internal temperature is not stable yet.

e. While the FREE FLOW-meter is in the technician mode and the FREE FLOW channel is dry, the FREE-FLOW performs an internal Self Test. The Self Test status is shown on the FREE-FLOW's display as **Cxxx** every 10 to 20 seconds. As long as the FREE-FLOW meter shows the **Cxxx** message the Self Test is ok. IF no **Cxxx** message is seen or if **SRVx** message appears the Self Test failed.

f. If the Self Test failed the operator should verify that the FREE-FLOW channel is dry and clean and wait for the Self Test status again. If still the FREE FLOW Self Test fails, the operator can try to fix the problem by using the remote's "RECAL" option. If still the FREE_FLOW self-test fails the FREE FLOW meter is defective and should be replaced.

g. If the **xxx** values are lower than 80, a RECAL of the FREE FLOW can optionally be done, although NOT mandatory. After RECAL the FREE FLOW with DISPLAY **CXXX** again but the XXX will be between 98 and 100.

h. Insert the test probe into the FREE FLOW channel. After a few seconds the FREE FLOW should display a **PASS** message and two numbers. The two values represent the flows measured by the FREE FLOW meter. The lower number is the minimal flow and the higher the maximal flow measured. The numbers shown are 4 digits and usually between 3,000 and 4,000 kg per minute.

i. Write the minimal and maximal flows on the "FREE FLOW routine test form" under **MinP** and **MaxP** columns.

j. During the routine test, the ratio between the **current MinP** and **MaxP** to the **original MinP** and **MaxP** should be calculated.

   Rmin = original MinP / current MinP

   Rmax = original MaxP / current MaxP

   Write the **Rmin** and **Rmax** values on the "FREE FLOW routine test form"

k. If Rmin and Rmax are between 0.98 and 1.02 the FREE FLOW meter is OK. Values outside the 0.98-1.02 range are too big and the FREE FLOW meter fails for the routine test. In case of FAIL the FREE FLOW channel should cleaned and inspected visually for any abnormalities. Note that most of deviation from the perfect 1.00 result is usually because the probe test is very sensitive. Small changes in the probe surface and/or cleanness will have some affect on the measurement.

Meters that failed the test should be inspected and if necessary cleaned internally and examined again. If a FREE FLOW Self test fails, a RECAL command using the remote control may fix the problem. A meter that continues to fail should be replaced.

8 Older meters

Some older FRE-FLOW units will display only 3 digits during the probe test. These meters display **Pxxx** instead of xxxx. In those cases the P should be though of the digit 3 and the new number used.

For example if the FREE-FLOW displays P678 then actually the number 3.678 is used.

9 Sampling equipment

a. Check the sampling equipment parts and it's cleanness

b. Store sampling equipment in a dry place free from dust.