



Weighall Milk Meter
User Manual

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1. Safety.



The last page of this User Manual is a CE Conformity Certificate.

1.1. Electricity.

Your electrician connected the transformer for the Weighall Milk Meters to your electrical installation. You are responsible for the standard of your electrical installation. The installation should conform to National/Local Rules for Electrical Installations.

Always turn off the electrical supply before removing the cover of the transformer. Use a safe means to ensure that the electrical supply is not erroneously reconnected while the cover is removed. Always replace the cover, with gasket properly in place, as soon as possible, but always before the electrical supply is re-connected.

1.2. Bang hazard.

The milk meter control panels may be a (head) bang hazard depending

on your height. The height at which the control panel has been located is a compromise between two conflicting requirements. It must be low enough for everybody to read the display and use the function keypad while at the same time it should be high enough to be over most operators' head levels.

1.3. Chemical resistance.

High performance modern engineering materials have been used in the construction of this equipment. They have good resistance to hot water, acid and alkali milking machine detergents at both low and high temperatures. These materials are generally the most advanced available for a given application.

These materials however may not be resistant to products containing alcohol, ketones, chlorinated hydrocarbons, other alcohols and some organic compounds. These chemicals are sometimes used in animal hoof care products, fly repellents, teat wipes and aerosol propellants. Care must be taken to ensure that these products do not

come into contact with plastic components on the milking equipment. Dairymaster cannot be responsible for chemical damage to equipment.

2. Introduction.

The Dairymaster Weighall milk meter accurately weighs the milk as it flows from the cow to the milk line. The Weighall milk meter can be fully integrated into a completely automated system with electronic identification and automatic feeding. It can then function as a data terminal that presents messages and warnings to the operator and also allows the operator to interact with a computer in the office.



Figure 1 Weighall milk meter.



Figure 2 Weighall milk meter control box.

3. How it works?

The Dairymaster Weighall milk meter is a unique device in that it weighs all the milk as it passes through the milk line. The milk flows in to the top chamber of the milk meter. This is where the air and the milk are separated. When the milk is separated the top valve controls the flow of milk into the weighing cup from the top chamber.

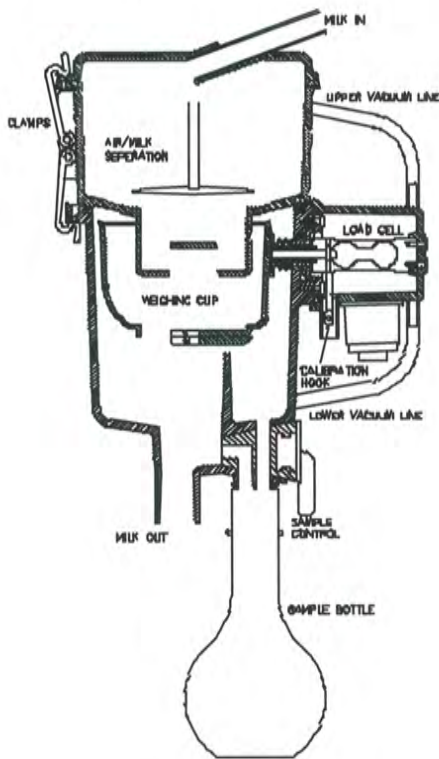


Figure 3 Section view of milk meter.

The bottom chamber holds the weigh cup, the bottom valve and the sampling area. The milk passes

through from the top chamber into the bottom chamber and into the weighing cup, the milk is weighed here and then the bottom valve allows the milk to pass through to the milk line. If the sample control tap is set to test some milk will be diverted into the sample bottle.

The sample area allows a sample to be taken. The milk is sampled continuously and flows into a sample bottle to provide a representation of the cow's milk.

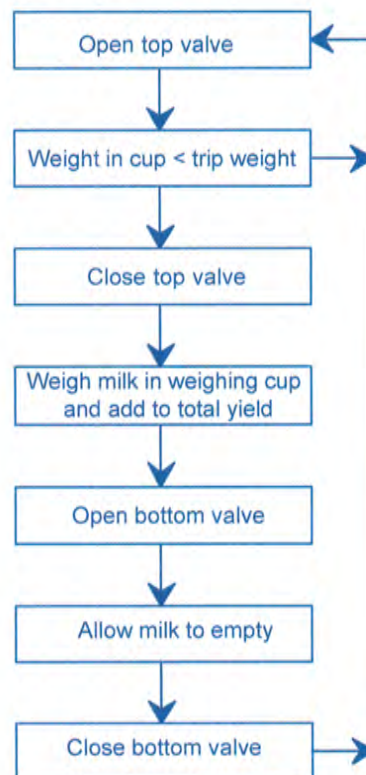


Figure 4 Flow diagram for milk meter operation.

3.1. Milk meter control unit.

The electronic control unit consists of a keypad and display screen. The milk meter electronic control unit has control over all aspects of milking and using this each milk meter can communicate with the other milk meters. The electronic control unit is shown in Figure 5 and it is followed by a brief explanation of the function keys.



Figure 5 Weighall milk meter control panel.

3.2. The control unit keys.

3.2.1. The F1 key.

F1 If a divert line is installed, this key is used to divert the milk. Pressing this key will toggle the meter through the three modes of normal milking, hold and divert.

Hold mode: When going from normal milking mode to divert mode

one will cycle through hold mode. On each operation, when in hold mode, the operator should check that vacuum is not available the cluster. If there is vacuum present at this point in time it could indicate a faulty diversion valve.

If a secondary milk line is installed the meter will toggle through normal milking, hold, secondary and divert. If no divert line is installed, the operation of this key can be configured in the DairyMaster Milk Manager.

Warning:

The diversion line is not suitable for milking cows that have been treated with antibiotics. Cows that have been treated with antibiotics must be milked with a separate cluster or milked last in accordance with the EU Milk Hygiene Directive 92/46.

3.2.2. The F2 Key.

F2 This key is in use with the personal computer only and is used for swapping sides in the milking parlour.

On a rotary parlour, if cow retention is installed, this button is used to toggle on/off Cow Retention.

3.2.3. The F3 key.

F3 This key is normally used with drafting.

The operation of this key can be configured in the DairyMaster Milk Manager.

3.2.4. The Function key.

This key is used when the meter is to perform a function. A function is initiated by pressing the Function key followed by pressing the required function number and then pressing



Example: Function 101 : Puts all milk meters into wash mode.


Press     .

3.2.5. The Enter key.

The Enter key is pressed after the correct function number has been

entered .

3.2.6. The Start key.

The Start key  is used to start milking. The milk meter will then start monitoring milk production of the cow. Alternatively a swing over arm or switch will perform this function.

Note: Ensure air is not admitted into the cluster after Start is pressed, as this may trigger a 'TARE OUT O RANGE' error. The meter displays 'TARE OUT O RANGE', when the


empty weigh cup is more than 500 grams heavier than the weight of the empty weigh cup recorded during calibration.

3.2.7. The Stop key.


The Stop key is used when the cow has finished milking. When the cluster has been removed press



3.2.8. The Restart key.

The  button is used if the cluster should fall off a cow and the ACR had been activated, this will re-release the cluster and ensures that the ACR and PC is aware that the cluster is not been put on a new cow.

3.2.9. The ACR on/off key.

The  key is used to control the Automatic Cluster Remover. After

pressing  you may override the Automatic Cluster Remover by

pressing the  button. The following screen appears (take note of the * on the display).



As the Automatic Cluster Remover is disabled at this stage the cluster must be removed manually and



pressed at the end of milking.

3.3. The milk meter control unit display screen.



Figure 6 Control unit display screen.

Figure 6 shows the initial stage when the milk meters are ready for milking and waiting to start.

All the messages will be displayed on the bottom line of the display screen. These messages indicate the current function of the milk meter. One of the following messages will be displayed on the bottom line during the milking process.

-- FILLING CUP --

-- INFLIGHT DELAY --

-- EMPTYING CUP --

The top line of the display screen is where the milk yield is displayed. The milk yield will remain on display on the top line of the display screen until



the key is pressed. The



key re-sets the milk yield to zero.

Figure 7 shows the electronic control unit display screen. The top line is where the milk yield is shown and the bottom line is where the messages are displayed.




Figure 7 Control unit display screen.

4. Milk recording.

Steps in milk recording.

To begin milking

1. Press the  key on the electronic control unit. Alternatively a swing-over arm or switch will perform this function.

2. Put the cluster on the cow.

3. When the cow is finished milking first remove the cluster then

press .

4. Record milk yield from display screen by writing down in a notebook. This must be noted before

pressing  again as pressing start sets the milk yield back to zero.

5. The next cow can now be milked;

--WAITING START --

should now be displayed on the display screen of the control unit.

Press  and then put the cluster on cow.

5. Sampling.

1. Put empty sample bottle in place.

2. Turn the sampling tap to TEST.



Figure 8 Test position.

3. Press  and begin milking.

4. When finished milking close the shut off valve on the claw-piece and remove the cluster then press



Figure 9 Hold position.

5. Turn the sample bottle to HOLD and remove the sample bottle.

6. Shake the sample bottle by inverting the bottle at least twice and then remove the amount of sample required.



Figure 10 Test position.

IMPORTANT:

It is important that the sample bottle is inverted at least twice when finished milking to ensure good sampling.

Occasionally the sample bottle may be completely full with very high yields, in this case it is necessary to transfer the sample into a larger bottle before mixing.

Note: When washing the machine after sampling put the wash cap into place and turn the sample tap to TEST. You should also open the sample caps after washing to drain any residual water and ensure effective cleaning.



Figure 11 Empty position.

When a sample is not required, the sample tap can be left in the EMPTY position for both milking and washing.



Figure 12 Remove position.

Remove and lubricate the sample tap periodically, to maintain free movement.

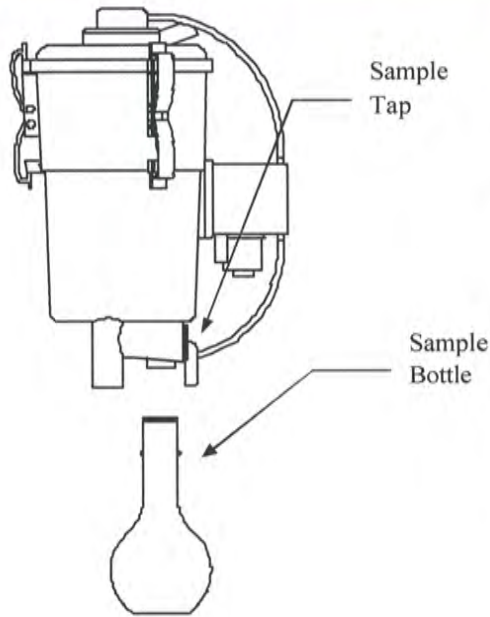


Figure 13 Meter and sample cup.

6. Washing.

The washing procedure is one of the most important procedures in the milking process. This washes the milk meters and washes out the milk line when milking is complete. Always use [DairyMaster Liquid Gold](#) detergent and a minimum of 10 litres of water per milking unit is recommended, normal washing procedures for this product should be followed. If one wishes to use a detergent other than Liquid Gold when washing the milk meter then the compatibility of the detergent with the milk meters materials should be checked.

6.1. Entering wash mode.

To put the meters into wash mode type in function 101 at the electronic control unit of any meter. This function can be entered at any meter and it will automatically put all of the meters into wash mode.



Press

Now all the meters are in wash mode. The display screen on the electronic control unit will look like this in the first stage of the washing procedure.

6.1.1. Single Meter Wash Mode, Function 107.

To set an individual meter in wash mode:



Press

6.2. The display screen when in washing mode.



The bottom line of the display screen displays the stages that the washing procedure is in. The washing procedure is as follows:

- FILL CUP --
- FILL TOP --
- FLOOD CUP --
- EMPTY METER --

6.3. Exiting wash mode.

There are two ways of exiting the wash mode.

1. Turn off the power.

OR

2. Type in  followed by:    then .

Function 100: Normal mode i.e. this terminates washing mode and puts the meters into normal mode which is recording mode.

6.3.1. Single Meter Normal Mode, Function 108.

To set an individual meter in normal mode:

Press     .

6.4. External washing.

Refrain from spraying the outside of the milk meters with excessive amounts of water as this only increases the build up of lime scale externally.

It is recommended that the electronic control units are not sprayed with high-pressure jets and that cleaning detergents are not used on it. To clean, simply wipe with a damp cloth.

7. Important function numbers and meanings.

These are the function numbers that are used most often.

Function no.	Definition of Function
100	Normal mode.
101	Wash mode.
102	Meter open - non-recording mode.
103	Hold, Jettors down Left.
104	Hold Jettors down Right.
106	Normal – Leave jetter down.
107	Wash mode – no broadcast.
108	Normal mode – no broadcast.


8. Non recording - meter open mode, Function 102:

When using Function 102, which is milking without recording, the top and bottom valves in the milk meter are opened and the milk flows straight through the milk meter and into the milk line without being weighed.

Steps in milking without recording.

1. Start the milking machine in the normal manner.

2. On any electronic control unit

on any milk meter press  followed by the function number i.e.



This starts the straight through mode. This will speed up the milking process but it will not display the milk yields.

3. Follow normal washing procedures outlined previously i.e. using function 101.

4. Turn off power.

9. Hold, Jetters Down, Function 103/104.

If the wash jettors are on the left, and function 103 is entered whilst milking the last row on the right:

When the arm is then swung to the left, after the cluster has been removed, the cluster will be dropped but no vacuum is applied. Allowing the cluster to be attached on the wash jettors.

Use function 104 if the wash line is on the right side.

10. Maintenance.

- Ensure the Meter is kept in good condition, otherwise it will affect the overall accuracy of the meter.
- All milk meters should be kept level, straight and upright as when they were installed and should be serviced once per year or every 7000 milkings which ever occurs first.
- Ensure the sample taps are periodically removed, cleaned and lubricated to maintain free movement.

11. Certificate of Conformity.

Certificate of Conformity.

The company herewith declares that the Dairymaster Weighall Milk Meter when installed correctly is in conformity with the following legislation and international standards:

Machinery Directive (89/392/EEC).

EMC Directive (89/336/EEC and 92/31/EEC).

Low Voltage Directive (73/23/EEC and 93/68/EEC).

EN50081-1 Generic Emission Standard.

EN50082-1 Generic Immunity Standard.

ISO 5707:1996 Milking machine installations - Construction and performance.

ISO 5707:1996/Cor 1:1997

ISO 3918:1996 Milking machine installations -- Vocabulary

ISO 6690:1996 Milking machine installations -- Mechanical tests

Dairymaster, Causeway, Co. Kerry, Ireland.

November 1999

6. Milk Meter Calibration Function 1976.

Note:

The settings in each individual milk meter must be calibrated before being put into operation. The calibration must take place on each farm as each meter must be calibrated individually and on the site they are going to be in operation. The meter must also be recalibrated after any service work.

CAUTION: The vacuum must be on when calibrating the meter to get a proper calibration reading.



Figure 37 Cap on load cell housing.

1. Remove the cap from the load cell housing. Figure 37 Cap on load cell housing



Figure 38 Calibration weight.

2. Enter the calibration mode. To enter the calibration mode for each individual meter, press the



key, then type in



then press



again.

3. Edit the calibration setup values.



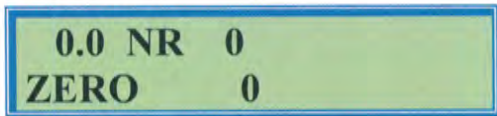
Press to move through the

calibration setup values, the only values that can be edited here are : *Comms En 1*, This is always 1 so that the meters will be able to talk to each other, i.e. using the comms wire.



This Address on each meter has to have a unique address so that the PC can communicate with it. (meter + 10).

i.e. meter 2 +10 = address 12
meter 3 +10 = address 13 etc...

4. Calibration parameter *zero* is then arrived at.




Ensure the meter is in a steady position.

Then press the  key and keep it pressed for 20 seconds, release the  key.

This is the number of counts of the load cell that corresponds to zero weight.

5. Press Enter again, the display screen should now have *span* on display. Hang the known test weight from the calibration hook and make sure it is not moving, swinging or touching anything i.e. keep it steady.

Keep the  key pressed for 20 seconds. Release the Function key. The meter now knows the effect of 500g on the load cell.

6. Then press  again, *cal factr* should now be on display. Key in the appropriate *cal factr* value.

Note:

Zero, span and cal factr values are used by the meter to automatically calibrate itself and give an accurate reading when milk recording.

Calibration Values.

Parameters	Meaning	Value
Comms En	Allows the meters to communicate with each other.	1:-ON
This Addr	Each meter must have a unique address so that the PC can communicate with it.	From 11 -to 120
Zero	Reading from the load cell when there is no weight in the cup.	From -14,000 to + 14,000
Span	Reading from the load cell when the test weight is applied	From 4000 – 7000
Cal Factr	The Calibration Factor	528

Table 15. Calibration values.

7. Milk Meter functions.

The following is a table containing the milk meter functions.

Function	Description
Function 1975	Setup Mode. (See Section 5.2)
Function 1976	Calibration Mode. (See Section 6)
Function 1977	Keypad Test. (See Section 10.1.4)
Function 1978	Comms Test.
Function 1979	Exit display parameters.
Function 1980	Display CurrentFlowRate, AcrRate and TimeSinceTrip.
Function 1981	Display CurrentFlowRate, AcrRate and MinMilkingTimer.
Function 1982	Display / Test inputs.
Function 1983	Display / Test outputs.
Function 1984	Display Version number.
Function 1985	Display / Test Expander board inputs/ outputs.
Function 1986	Broadcast settings to all meters. Requires V3.29
Function 1987	Settings Checksum.
Function 1988	Conductivity Settings.
Function 1989	All Meters show Conductivity & Temperature Readings.
Function 1990	All Meters show Average Conductivity & Temperature.
Function 1991	All Meters show Conductivity on all three probes.
Function 1992	Pulse Comms Test Mode.

Table 16 The milk meter functions.

7.1. Function 1980.

Display CurrentFlowRate, AcrRate and TimeSinceTrip.

This function is used to display the current flow rate (flow of milk into the weigh chamber), the ACR rate (flow

rate below which the ACR is activated) and time since last cup empty.

These factors will be useful in trouble shooting problems where the ACR is not being activated when it should be.

To exit this function one must enter FUNCTION 1979.

7.2. Function 1981.

Display CurrentFlowRate, AcrRate and MinMilkingTimer.

This function is used to display the current flow rate, the ACR rate and MinMilkingTimer (amount of time the cluster will remain on the cow regardless of flow rate).

These factors will be useful in trouble shooting problems where the cluster is been removed from the cow prematurely or when the ACR is remaining on too long. To exit this function one must also enter FUNCTION 1979.

7.3. Function 1982.

This function is extremely useful to test if the milk meter is receiving external inputs e.g. the signal from the swing over arm.

While in this function one will see an X for an unused input a 0 for a positive signal and a 1 for either a ground or unconnected terminal.

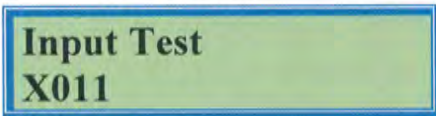


Figure 39 Input test.

In Figure 39 Input test shows a meter in Function 1982. If the meter is functioning correctly then on pushing the swing over arm to the other side the display will change to the following.





Figure 40 Input test (swing over arm at opposite side).

Character.	Representation.
1	Unused.
2	Swing arm left.
3	ACR float switch.
4	Swing arm right.

Table 17 Input test displays.

7.4. Function 1983.

This function is used to display and test the outputs. Figure 41 Output test (normal milking) shows the out put test while a machine is milking in normal mode. While in the output test the solenoid valves can be tested by

pressing  and  to toggle the top and bottom solenoid valves respectively.

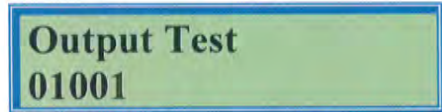


Figure 41 Output test (normal milking).

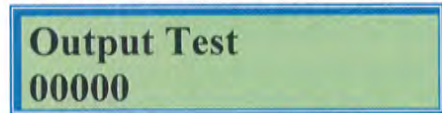


Figure 42 Output test (milking in hold mode).

Character.	Representation.
1	Meter, top valve.
2	Meter, bottom valve.
3	ACR ram.
4	Diversion valve, divert.
5	Diversion valve, milk.

Table 18 Output test display explained.

7.5. Function 1984.

Display the Meter version number.

7.6. Function 1985.

This function displays the status of the inputs(1 to 4) to the expander board.

**IP:0000 OP:1000
EXPANDER 1 OK**

Inputs (IP):

Character.	Representation.
1	Not used.
2	Not used.
3	Not used.
4	Not used.

Outputs (OP):

Character.	Representation.
1	Main Milk Line.
2	Secondary Milk Line/ Platform Teat Spray/ C/C Water
3	Hold Cow.
4	C/C Air

Inputs (IP) Milkmeter 2 board

Character.	Representation.
1	Not used.
2	Not used.
3	Not used.
4	Not used.

Outputs (OP):Milkmeter 2 board

Character.	Representation.
1	Main Milk Line.
2	Secondary Milk Line
3	Platform Teat Spray.
4	

Keys 1 to 4 toggle outputs 1 to 4.



switches to expander board 2



and switches back to expander board 1.

7.7. Function 1986.

This function configures all meters with the settings of the current meter (Table 14 Milk Meter settings.).

**Broadcast Setups
MESSAGES 1**

Note: Requires V3.29 or greater.

7.8. Function 1987.

This function gets all meter terminals to display a checksum of Function 1975 settings and Function 1976 settings.

All meters should have the same function 1975 settings i.e. all meters display the same checksum for 1975. All meters should have different Function 1976 settings i.e. all meters should display different checksums for 1976.

**METER SETUP CHK
8223 10228**

1975 chksum

1976 chksum

Note: Requires V3.29 or greater.

7.9. Function 1988.

Modify Conductivity settings.

Setup parameters	Meaning	Default Value
CondSampT	Sample Time	400
Temp Cal	Temperature Calibration	30000
Stream En	Enable Streaming	0

7.10. Function 1989.

All meters display Conductivity and Temperature values.

7.11. Function 1990.

All meters display Average Conductivity and Temperature values.

7.12. Function 1991.

All meters display Conductivity values on all three probes.

7.13. Function 1992.

Test Mode : Milk Meter outputs a Pulse on the Comms line.

8. Maintenance.

8.1. Annual Service:

- Replacement of rubber diaphragm on top valve.
- Replacement of rubber diaphragm on bottom valve.
- Replacement of top valve grommet.
- Replacement of bottom valve grommet.

8.2. Every second Service:

- Replacement of load-cell grommet.
- Replacement of top and bottom valves if necessary.

8.3. Disassembly of the milk meter.

1. Care is essential when disassembling the milk meter.
2. Switch off all power.
3. Unplug the connecting lead and remove the milk meter from the milking line, this will facilitate disassembly of the milk meter at a convenient working height.
4. Remove the upper and lower vacuum lines (clear plastic tubes) from the blue load-cell housing.
5. Remove the top cover by unfastening the upper assembly clips.

6. Remove the separation chamber by unfastening the remaining assembly clips.
7. Unscrew the calibration pin cap and calibration pin.
8. Remove the four bolts between the load-cell housing and the main chamber.
9. While carefully holding the weighing cup in position, remove the load-cell housing by gently pulling on it. It is essential not to apply excessive force as this can lead to damage of the sensitive load-cell.
10. Remove the plastic spacer between the load-cell grommet and load-cell.
11. The weighing cup may now be removed.
12. The top and bottom valves need now be disassembled, remove the four bolts holding the diaphragm covers in position. Disassemble as shown in Figure 43 Disassembly of milk meter.
13. All parts are now easily accessible.

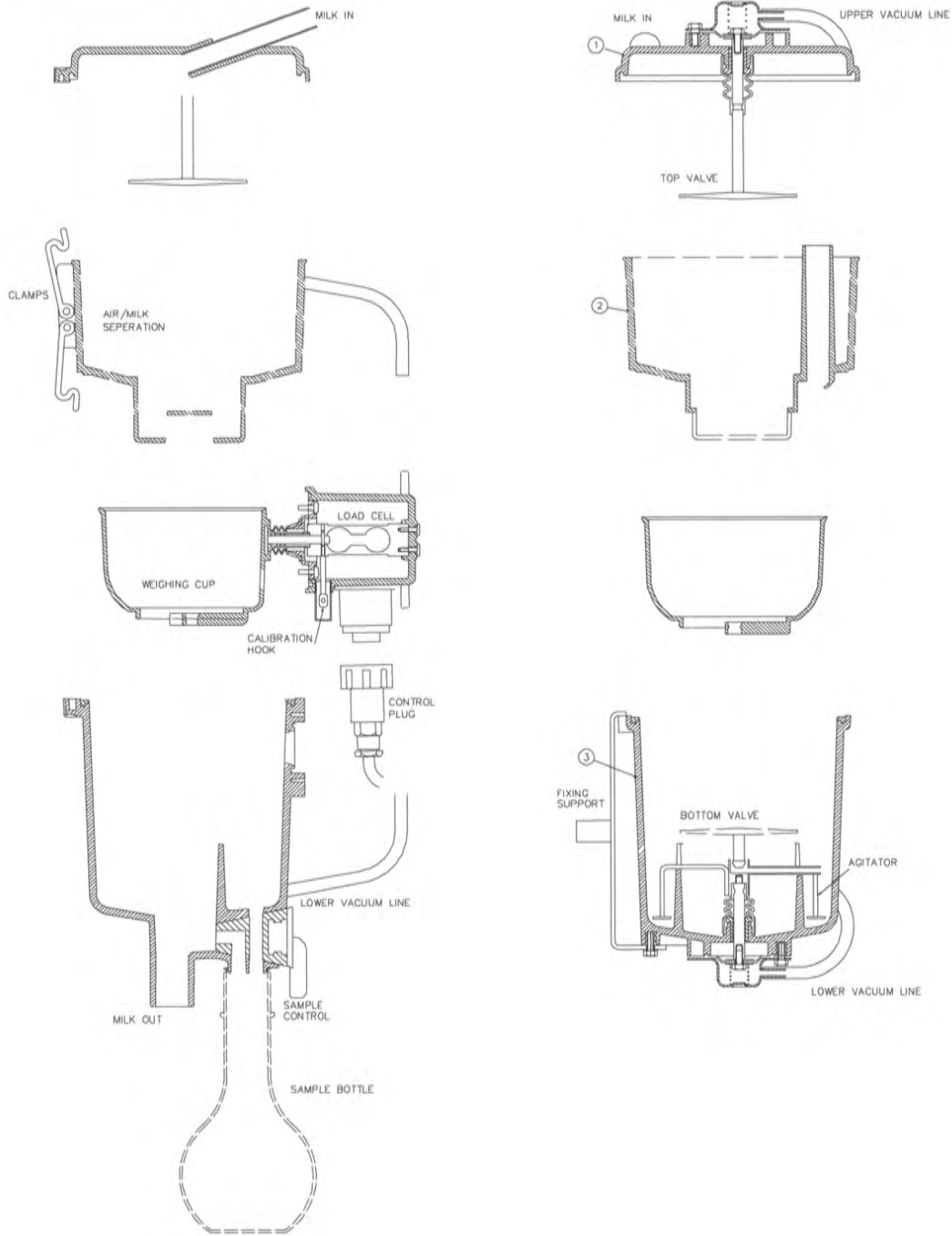


Figure 43 Disassembly of milk meter.

9. Milk Meter Board Upgrade / Downgrade.

When upgrading Weighall Milk Meters to take advantage of new advanced features e.g. 6 Digit CowIDs and Milk Manager Version >1.13, it may be necessary to upgrade from a three microchip system to a single faster microcontroller system. The newer microcontroller (V4.00) supports Swiftdevice upgrades allowing Weighall Milk Meters to be upgraded in the future to the latest version via comms from the PC without necessitating changing of the microcontroller.

Important: All Milk Meters in an installation should be the same version to ensure all units function correctly.

Warning: Microcontrollers and EPROM devices are static sensitive and appropriate precautions should be taken when handling.

9.1. Upgrade EPROM Milk Meter Board (<3.29) to support Single Microcontroller (>3.30).

To upgrade Weighall Milk Meter version <3.29 the following changes are required:

Link jumpers: J1, J6 and J7.

Unlink jumpers: J2 (Cut track linking pin of J2 if present)

Unlink jumpers: J8 (Cut track linking pins of J8 if present).

Remove U1, U2 and U3.

Insert New U1 chip (MM201 Microcontroller).

9.2. Downgrade Single Microcontroller Milk Meter Board (>3.30) to support EPROM (<3.29).

To replace a new meter board into an existing installation (<3.29) the following changes are required to support the older MM178 EPROM:

256K EPROM (MM178):

Link jumper: J8.

Unlink jumper: J7.

Additionally for an older 128K EPROM:

Link jumper: J2.

Unlink jumper: J1 (Cut track linking pins of J1 if present).

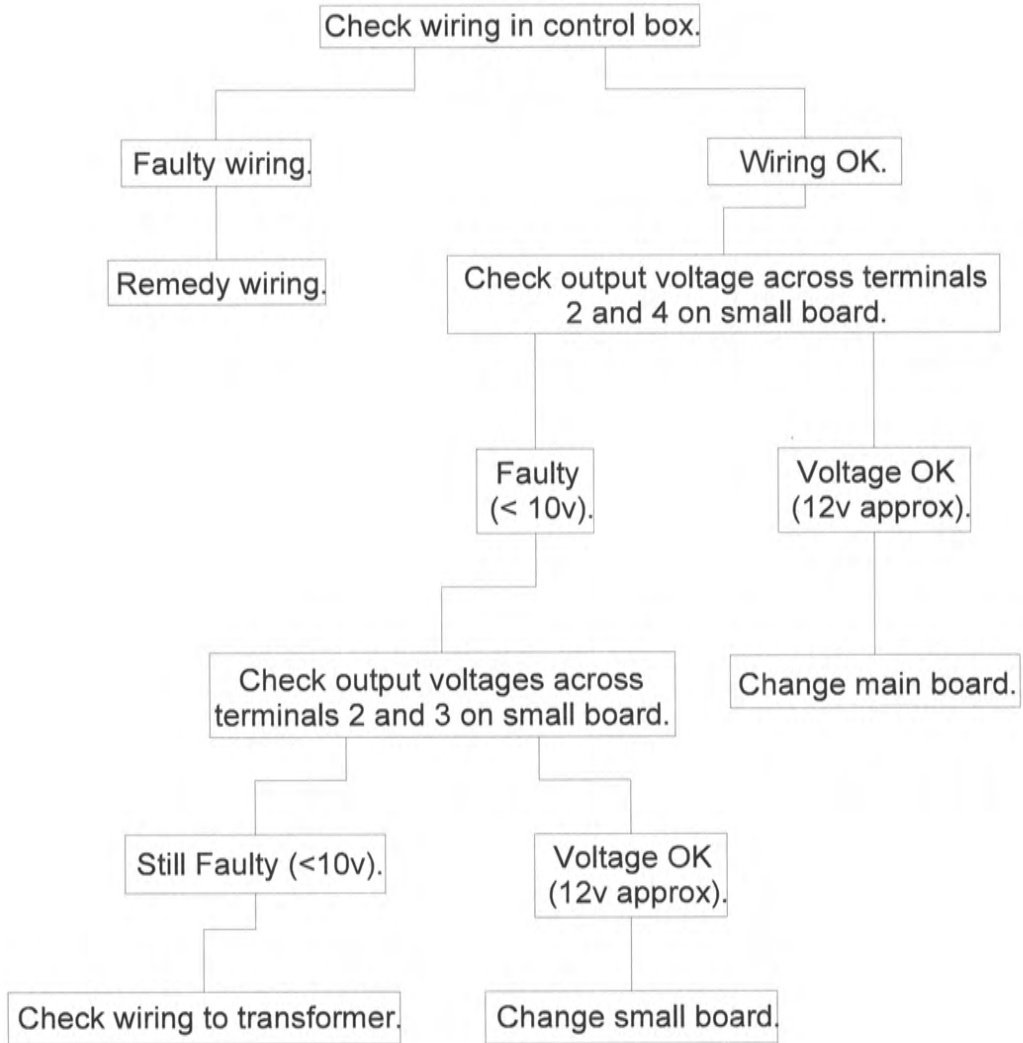
Remove U1 (MM201).

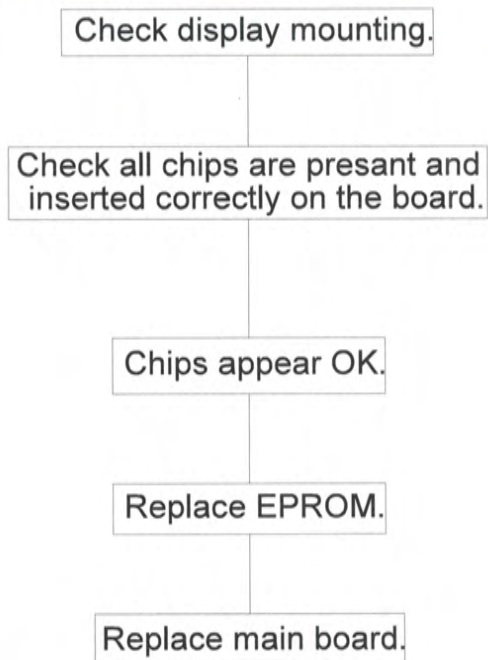
Insert older U1, U2 and U3.

10. Troubleshooting.

10.1. Control Box

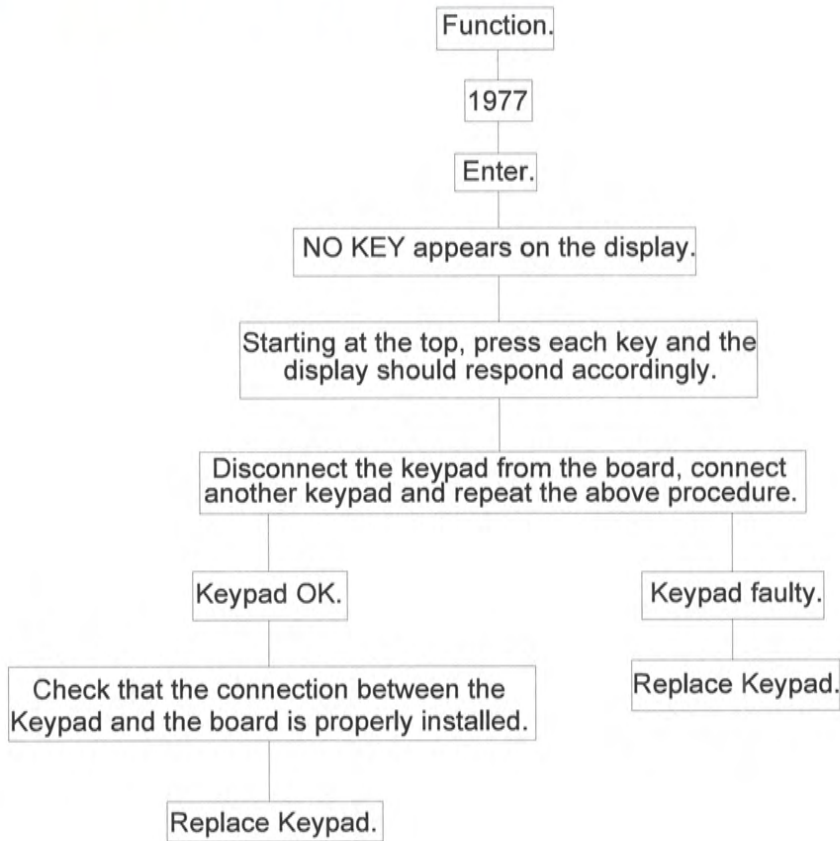
10.1.1. Display will not light up.



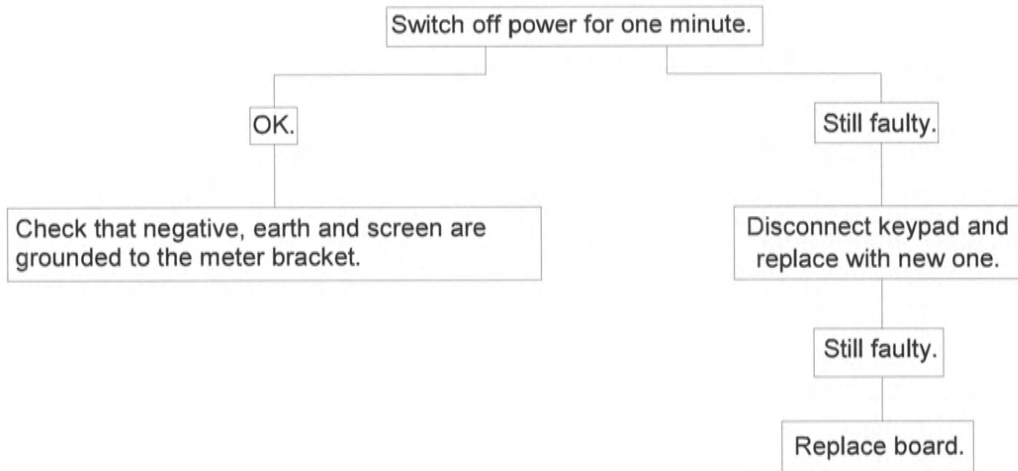
10.1.2. Display lights up and boxes appear on the screen.**10.1.3. Display characters very faded.**

Adjust pot on rear of board until characters are clear.

10.1.4. Keypad check.

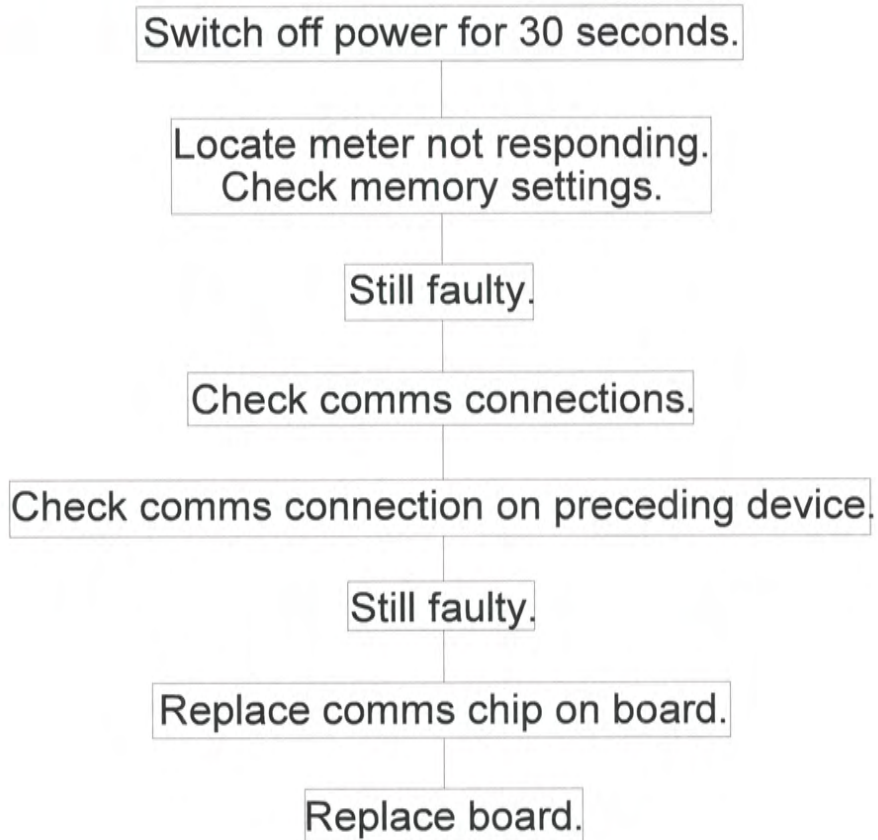


10.1.5. Keypad does not activate meter.



10.2. Communications.

10.2.1. One meter not communicating.



10.2.2. Inconsistent comms.

Faults on the communications system are typically due to:

- Termination resistor not fitted or incorrect value.

Perform the **resistance test**.

- Bad connections or incorrect wiring.

Perform the **parlour halving test**.

- Incorrect addresses in device or PC.
- Incorrect settings.
- Damaged communications chip due to lightening etc.
- High neutral to earth voltage.
- Incorrect serial port selected on PC.

Perform the **comm port test**.

- T-junction in communications network.

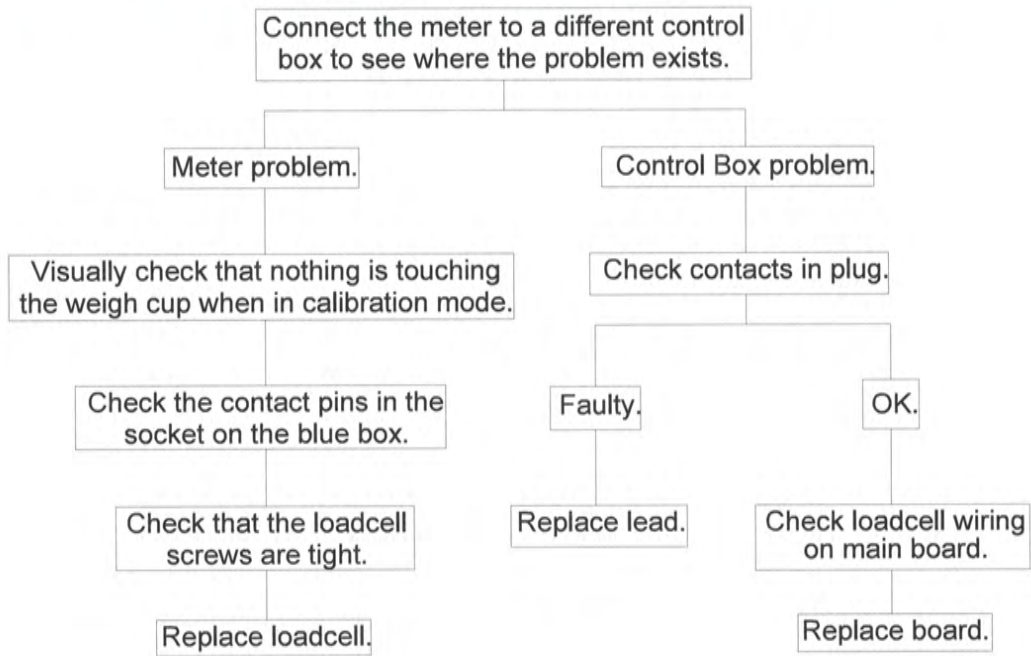
See Communication Testing Procedure Manual.

10.2.3. "ISP MODE – CODE 2".

On power up, the meter displays "ISP MODE – CODE 2" and does not respond to any key press.

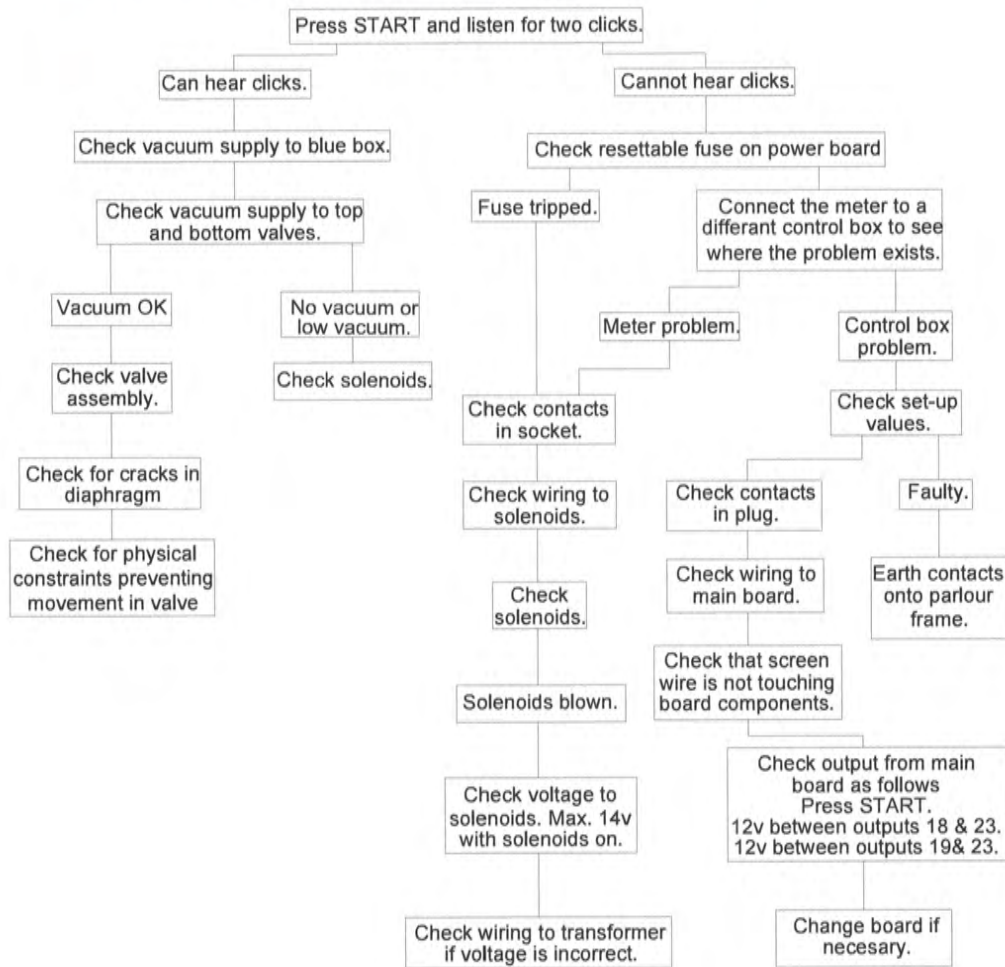
- Check the communication wiring (see Section 10.2.2 above).
 - Check for A and B connected the wrong way round.
 - Perform the **parlour halving test** to identify the effected device(s).

10.3. 'Low' or 'high' appears on the display when calibrating meter.



10.4. Valve does not open / close.

Top valve or Bottom valve does not open / close.



10.5. Total yields recorded differ to volume in tank.

- Milk Meter Yields are recorded in kg, and total yield values displayed by DairyMaster Milk Manager are in kg. Tank volumes are usually measured in Litres.

Litres of milk may be converted to kg of milk using the following formula:

$$\text{Litres of Milk} \times 1.03 = \text{kg of Milk.}$$

- Ensure all yields for all cows were recorded and are valid i.e. check for very high or very low values that may indicate erroneous readings.
- Account for milk removed from the tank e.g. for feeding to calves.
- For official milk recording purposes a tolerance of $\pm 2\%$ is considered acceptable.

10.6. Water Test

Prior to performing the water test:

Ensure that the meter is operating correctly and all valves are sealing correctly. (See Section 7.4 On using Function 1983 to open and close the top and bottom valves.)

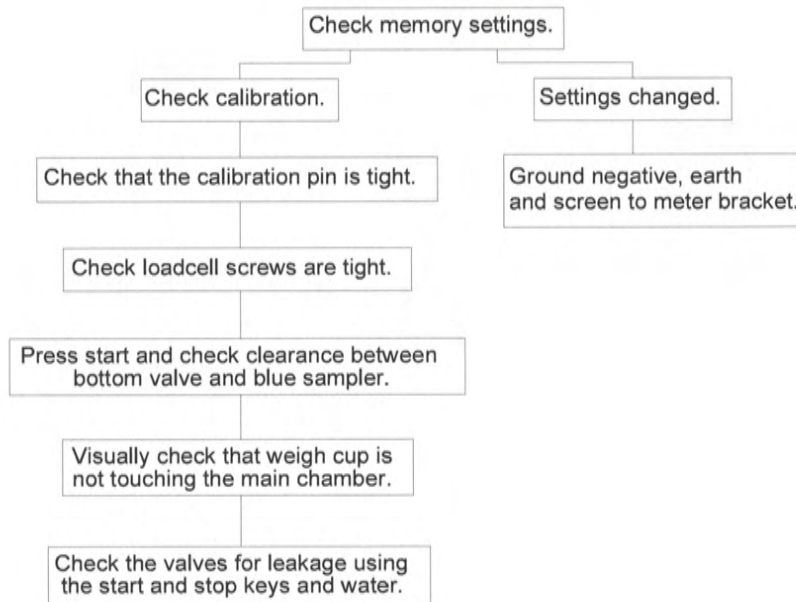
Milk meter calibration can be tested as follows:

- Fill a 10 to 20-litre container with water.
- Place the container on an accurate weighing scale and take careful note of the total weight of the water.
- Enter the calibration mode (Function 1976) of the meter under test and change the cal factor to 550 for water.
- Disconnect the cluster milk tube for the meter under test and connect the Milk meter calibration tube to the milk line. The Milk meter calibration tube has a 4mm bore with a 1mm air bleed hole near the top.
- Start the milking machine as normal.
- Place the end of the Milk meter calibration tube beneath the level of the water allowing water to be sucked up but not any air.
- Ensure that the water is not entering the top chamber of the meter too quickly as this would not be realistic and give a false reading.
- Stop the vacuum when the water has been sucked up.
- Ensure water in the milk tube is drained back to the container.
- Calculate the weight of the water that passed through the meter by subtracting the weight of the water remaining in the container.

Repeat the above procedure two more times and calculate an average for the results.

Note: If it is determined that the weight measurements recorded by a meter are outside the meter tolerance of $\pm 2\%$, the Cal Factor (528, default for milk) can be modified by the required percentage. For example, if the recorded value is 4% too high then decrease the Cal Factor by 4%.

10.7. Suspected inaccuracy in readings.



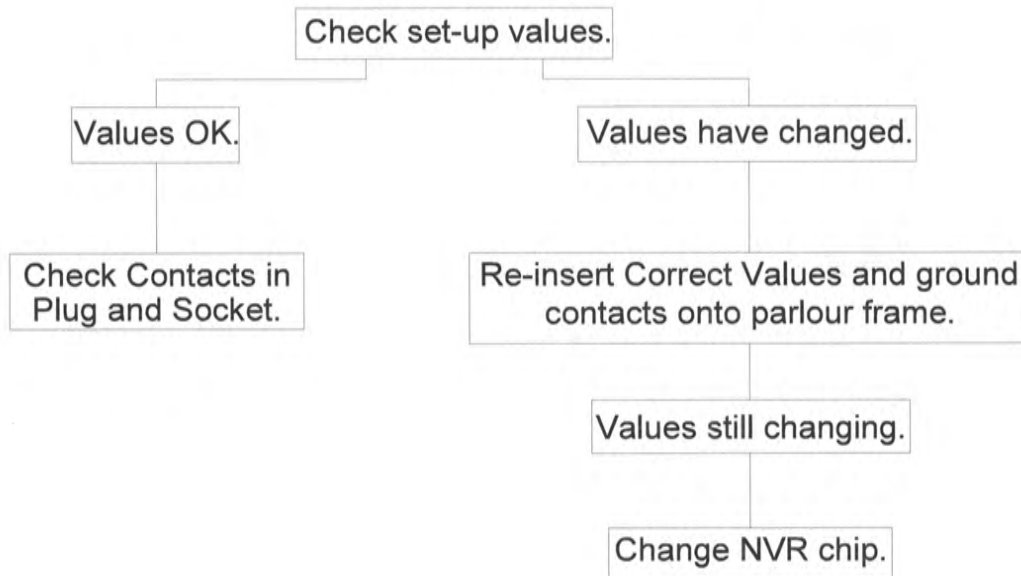
10.8. 'TARE OUT O RANGE' appears on the display.

The meter displays 'TARE OUT O RANGE', when the empty weigh cup is more than 500 grams heavier than the weight of the empty weigh cup recorded during calibration.

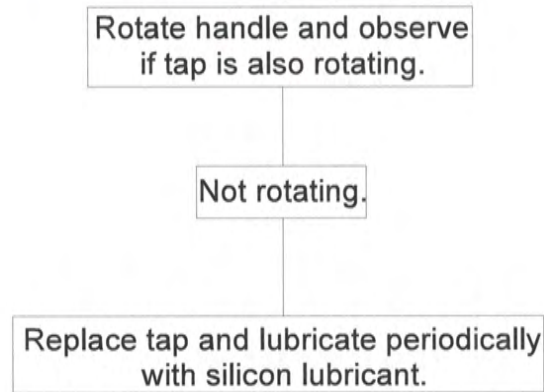
Ensure that the operator does not allow air to be admitted into the cluster when starting a new cow.

- Ensure air is not admitted into cluster after the meter is started.
- Check weigh cup travel is un-inhibited.
- Check meter settings.
- Calibrate meter.

10.9. Meter not functioning correctly.



10.10. Sample tap not functioning correctly.



10.11. Cluster Cleanse not functioning correctly.

