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.
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.

![Diagram of milk meter](image)

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.

![Flow diagram](image)

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.](image)

3.2. The control unit keys.

3.2.1. The F1 key.

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.

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.

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.

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.
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.

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

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

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 100 followed by:

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


To set an individual meter in normal mode:

Press F108

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.

<table>
<thead>
<tr>
<th>Function no.</th>
<th>Definition of Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Normal mode.</td>
</tr>
<tr>
<td>101</td>
<td>Wash mode.</td>
</tr>
<tr>
<td>102</td>
<td>Meter open - non-recording mode.</td>
</tr>
<tr>
<td>103</td>
<td>Hold Jutters down Left.</td>
</tr>
<tr>
<td>104</td>
<td>Hold Jutters down Right.</td>
</tr>
<tr>
<td>106</td>
<td>Normal - Leave jitter down.</td>
</tr>
<tr>
<td>107</td>
<td>Wash mode - no broadcast.</td>
</tr>
<tr>
<td>108</td>
<td>Normal mode - no broadcast.</td>
</tr>
</tbody>
</table>
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.

   ![Function Button]

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.

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

EN50081-1 Generic Emission Standard.
EN50082-1 Generic Immunity Standard.
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

**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.

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

2. Enter the calibration mode.
   To enter the calibration mode for each individual meter, press the `F` key, then type in
   `1 9 7 6` 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.

```
  0.0 NR  0
  ZERO   0
```
Ensure the meter is in a steady position.
Then press the button 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.

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

Table 15. Calibration values.

7. Milk Meter functions.

The following is a table containing the milk meter functions.

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

Table 16 The milk meter functions.

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.
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.

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.

![Input Test X011](image)

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.

<table>
<thead>
<tr>
<th>Character</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unused</td>
</tr>
<tr>
<td>2</td>
<td>Swing arm left</td>
</tr>
<tr>
<td>3</td>
<td>ACR float switch</td>
</tr>
<tr>
<td>4</td>
<td>Swing arm right</td>
</tr>
</tbody>
</table>

Table 17 Input test displays.

This function is used to display and test the outputs. Figure 41 Output test (normal milking) shows the output test while a machine is milking in normal mode. While in the output test the solenoid valves can be tested by pressing [1] and [2] to toggle the top and bottom solenoid valves respectively.

![Output Test 01001](image)

Figure 41 Output test (normal milking).

![Output Test 00000](image)

Figure 42 Output test (milking in hold mode).

<table>
<thead>
<tr>
<th>Character</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meter, top valve</td>
</tr>
<tr>
<td>2</td>
<td>Meter, bottom valve</td>
</tr>
<tr>
<td>3</td>
<td>ACR ram</td>
</tr>
<tr>
<td>4</td>
<td>Diversion valve, divert.</td>
</tr>
<tr>
<td>5</td>
<td>Diversion valve, milk.</td>
</tr>
</tbody>
</table>

Table 18 Output test display explained.
Display the Meter version number.

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

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

Inputs (IP):

<table>
<thead>
<tr>
<th>Character</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used.</td>
</tr>
<tr>
<td>2</td>
<td>Not used.</td>
</tr>
<tr>
<td>3</td>
<td>Not used.</td>
</tr>
<tr>
<td>4</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Outputs (OP):

<table>
<thead>
<tr>
<th>Character</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Milk Line.</td>
</tr>
<tr>
<td>2</td>
<td>Secondary Milk Line/ Platform Teat Spray/ C/C Water</td>
</tr>
<tr>
<td>3</td>
<td>Hold Cow.</td>
</tr>
<tr>
<td>4</td>
<td>C/C Air</td>
</tr>
</tbody>
</table>

**Inputs (IP) Milkmeter 2 board**

<table>
<thead>
<tr>
<th>Character</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used.</td>
</tr>
<tr>
<td>2</td>
<td>Not used.</td>
</tr>
<tr>
<td>3</td>
<td>Not used.</td>
</tr>
<tr>
<td>4</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

**Outputs (OP): Milkmeter 2 board**

<table>
<thead>
<tr>
<th>Character</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Milk Line.</td>
</tr>
<tr>
<td>2</td>
<td>Secondary Milk Line</td>
</tr>
<tr>
<td>3</td>
<td>Platform Teat Spray.</td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Keys 1 to 4 toggle outputs 1 to 4.

**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 checksum

1976 checksum

Note: Requires V3.29 or greater.
Modify Conductivity settings.

<table>
<thead>
<tr>
<th>Setup parameters</th>
<th>Meaning</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CondSampT</td>
<td>Sample Time</td>
<td>400</td>
</tr>
<tr>
<td>Temp Cal</td>
<td>Temperature Calibration</td>
<td>30000</td>
</tr>
<tr>
<td>Stream En</td>
<td>Enable Streaming</td>
<td>0</td>
</tr>
</tbody>
</table>

All meters display Conductivity and Temperature values.

All meters display Average Conductivity and Temperature values.

All meters display Conductivity values on all three probes.

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.
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.

Check wiring in control box.

Faulty wiring.
Remedy wiring.

Wiring OK.
Check output voltage across terminals 2 and 4 on small board.

Faulty (< 10v).
Voltage OK (12v approx).

Check output voltages across terminals 2 and 3 on small board.

Still Faulty (<10v).
Check wiring to transformer.

Voltage OK (12v approx).
Change small board.
Change main board.
10.1.2. Display lights up and boxes appear on the screen.

Check display mounting.

Check all chips are present and inserted correctly on the board.

Chips appear OK.

Replace EPROM.

Replace main board.

10.1.3. Display characters very faded.

Adjust pot on rear of board until characters are clear.

Function.

1977

Enter.

NO KEY appears on the display.

Starting at the top, press each key and the display should respond accordingly.

Disconnect the keypad from the board, connect another keypad and repeat the above procedure.

Keypad OK.

Keypad faulty.

Check that the connection between the Keypad and the board is properly installed.

Replace Keypad.

Replace Keypad.
10.1.5. Keypad does not activate meter.

Switch off power for one minute.

OK.

Check that negative, earth and screen are grounded to the meter bracket.

Still faulty.

Disconnect keypad and replace with new one.

Still faulty.

Replace board.
10.2. Communications.

10.2.1. One meter not communicating.

- Switch off power for 30 seconds.
- Locate meter not responding. Check memory settings.
  - Still faulty.
  - Check comms connections.
  - Check comms connection on preceding device.
  - Still faulty.
  - Replace comms chip on board.
  - Replace board.
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.


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.

Connect the meter to a different control box to see where the problem exists.

Meter problem.

Visually check that nothing is touching the weigh cup when in calibration mode.

Check the contact pins in the socket on the blue box.

Check that the loadcell screws are tight.

Replace loadcell.

Control Box problem.

Check contacts in plug.

Faulty.

Replace lead.

OK.

Check loadcell wiring on main board.

Replace board.
10.4. Valve does not open / close.
Top valve or Bottom valve does not open / close.

Press START and listen for two clicks.

Can hear clicks.
- Check vacuum supply to blue box.
  - Check vacuum supply to top and bottom valves.
    - Vacuum OK
    - No vacuum or low vacuum.
      - Check solenoids.
        - Check valve assembly.
          - Check for cracks in diaphragm
            - Check for physical constraints preventing movement in valve
              - Check voltage to solenoids. Max. 14v with solenoids on.
    - Check solenoids.
      - Solenoids blown.
        - Check wiring to solenoids.
          - Check output from main board as follows:
            - Press START.
            - 12v between outputs 18 & 23.
            - 12v between outputs 19 & 23.
          - Change board if necessary.

Cannot hear clicks.
- Check resettable fuse on power board.
  - Fuse tripped.
    - Connect the meter to a different control box to see where the problem exists.
      - Control box problem.
        - Check set-up values.
          - Faulty.
            - Check that screen wire is not touching board components.
              - Earth contacts onto parlour frame.
                - Check wiring to main board.
                  - Check contacts in plug.
                    - Check contacts in socket.
                      - Meter problem.
                        - Control box problem.
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 ±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 ±2%, the Cal Factr (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 Factr by 4%.
10.7. Suspected inaccuracy in readings.

Check memory settings.

Check calibration.
- Check that the calibration pin is tight.
- Check loadcell screws are tight.
- Press start and check clearance between bottom valve and blue sampler.
- Visually check that weigh cup is not touching the main chamber.
- Check the valves for leakage using the start and stop keys and water.

Settings changed.
- Ground negative, earth and screen to meter bracket.
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.

Diagram:
```
  Check set-up values.
      Values OK.
          Check Contacts in Plug and Socket.
      Values have changed.
          Re-insert Correct Values and ground contacts onto parlour frame.
              Values still changing.
                  Change NVR chip.
```

10.10. Sample tap not functioning correctly.

Rotate handle and observe if tap is also rotating.

Not rotating.

Replace tap and lubricate periodically with silicon lubricant.

10.11. Cluster Cleanse not functioning correctly.

No Water at Cluster

Check water supply to tank

Check the float switch.

Check the on/off switch.

Check seals in pump

Check inline filter on the water solenoid

Check 12v at Coil when operating