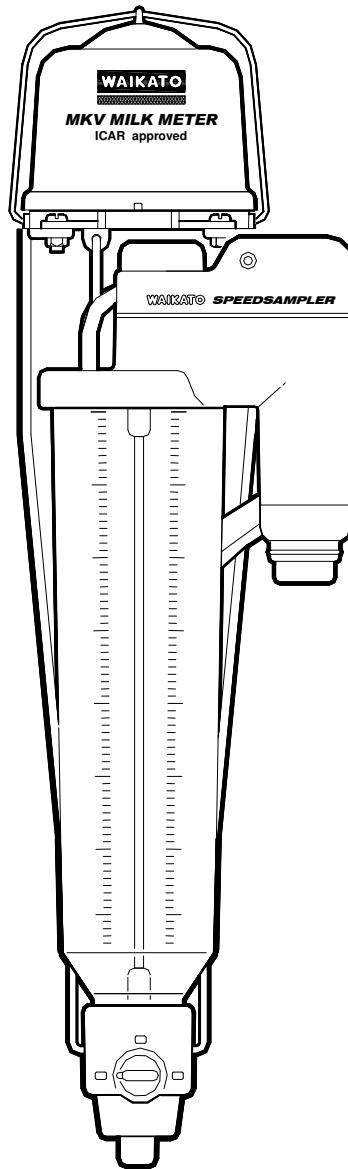




WAIKATO ***SPEEDSAMPLER***



TECHNICAL MANUAL

Part Number: 39860152

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Milk meters are an important management aid on any dairy farm. With regular use they provide information on which to base feeding, breeding and culling decisions.

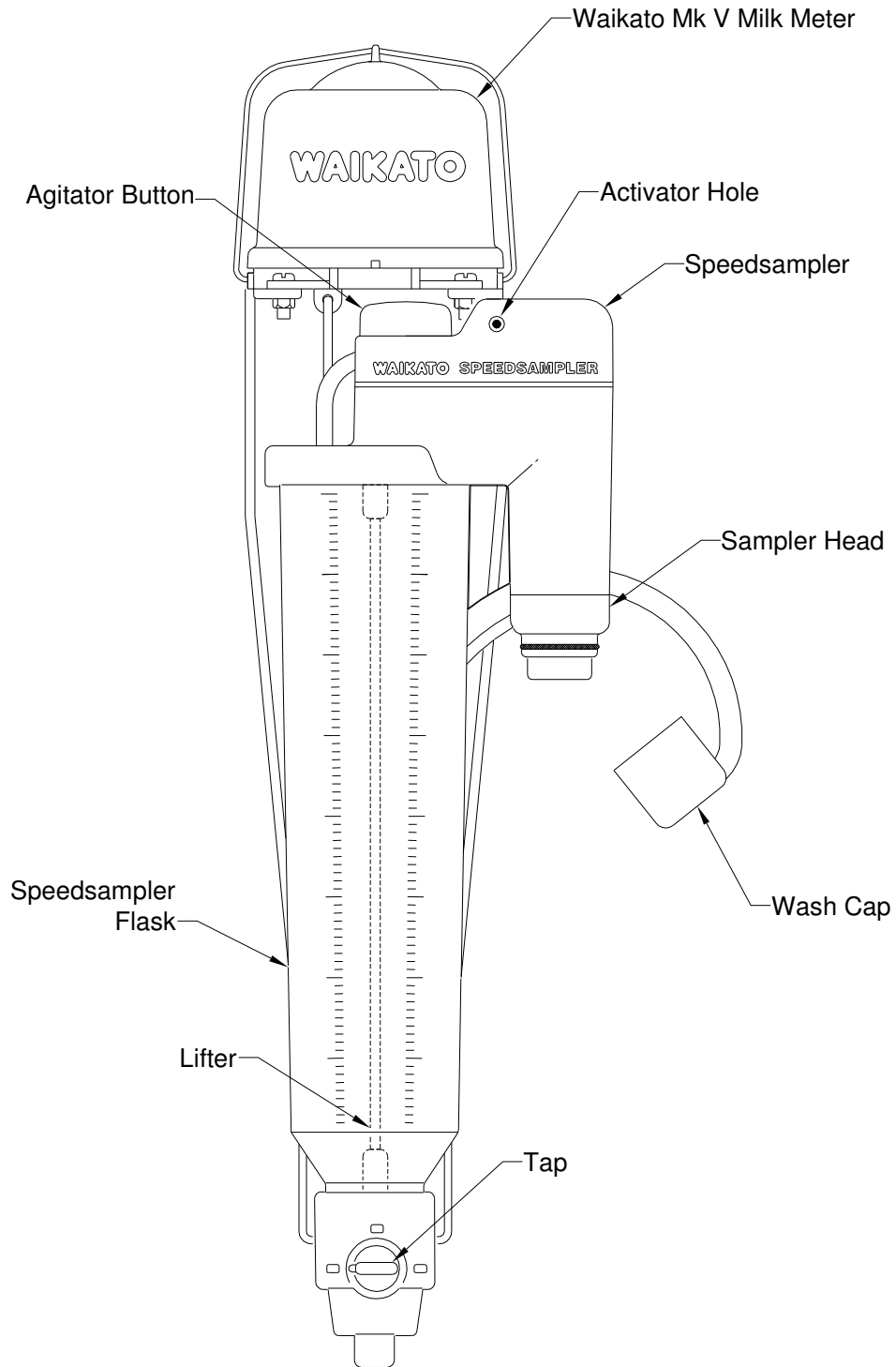
The **Waikato *SPEEDSAMPLER*** is a robust device that simplifies milk sampling for component analysis. It uses the metering head of the **Waikato Mk V Milk Meter** to accurately measure milk yield. It is available either as a complete unit, or as the milk sampler only ready to fit to an existing **Mk V Milk Meter**.

The ***SPEEDSAMPLER*** fits into the long milk tube between each milking unit and the milk pipeline. It directs a fixed proportion of the milk extracted from the cow directly into a calibrated flask. Reading the flask gives the cow's milk yield.

For accurate efficient milk metering performance the milking machine must meet the standard performance requirements of ISO 5707 for effective reserve, vacuum level, milkline diameter, and cluster air admission.

The ***SPEEDSAMPLER***:

- is provisionally approved by ICAR (International Committee for Animal Recording) for use as a herd recording device.
- is easy to install, with portable or mounting options for any dairy.
- is easy to use.
- measures milk yields up to 42kg (92 lb) per cow.
- has a tapered flask that improves reading accuracy at low yields.
- has a nominal sampling ratio of 25 g/kg for milk yield.
- collects a milk sample for component analysis of at least 20 ml if the milk yield from the cow is at least 2 kg.
- delivers the milk sample directly into a vial ready for removal for analysis (the standard sample head takes vials with internal mouth diameters of 25 mm and 29 mm).
- has low resistance to milk flow.
- Is constructed of durable hygienic, food grade materials
- cleans in place when fitted to a milking machine with a circulation cleaning system.



Main SPEEDSAMPLER Components

3.1 BEFORE MILKING

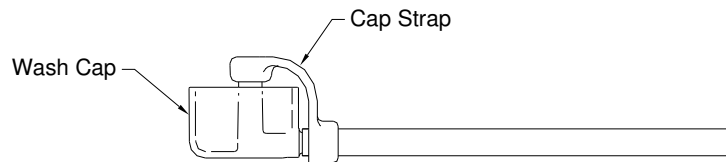
- 3.1.1 Mount the **SPEEDSAMPLER** according to the instructions in Sections 5 and 6.

Ensure that the **SPEEDSAMPLER** is mounted in the long milk tube between the milk line and the vacuum shut off valve.

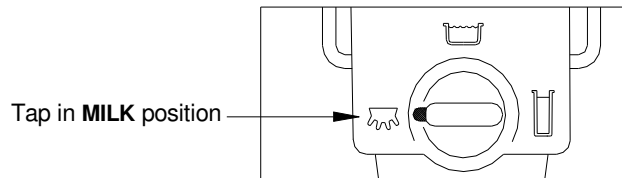
- 3.1.2 Turn **ON** the vacuum to the milking machine.

NOTE: The **SPEEDSAMPLER** is designed to operate at a vacuum level between 40 and 50 kPa (12 to 15 "Hg).

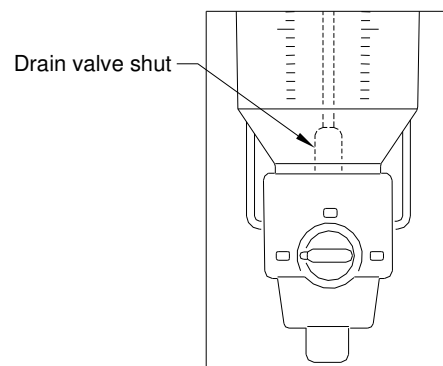
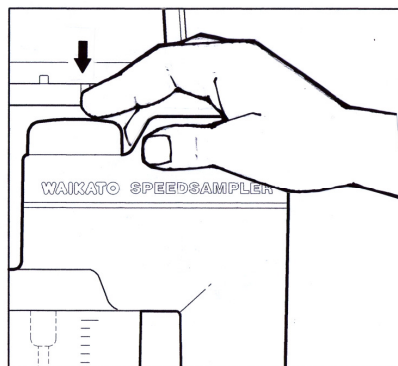
- 3.1.3 Check that the wash cap is plugged.



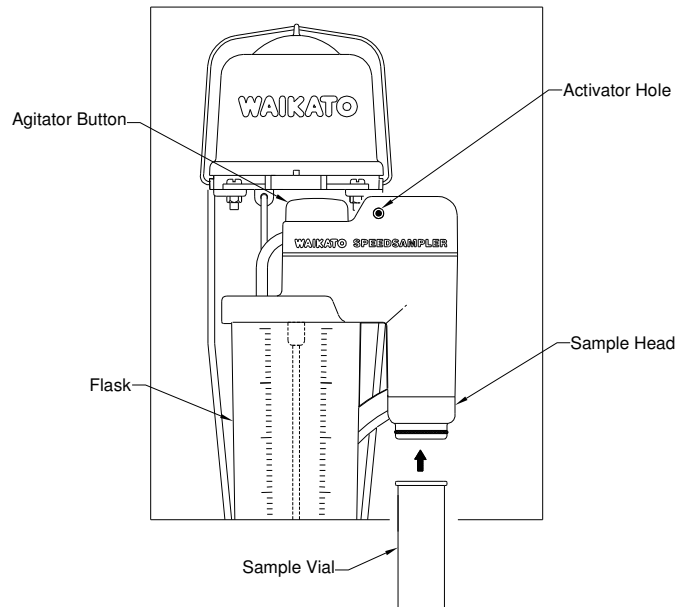
- 3.1.4 Turn the tap at the bottom of the **SPEEDSAMPLER** flask to the **MILK** position.



- 3.1.5 Set the **SPEEDSAMPLER** by simultaneously blocking the **ACTIVATOR HOLE** and pressing the **AGITATOR BUTTON**. This ensures that the **SPEEDSAMPLER** is ready for milking with the drain valve closed, and that it is not in agitation mode (refer to Section 3.2.4). This procedure will also purge the flask (if required).



3.2 SAMPLING



- 3.2.1** Place a clean sample vial onto the sample head.
- 3.2.2** Apply the cluster to the cow.
- 3.2.3** When the cow has finished milking, and before applying the cluster to the next cow, read the milk yield from the scale on the flask.
- 3.2.4** Press the **AGITATOR** button. This puts the **SPEEDSAMPLER** into agitation mode, where the milk in the flask is mixed by bubbling a small amount of air through it.
- 3.2.5** After 5 to 10 seconds of mixing, briefly cover the **ACTIVATOR HOLE** until the agitation stops. (Mixing stops as soon as the activator hole is closed).
- The **SPEEDSAMPLER** will automatically drain the flask, fill the sample vial, and reset itself ready for the next cow.
- 3.2.6** Apply the cluster to the next cow. The air entering the system as the cluster is applied will purge the bypass tube.
- 3.2.7** Remove the sample vial at any time after it has filled and before activating the **SPEEDSAMPLER** to get a milk sample from the next cow.

The vial containing milk from *Cow "n"* can stay on the sample head without being contaminated by milk from *Cow "n+1"* right up until *Cow "n+1"* has

finished milking. It must be removed before the **SPEEDSAMPLER** is activated to take a sample from Cow "n+1".

- 3.2.8** Place a fresh clean empty sample vial onto the sample head to receive a milk sample from the next cow.

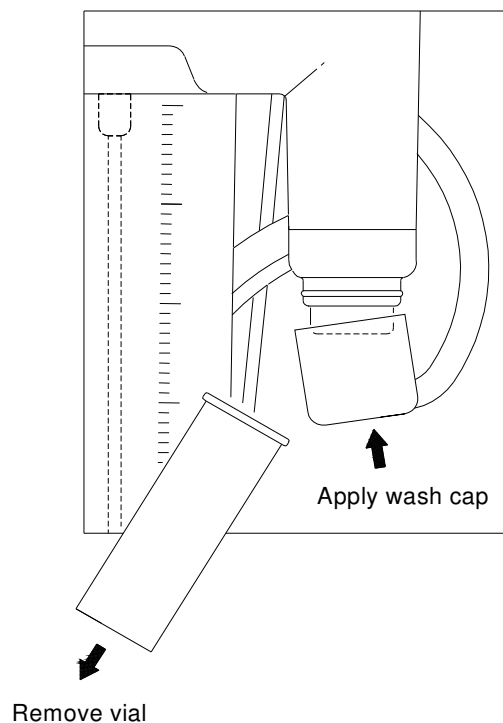
3.3 CLEANING

The **SPEEDSAMPLER** is designed to wash in place when connected to a normal milking machine circulation cleaning system

- 3.3.1** Unplug the cap strap from the wash cap.

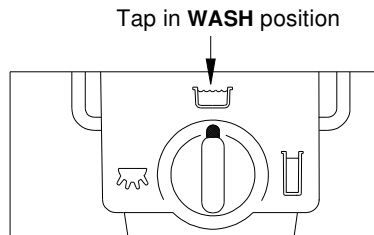


- 3.3.2** Remove the sample vial from the sample head.

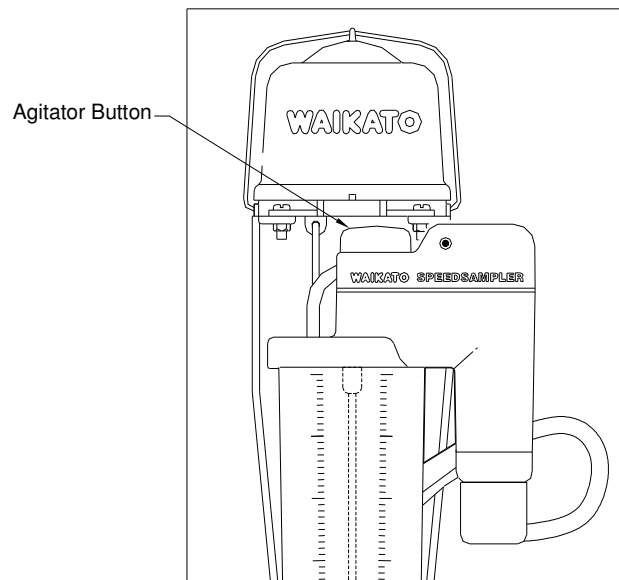


3.3.3 Place the wash cap onto the sample head.

3.3.4 Turn the tap to the **WASH** position.



3.3.5 Press the **AGITATOR BUTTON**.



3.3.6 Start the milking machine washing process in the normal way.

The **SPEEDSAMPLER** including the metering head will clean in place. Cleaning fluids will flood the flask and circulate through the bypass tube and sample head.

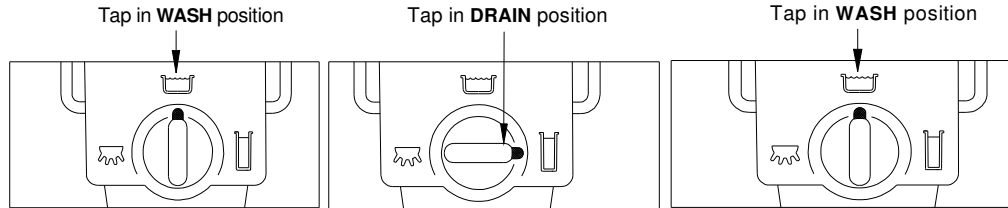
For the **SPEEDSAMPLER** to adequately clean in place, the flask must completely fill with cleaning solution, and the solution must circulate through the metering head and **SPEEDSAMPLER** for at least three minutes. To achieve this, make sure that the milking machine is rinsed with at least 15 litres per cluster of cold water followed by at least 10 litres per cluster of hot water containing detergent, and that the flow rate through each cluster is at least 3.5 litres per minute.

3.3.7 Manual Flask Drainage

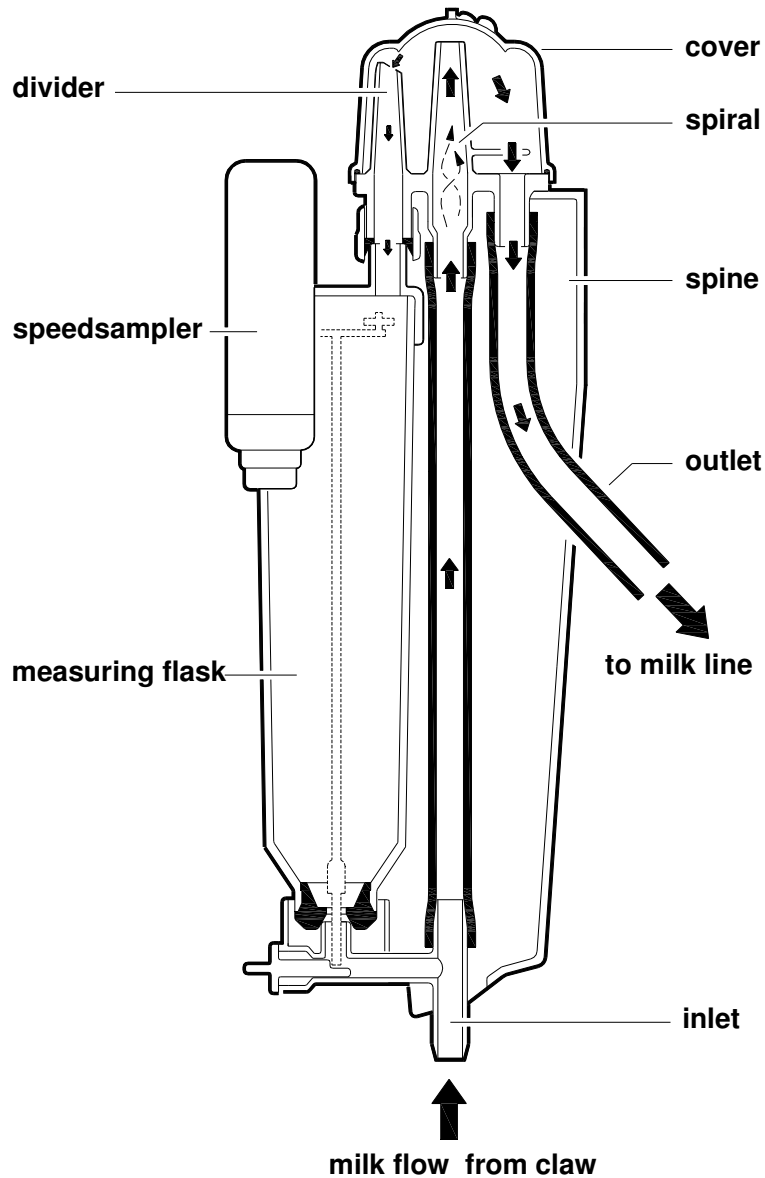
At any stage during operation to drain the flask manually, turn the tap to the **DRAIN** position. This will also fill the sample vial.

3.3.8 Marginal Milking Machine Cleaning Systems

If the milking machine cleaning system is marginal, the **SPEEDSAMPLER** cleaning will be improved by draining the flask two or three times during washing. To do this, briefly block the agitator hole, or turn the tap to the **DRAIN** position for about one second, then return it to the **WASH** position.



The flask will drain and refill with fresh cleaning solutions.



The milk meter has a central milk inlet tube (D) in which the milk moves up from the claw with each pulsation of the milking machine.

Spiral vanes (C) near the top of the inlet tube rotate the milk as it leaves the inlet tube, and it spreads out evenly over the inside surface of the cover (B).

The divider orifice (A) diverts a fixed proportion of the milk film into the measuring flask (E) while the bulk of the milk continues through the outlet tube (F) into the milking system.

The **SPEEDSAMPLER** may be installed permanently or so that it is readily detachable.

It may be fitted to flat surfaces or vertical or horizontal piping so long as the base of the metering head remains within $\pm 5^\circ$ of horizontal.

5.1 PERMANENT MOUNTING

See Figure 5.1

- To flat surface
- To vertical or horizontal piping

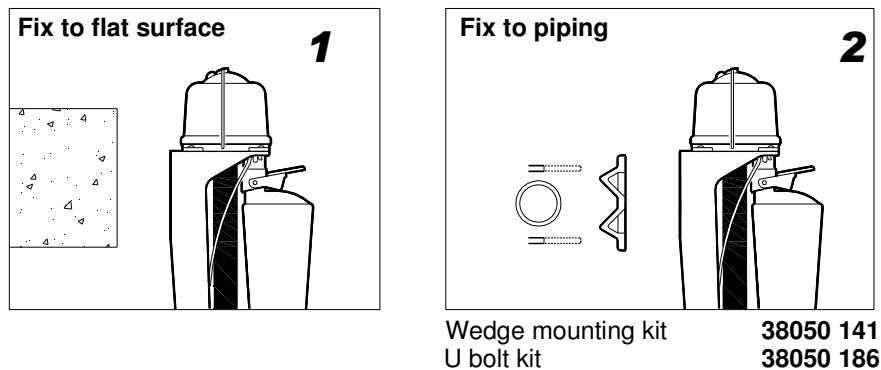


Figure 5.1 Permanent Mounting

5.2 DETACHABLE MOUNTING

See Figure 5.2

- Stem and Wedge Mounting Set for flat surfaces or piping.
- Wedge Mounting Set for flat surfaces or piping.
- Hanger bracket off piping.
- Vandenberg adjustable
- Vandenberg adapter)

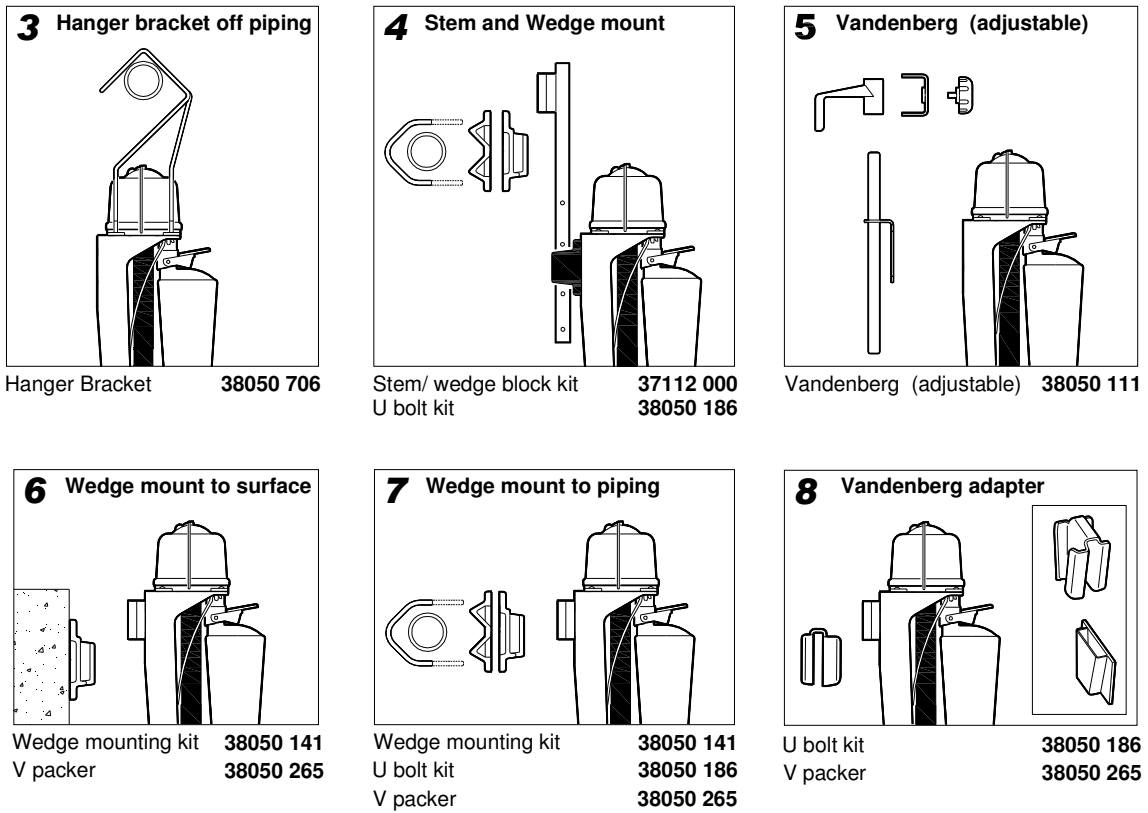


Figure 5.2 Detachable Mounting

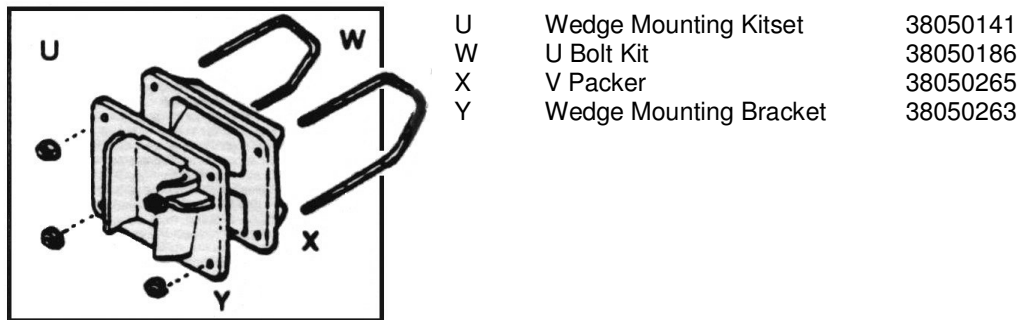
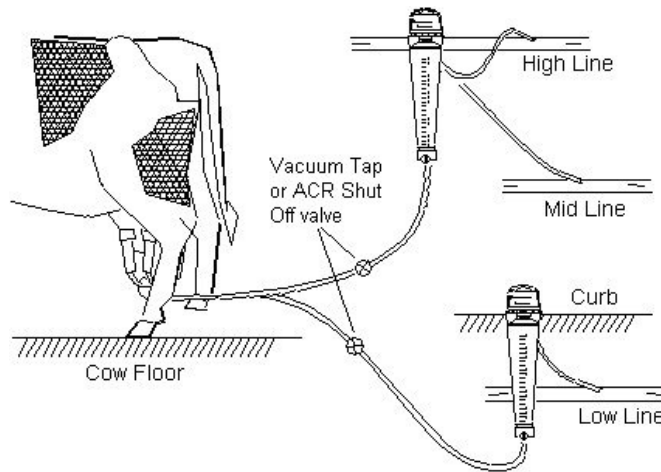
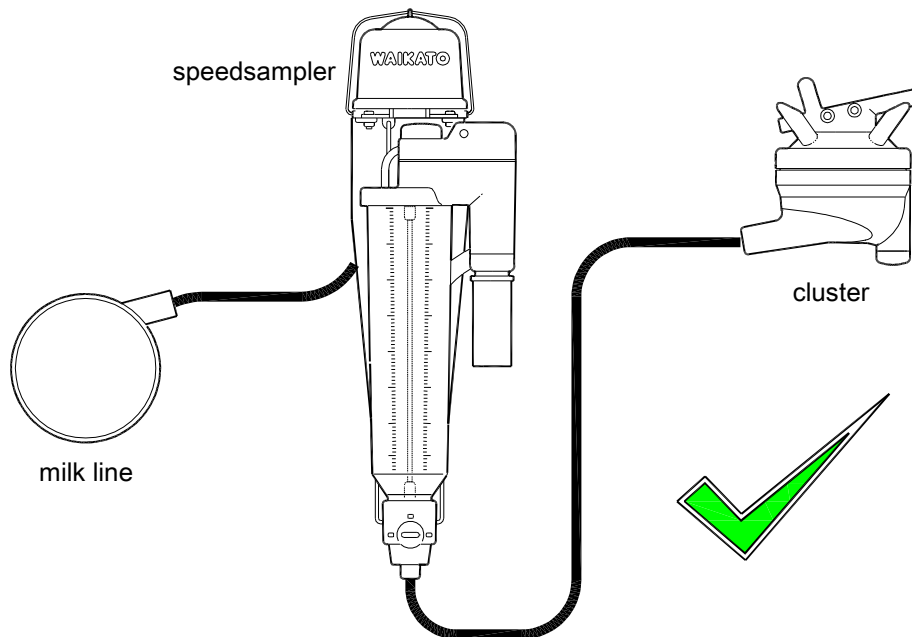


Figure 5.3 Wedge Mounting Kitset

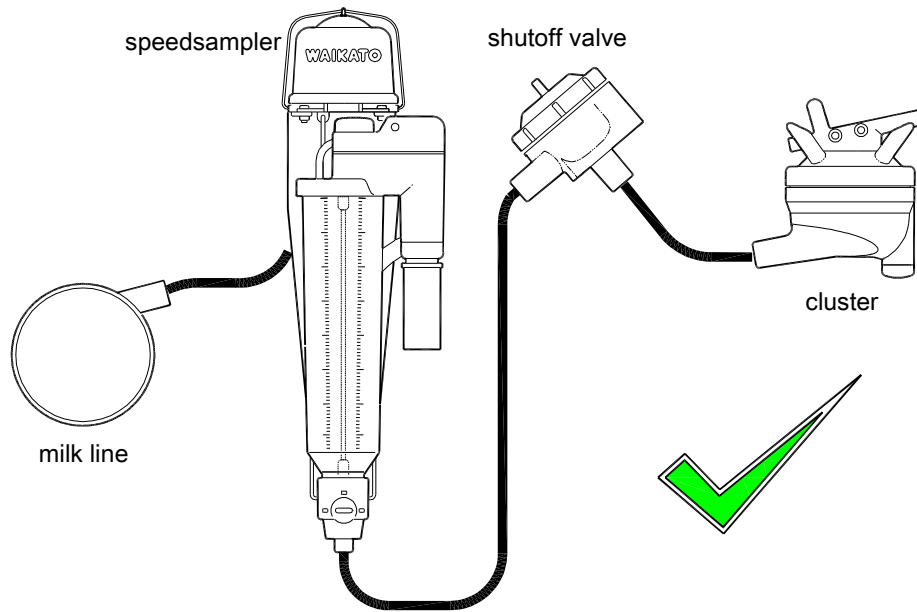
6.1 LOCATION



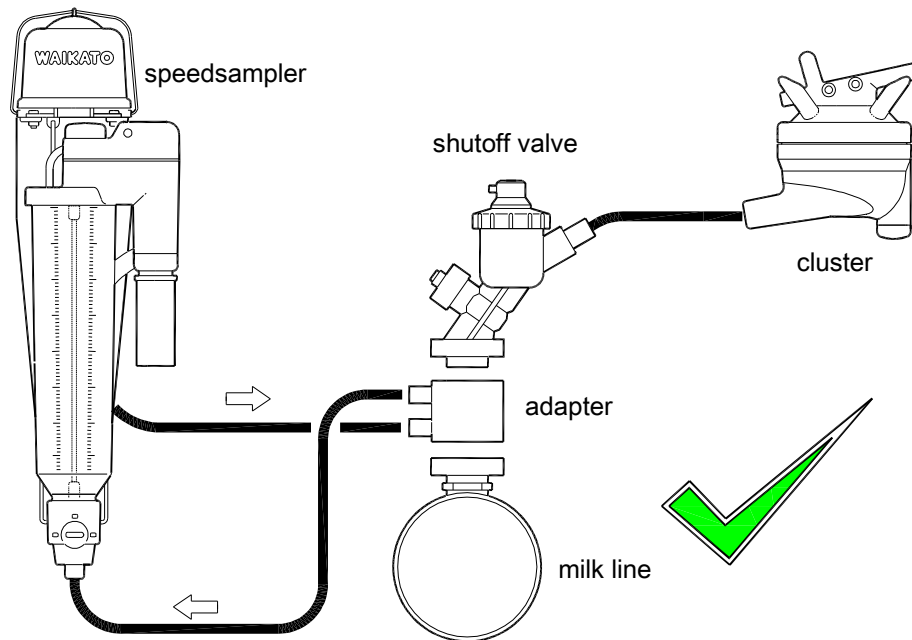
Install the **SPEEDSAMPLER** in the long milk tube between the vacuum tap in the long milk tube and the milking line, in a position where it is not vulnerable to cow damage, will not cause injury or interference to cows, and where the operator can easily read the measuring flask.



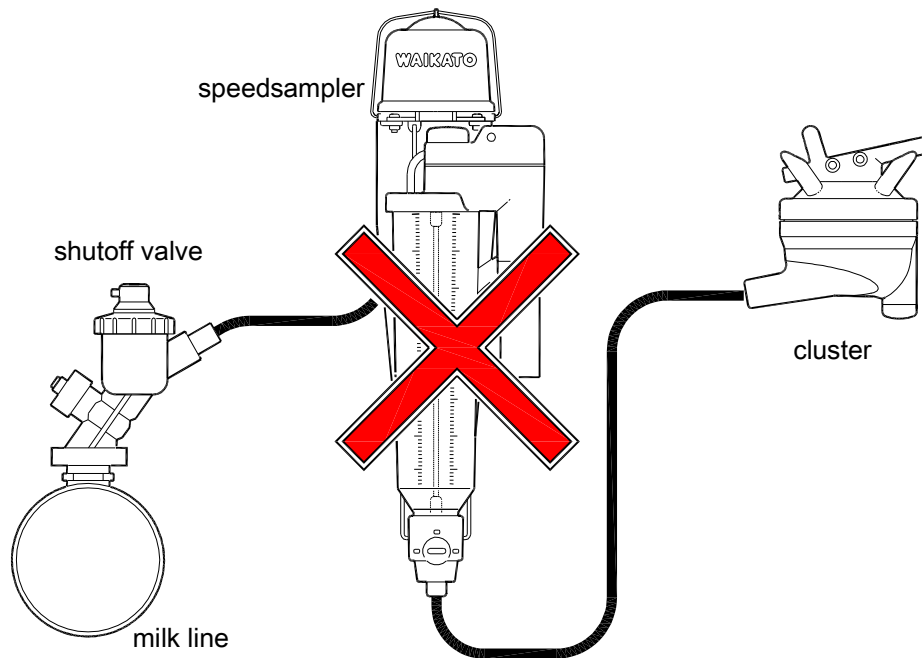
Speedsampler connected directly to the milk inlet.



Speedsampler connected between the flow sensor and milk line



Speedsampler connected between the flow sensor and milk line



Speedsampler connected between the cluster and the flow sensor.

Mount the **SPEEDSAMPLER** rigidly enough so that cow or other movement does not pull the metering head base away from horizontal by more than $\pm 5^\circ$.

6.2 MILK TUBE SIZE

The **SPEEDSAMPLER** inlet and outlet nipples will accommodate 13mm (1/2") to 16mm (5/8") internal diameter milk tubing.

6.3 INSTALLATION WITH AUTOMATIC CLUSTER REMOVERS

In dairies with automatic cluster removers (ACRs), install the **SPEEDSAMPLER** between the vacuum shut-off valve and the milkline. The **SPEEDSAMPLER** must be under vacuum for successful sampling, flask draining, and resetting to occur.

6.4 RECEIVER VACUUM LEVEL

Set the receiver vacuum high enough to maintain claw vacuum during peak milk flow at 36 - 42 kPa. If the **SPEEDSAMPLERS** are not permanently installed, you may need to raise the receiver vacuum by up to 3 kPa to keep the claw vacuum at this level when they are used. Make sure that the vacuum level is restored to its original setting when the **SPEEDSAMPLERS** are removed.

Never set the vacuum level above 50 kPa (15" Hg).

The **SPEEDSAMPLER** is designed to operate at vacuum levels between 40 and 50 kPa (12 to 15 " Hg).

7.1 ROUTINE MAINTENANCE

The condition of the cover, base assembly, and flask affect the calibration of the meter. If any of these parts is cracked, chipped, or scratched replace it immediately, and retest and recalibrate the meter.

Cracking, chipping, and scratching may occur as a result of poor handling or transport, or because of incorrect manual cleaning procedures.

- ALWAYS handle the **SPEEDSAMPLER** with care. Remember it is a precision instrument.
- DO NOT use brushes inside the cover or base assembly, or in the flask.
- DO NOT use any solid implement to clean divider orifice lips.

After each milking

Check that there is no foreign matter in the metering head or flask.

Monthly

Clean the foam filter in the body.

Lubricate all O-rings with a thin film of Molykote 111 O-ring lubricant (Part No. 39650836) or similar. **Apply lubricant sparingly!**

Annually

Dismantle the **SPEEDSAMPLER** and check the condition of all components.

Replace the following components:

Part No	Description
38050542	Valve O-ring
38050539	Sampler head upper O-ring
38050540	Sampler head lower O-ring
38050541	Tap O-ring
38050536	Wash tube
38050535	Bypass tube

Replace any other components that show signs of perishing, cuts, splits or excessive scratching.

After reassembling the **SPEEDSAMPLER**, test and recalibrate it according to the procedures in Section 10 and 11.

7.2 MANUAL CLEANING

The ***SPEEDSAMPLER*** is designed to wash when connected to a normal milking machine circulation cleaning system.

Specific washing procedures are detailed in Section 3.3.

After each CIP wash, check the sample head O-ring, and manually clean it if necessary.

After every 150 cow milkings, dismantle the ***SPEEDSAMPLER***, check all components, and manually clean or lubricate them if necessary.

CAUTION:

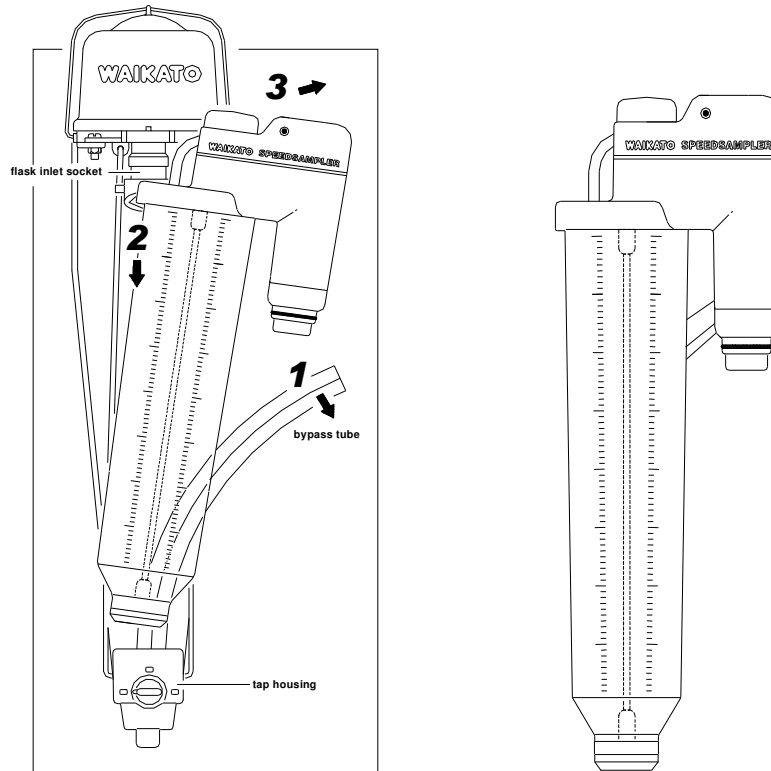
When manually cleaning the ***SPEEDSAMPLER***

- Use water and an approved dairy detergent at 50° C (120° F) or more
- Do not use abrasive solutions or powders as these may scratch the surface.
- Do not use organic solvents or hydrocarbons as these may damage the plastic parts of the ***SPEEDSAMPLER***.
- Use sponges or soft cloths to clean plastic parts - do not use brushes, abrasive pads or any hard implements.

7.3 REPAIRS

Always test and recalibrate the ***SPEEDSAMPLER*** after making any repairs.

8.1 REMOVE THE *SPEEDSAMPLER* FROM THE METER

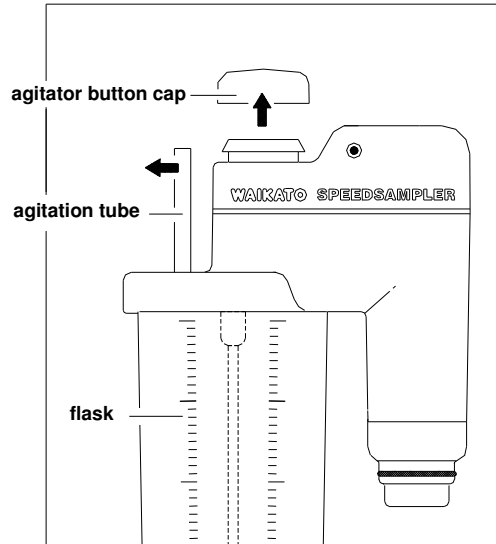


8.1.1 Remove the bypass tube from the sample head.



8.1.2 Pull down on the flask to disengage it from the flask inlet socket.

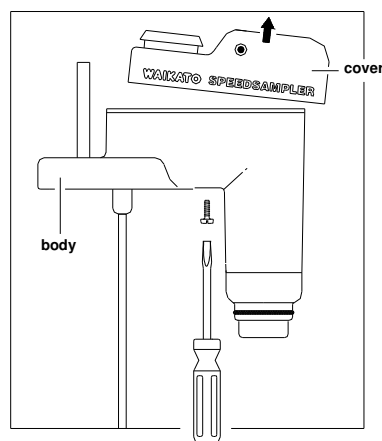
8.1.3 Lift the base of the flask out of the tap housing.

8.2 REMOVE THE FLASK FROM THE *SPEEDSAMPLER* HEAD

8.2.1 Pull the agitation tube off the nipple on the cover.

8.2.2 Rotate the flask clockwise to disconnect it from the body.

8.2.3 Remove the ***SPEEDSAMPLER*** body and lifter assembly from the flask.

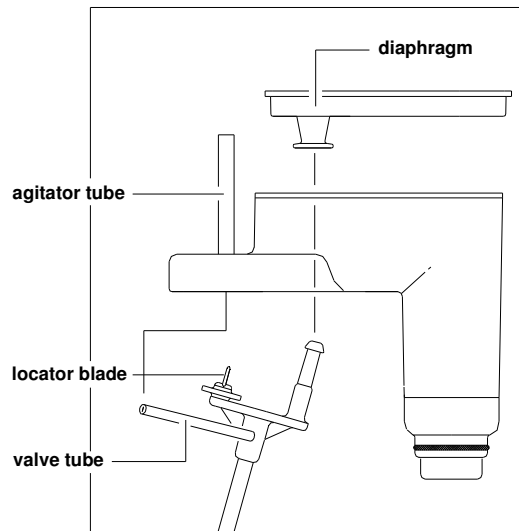
8.3 REMOVE THE COVER FROM THE *SPEEDSAMPLER* BODY.

8.3.1 Use a 5 mm flat bladed screwdriver to unscrew the cover from the body.

8.3.2 Lift the cover from the body.

8.4 DISASSEMBLE THE BODY

8.4.1 Lift the diaphragm from the lifter assembly.



8.4.2 Pull the valve tube off the nipple on the body.

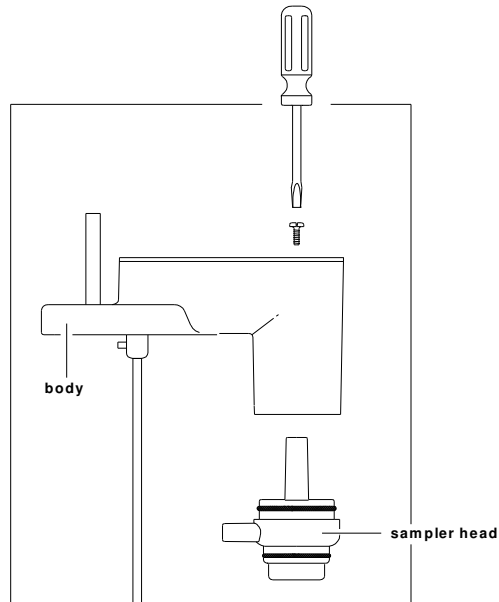
8.4.3 The lifter assembly is now disconnected from the body.

The lifter assembly can be pulled out of and pushed back into the diaphragm without removing the cover. When pushing it back in, hold the agitator button down. Ensure that the locator blade is engaged in the inlet hole, and is free to move.

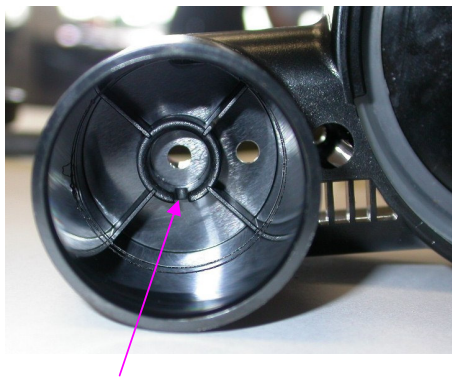
8.4.4 Pull the flask seal out of the body.

8.5 DISASSEMBLE THE SAMPLE HEAD

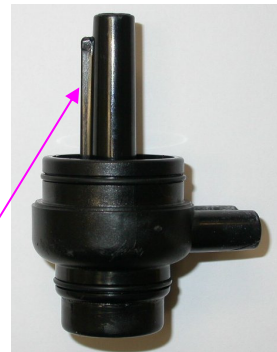
8.5.1 Unscrew the sample head from the body.



8.5.2 Pull the sample head down out of the body. (When reassembling, rotate the sample head until the internal key lines up with its slot).



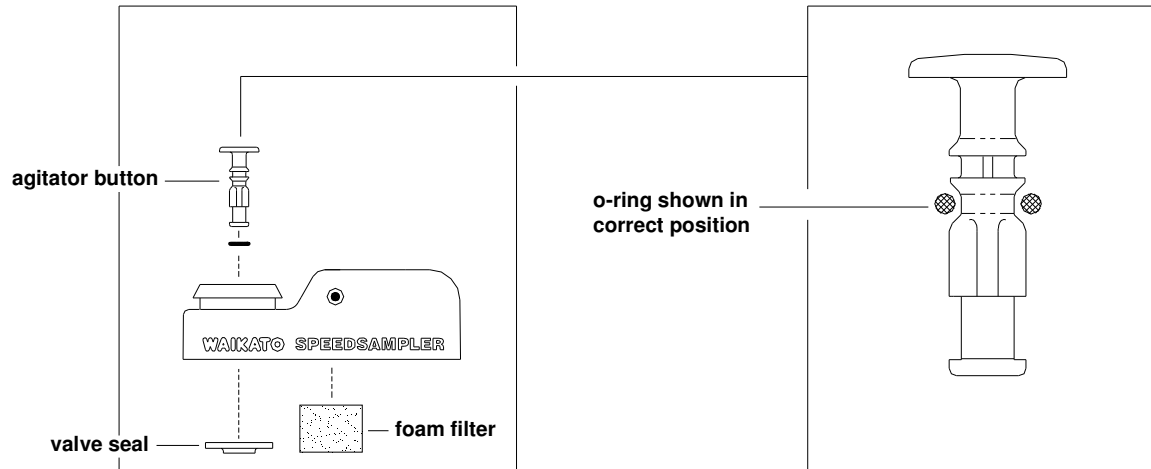
Sample Head Slot



Sample Head Key

8.5.3 Remove the o-rings from the sample head.

8.6 DISASSEMBLE THE COVER



8.6.1 Lift off the agitator button cap.

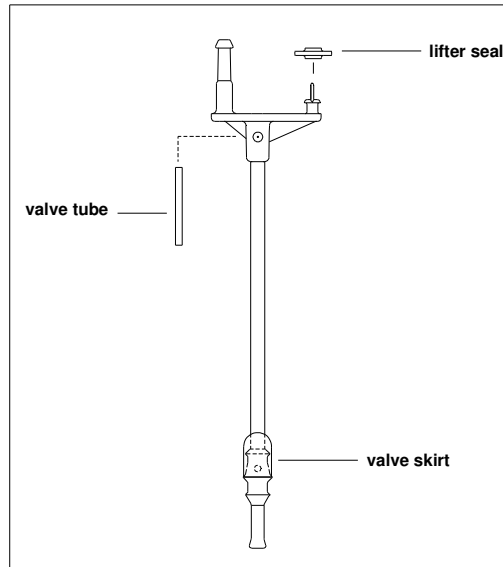
8.6.2 Note the orientation of the valve seal in the cover, and carefully remove it from the agitator button. When reassembling, ensure correct orientation. The larger raised portion in the centre of the seal must be at the bottom furthest away from the agitator button.

8.6.3 Pull the agitator button up to release it from the valve seal.

8.6.4 Remove the o-ring from the agitator button.

8.6.5 Remove the foam filter from the cover.

8.7 DISASSEMBLE THE VALVE LIFTER



8.7.1 Pull the valve tube from the nipple on the valve lifter.

8.7.2 Pull the lifter seal off the lifter assembly.

8.7.3 Slide the valve skirt up the lifter assembly stem.

8.8 DISASSEMBLE THE TAP

8.8.1 Pull the tap out of the tap housing.

8.8.2 Remove the o-ring from the tap.

8.9 DISASSEMBLE THE FLASK

8.9.1 Pull the bung out of the base of the flask.

The **SPEEDSAMPLER** is now completely disassembled.

To reassemble, follow the reverse order, making sure that all o-rings, diaphragms, and seals are correctly located.

9.1 The flask does not fill during milking.

The most likely cause is a leak somewhere on the metering head or **SPEEDSAMPLER**, usually a loose hose or fitting. Check the following:

- Agitation button is in the down position. Needs to be reset (see procedure)
- Wash cap hose or rubber cap not secure
- Lifter assembly is in “up” position - check tap is in **MILK** mode
- Milk meter cover not sitting correctly
- Agitation tube disconnected
- Bypass tube not properly connected
- Flask seal and Check-valve seals
- Tap plug missing

9.2 The flask has small visible air bubbles during milking.

- Agitation tube leaking or damaged - *Check fit to nipple*
- Foreign material on plate seal in upper valve assembly. *Dismantle and clean*
- Tap assembly distorted, flask assembly not seated correctly - *Check inlet tube from cluster has sufficient freedom - Move Tap assembly firmly from side to side and push in until firm.*

9.3 The drain valve will not open to drain the flask.

The agitation conduits require good air flow for the **SPEEDSAMPLER** to work correctly. Ensure all hose connections are secure and unrestricted.

- Agitation tubes restricted due to foreign material or incorrect assembly - *Remove tubes, clear any obstructions, and reassemble correctly*
- Lower agitation valve restricted - *Dismantle inspect and remove any restrictions*
- Cracked or damaged Body - *Replace body*
- Cover not secured correctly - *Secure cover correctly*
- Lifter assembly misaligned - *Remove flask and inspect. Ensure Lifter is firmly fitted to Diaphragm and Lifter seal is located over Flask inlet hole*
- O-ring not fitted to Valve stem - *Fit O-ring*
- Damaged or perforated diaphragm - *Replace diaphragm*
- Internal O-ring perished or not fitted to Sampler Head - *Replace or fit O-ring*

9.4 The lifter alternates between the “up” and “down” positions.

- O-ring damaged or not fitted to Valve stem - *Replace O-ring*
- Obstruction under rubber cap - *Remove obstruction*
- Foreign material on plate seal in upper valve assembly. *Dismantle and clean*

9.5 The lifter drops before the flask is empty.

- Lifter Seal is missing or damaged - *Replace seal*
- Lifter assembly damaged or distorted - *Replace Lifter assembly*
- Outlet tube or main milk line too restrictive - *Remove restrictions*

9.6 The flask does not fill in “Wash” mode.

- Excessive air leaks - *Check all connections*
- Insufficient flow from cluster washer - *Adjust flow through cluster washer to at least 3.5 litres/min*
- Tap not in **WASH** position - *Put tap in **WASH** position*
- Sampling head external O-ring missing or damaged - *Replace O-ring*

9.7 The flask reading is inaccurate.

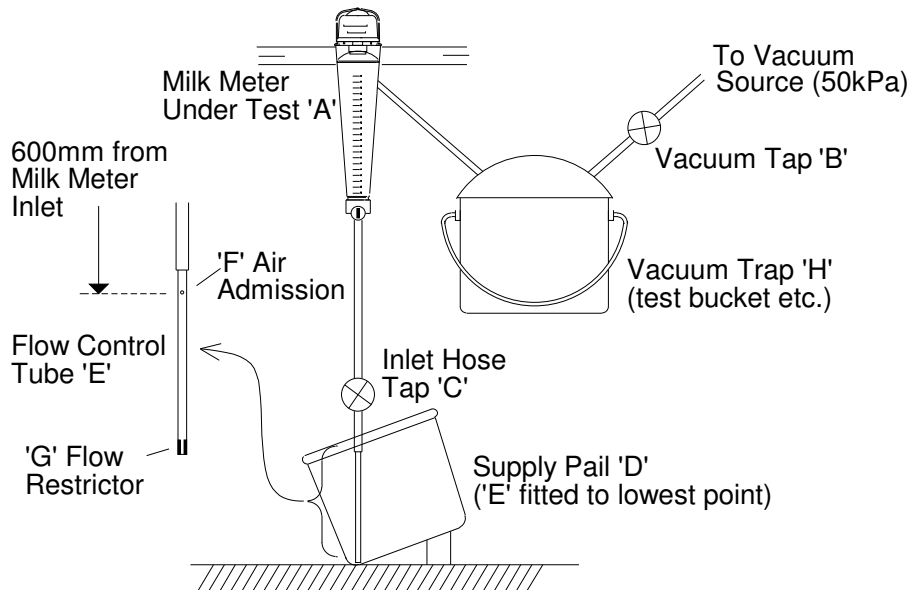
- Milking machine performance below standard - *Service milking machine*
- Meter incorrectly installed - *Mount meter correctly.*
- Meter base pulled off horizontal by cow movement or incorrect bracket mounting - *Mount meter correctly.*
- Milk flow back to the meter from the milklime - *increase milklime diameter to meet standards.*
- Milk in flask from the previous cow - *Empty flask before the next cow is milked.*
- Tap not in **MILK** position - *Put tap in **MILK** position*
- Foreign matter in meter head - *Remove material from meter head.*
- Parts of meter damaged, especially divider orifice lips - *Replace damaged parts.*
- Operator error in reading milk yield - *Train operator to read scale correctly.*

9.8 The meter does not clean properly.

- **For the *SPEEDSAMPLER* to adequately clean in place, the milk meter flask must completely fill with cleaning solution, and the solution must circulate through the meter and *SPEEDSAMPLER* for at least three minutes.** To achieve this, make sure that the milking machine is rinsed with at least 15 litres per cluster of cold water followed by at least 10 litres per cluster of hot water containing detergent, and that the flow rate through each cluster is at least 3.5 litres per minute.

This test procedure is specified by the DHIA and approved by ICAR.

10.1. TEST RIG SET UP



- 10.1.1** Mount the **SPEEDSAMPLER** ensuring that the base of the metering head is horizontal.
- 10.1.2** Place the **SPEEDSAMPLER** inlet hose into an open 18 litre (40lb) pail (D) directly below the meter. The inlet hose must contain a restrictor (G) to ensure a flow of 3.5 to 4.0 litres per minute at the available vacuum level, and a 1 mm diameter (No.60 drill) air admission hole (F) located 600mm (24 inches) from the metering head inlet to admit 15 l/min (0.5 cfm) free air.
- 10.1.3** Fall the **SPEEDSAMPLER** outlet hose directly into the inlet of a vacuum trap (H), (for example test bucket, pail milker, or weigh jar). Connect the vacuum trap outlet to a stable 50 kPa (15" Hg) vacuum source.
- 10.1.4** Include vacuum taps in the inlet hose (C) and the vacuum source hose (B).
- 10.1.5** Volumetric flasks or accurate scales will be required.

10.2. TEST PROCEDURE

- 10.2.1** Using water as the working fluid fill the supply pail (D) with 16 litres (16 kg or 35.26 lb).
- 10.2.2** With the inlet tap (C) closed, open the source vacuum tap (B).

- 10.2.3 Ensure that the internal surfaces of the **SPEEDSAMPLER** are damp so that valves seal properly, and that the flask tap is in the **MILK** position.
- 10.2.4 Open the inlet hose vacuum tap (C).
- 10.2.5 Draw all of the water from the supply pail (D) through tube (E) past the air admission hole (F) through the metering head (A) and into the vacuum trap (H).
- 10.2.6 Record the flask reading. (Read the bottom of the meniscus).
- 10.2.7 Purge the flask by simultaneously blocking the **ACTIVATOR HOLE** and pressing the **AGITATOR BUTTON**.
- 10.2.8 When flask is empty close the source vacuum tap (B).
- 10.2.9 When vacuum trap (H) has returned to atmospheric pressure close the inlet hose tap (C).
- 10.2.10 Refill the supply pail with exactly 16 litres of water and repeat the procedure, to obtain two results per meter.

10.3. RESULTS ANALYSIS

Calculate the 'p-values' for each reading as follows:

$$p = \frac{\text{meter reading in kg}}{16.48} \times 100\%$$

If both 'p-values' are in the range 97% to 103% the meter is acceptable.

If only one of the 'p-values' is outside the range 97% to 103%, perform the test a third time. The meter is then considered acceptable if no single 'p-value' is outside the range 95% to 105% and the mean of all three values is within the range 97% to 103%.

Withdraw from service any meter that fails this test, and submit it to a certified service agent for repair and recalibration.

Submit ***SPEEDSAMPLERS*** that have damaged calibration dependent parts, or those that have failed the Periodic Test Procedure to an authorised Repair and Recalibration Centre (e.g. DHIA in the USA) for repair.

11.1. DAMAGED *SPEEDSAMPLERS*

The parts of a ***SPEEDSAMPLER*** that may affect calibration are the flask, cover, and base assembly (See Section 12).

Replace damaged parts and closely inspect the other main parts. (See Section 7).

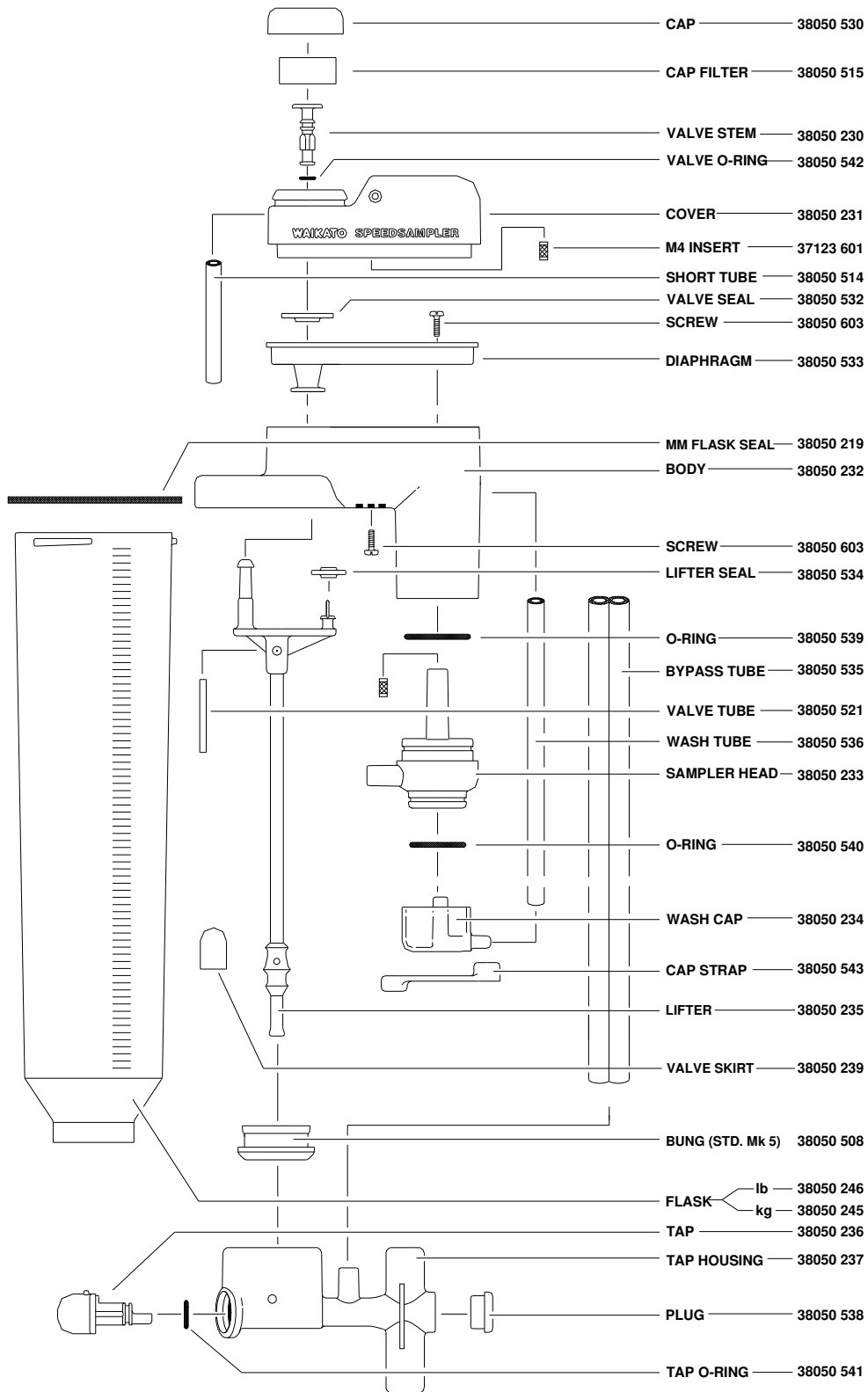
Re-test the ***SPEEDSAMPLER*** as described in Section 10. The resultant meter p-values must meet the criteria specified.

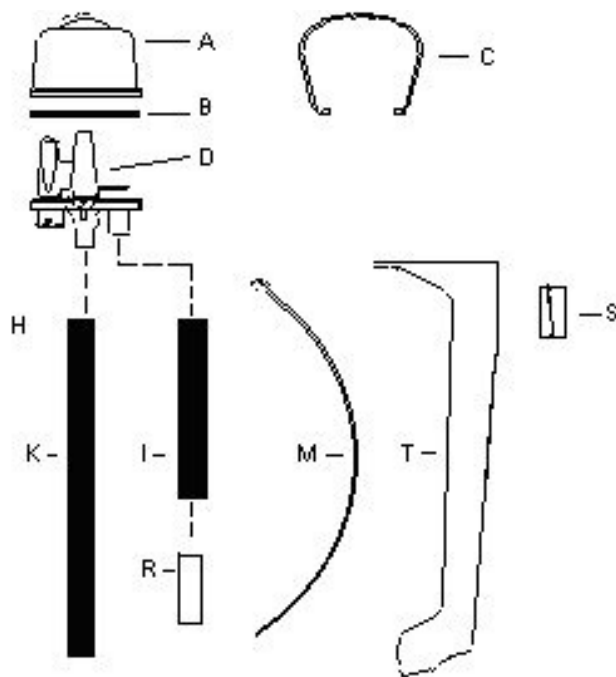
11.2. *SPEEDSAMPLERS* THAT FAIL THE 'PERIODIC TEST PROCEDURE'

To recalibrate a ***SPEEDSAMPLER*** that has failed the periodic test procedure,

- Replace the base assembly and retest.
- If the meter fails, replace the cover and retest.
- If the meter fails, replace the flask and retest.

A failure at this point is unlikely, but if a single case occurs, repeat the inspection and replacement procedure. If a large number of failures occur at this point, check the test rig and testing procedure for any points of non-compliance with these recommended procedures.





PART	Description	Part No.
A	Cover	38050251
B	Cover Seal	38050301
AB	Cover Assembly	38050122
C	Cover Clip	38050703
ABD	Assembly Base & Cover	38050160
D	Base	38050161
H	Valve Housing Gasket	38050503
I	Short Tube	38050505
R	Stainless Steel Connector	38050704
IR	S/S Connector Assembly	38050166
K	Hose	38050506
M	Flask Wires (pair)	38050702
T	Spine Bracket	38050216
ST	Spine with Wedge Block	38050182

Waikato Milking Systems NZ Limited warrants the Waikato ***SPEEDSAMPLER*** to be free from defect in manufacture and/or materials (fair wear and tear excepted) for a period of **ONE YEAR** from the date of installation.

Waikato Milking Systems NZ Limited will at its option repair or replace any defective ***SPEEDSAMPLER*** or component parts. Waikato Milking Systems NZ Ltd accepts no liability for any other claim arising out of any supply of defective units.

Waikato Milking Systems NZ Limited accepts no liability where damage to the unit has resulted from the attachment to or use in connection with the unit, of other equipment, parts or components, which have not been purchased from Waikato Milking Systems NZ Limited.

Waikato Milking Systems NZ Limited accepts no liability where damage to the unit has occurred during installation, or has arisen from unauthorised adjustment of the unit.

Waikato Milking Systems NZ Limited's liability under any claim shall not exceed the price (excluding GST) of the unit.

Claims must be lodged through the Waikato Milking Systems dealer responsible for the installation.

This warranty is conditional upon the ***SPEEDSAMPLER*** being installed and maintained in accordance with the specifications and guidelines contained in this manual.

Refer also to Waikato Milking Systems NZ Limited's Terms and Conditions of Sale for Components.