

Meter Technician Calibration Procedures

**2011 Meter Technician Training School
Springfield, MO**



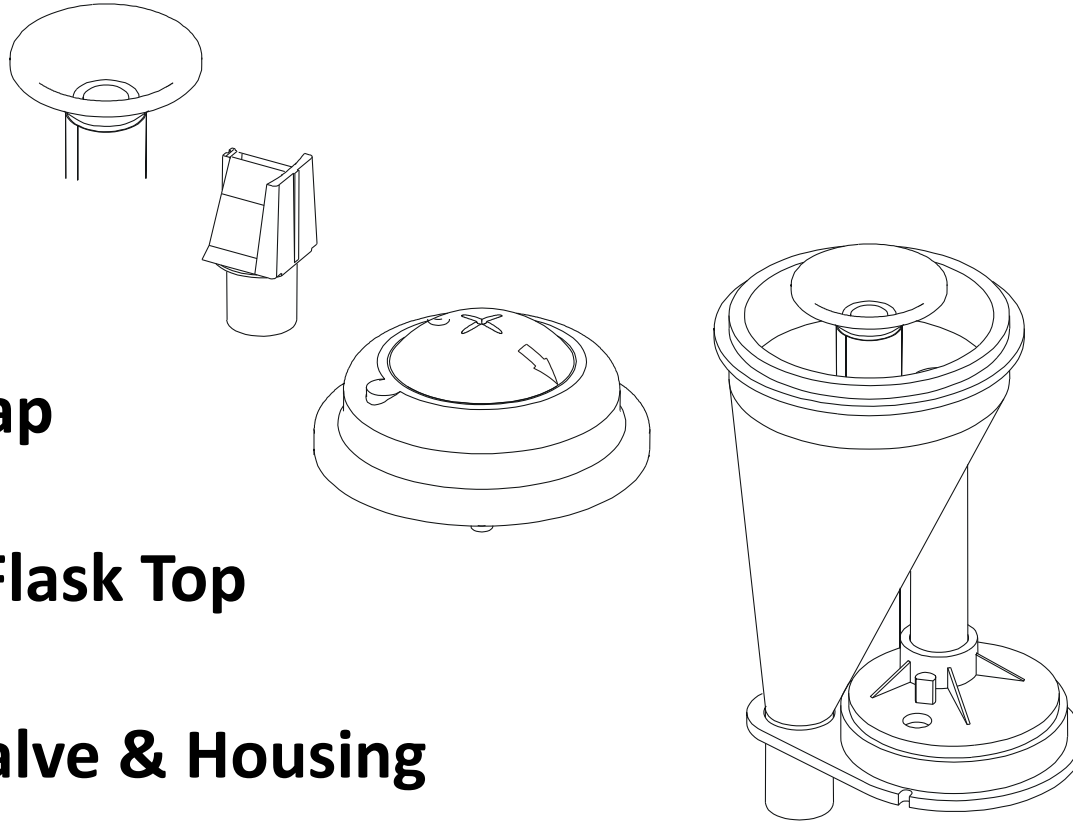
**Steven J. Sievert, Manager
Quality Certification Services Inc.**

Topics to Cover...

- **Principles of Operation**
- **Calibration Procedures**
- **Troubleshooting**
- **Meter Center Design**

Some Terminology

- ▶ **Sleeve**
- ▶ **Nozzle**
- ▶ **Cover/Cap**
- ▶ **Body & Flask Top**
- ▶ **Lower Valve & Housing**



Principle of Meter Operation

Volumetric Meters:

Measuring a Volume of Liquid Passing Through at a Controlled Rate and Then Diverting a Precise Amount into a Calibrated Flask to Obtain a Total Weight of the Liquid



Important Facts

- ▶ **The Meter takes a representative proportion of the total milk flow**
 - **Measuring pounds of milk**
- ▶ **The sub-sample must represent the entire milking letdown**
 - **For accurate components analysis**
 - **Fat, Protein, SCC, Other**
 - **This can be achieved either**
 - **by mixing the collected milk**
 - **by taking a small amount of the milk as it flows by during the emptying process**

Vacuum Drop

- ▶ **There are five main things which affect vacuum drop:**
 - **The type/model of meter**
 - **The air admission rate**
 - **The flow rate (diameter & length)**
 - **The length of extra tubing added to the system to connect the meters**
 - **The position of the meter - high or low**

Standard or Slow Flow Water Test

- ▶ **Requires Air Admission Inlet**
 - **Hole from a #60 drill bit**
 - **After the in-line water restrictor**
 - **24"-36" from the meter inlet**
- ▶ **Water Restrictor has 1/8" Opening**
- ▶ **Flow Rate = 8 lbs/minute (4:34)**

Fast Flow Water Test

- ▶ **63” From Bottom of Pail (restrictor) to Top of Meter Flask**
 - **Use a Pre-Cut Stick to Quickly Verify**
 - **Use a Marker or Tape to Mark Off 63”**
- ▶ **Water Needs a Straight Shot to the Meter**
 - **From Restrictor to Meter Inlet**
- ▶ **Wide Bore Meters = 58-65 Seconds**
- ▶ **Standard Bore Meters = 65-68 Seconds**

Getting Started

- ▶ **Inspect Meter**
- ▶ **Mount Meter on Rig**
- ▶ **Verify Correct Height**
 - **Fast Flow = 63" to Top of Flask**
 - **Hose is Straight as Possible**
- ▶ **Verify Water Volume**
 - **16 Liters / 16 kg / 35.3 lbs**
- ▶ **Verify Vacuum Level - 15" hg**

Meter Installation

- ▶ **The Meter should be mounted within ± 5 degrees of vertical**
- ▶ **Take-offs - install Meters between the sensor & milk line to maintain vacuum for agitation and sampling**
- ▶ **Air Bleed - must introduce air into the line, usually at the claw**

Clean Equipment

▶ Meter Rig

- Are Hoses in Good Condition?
- Is Water Changed Regularly?
 - “Field Techs Are Supposed to Keep Meters Clean!”
- Who’s seen my Vacuum Pump?
 - “If I adjust it, it could break”
 - “What Oil????”

While You Run

- ▶ **Check for:**
 - **Air Leaks**
 - **Blockages / Flow Restrictions**
 - **Abnormal Performance**

- ▶ **Remove Old Calibration Tag**

Periodic Maintenance

- ▶ **Milk meters should be periodically checked and maintained**
 - **Disassemble and clean the sample valve and meter body. Info Sheets and brushes are available for this procedure.**
 - **Wash all parts in very hot water with a proper dairy detergent.**
 - **Rinse all parts in clean water after the hot detergent wash.**

Periodic and Annual Maintenance

- ▶ **Inspect all rubber parts for cracks and wear in order to minimize build up of bacteria “grunge” and to assure proper sealing of gaskets and O-rings.**
- ▶ **Use a safety pin or “pick” to remove the o-rings so that the plastic grooves are not scratched or damaged.**
- ▶ **Water Test to ensure that the Meter is in proper calibration.**

Several Runs Later....

- ▶ **If You Can't Check the Water Before Each Run, Then.....**
 - **Now is a Good Time to Verify Water Level**

- ▶ **How clean is the test water?**
 - **You Know What to Do!!!**

- ▶ **Is Vacuum Gauge Holding at 15" hg?**

Maintaining Water Volume

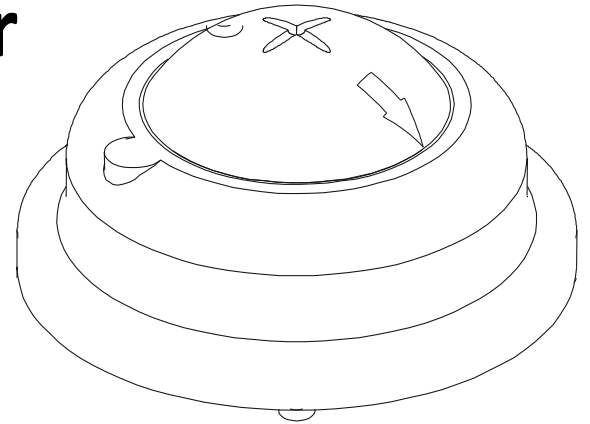
- ▶ **Electronic Scale is Best**
- ▶ **Etch or Tape a Mark on the Pail or Jar**
- ▶ **If it's a Float Pail - Is the Float Working?**
 - **Float Should Move Freely**
 - **Most Floats are in Disrepair**

Cleaning

- ▶ **Most dairy detergents can be used at the strengths recommended by the manufacturer**
 - **Avoid contact with:**
 - Direct Sunlight**
 - Petrochemicals & Hydrocarbons such as:**
 - fly spray, brake or hydraulic fluid, WD40, lubricants, super glue, alcohols, and fuels
- These chemicals attack polysulfone plastics that make up the key Meter components***

Trouble Shooting

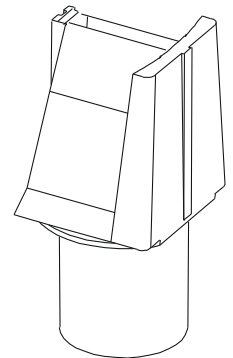
- ▶ **Milk Meter Cover**
- ▶ **Symptoms = abnormal readings**
 - **Cap Point Sharp & Smooth**
 - **Seated properly on Body**
 - **Look for Internal Scratches or Damage**



Trouble Shooting

► Nozzles

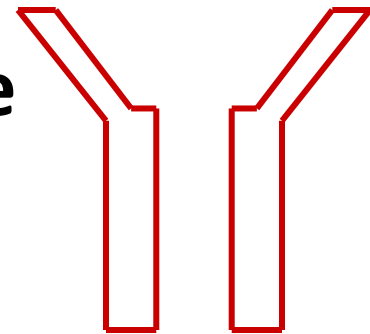
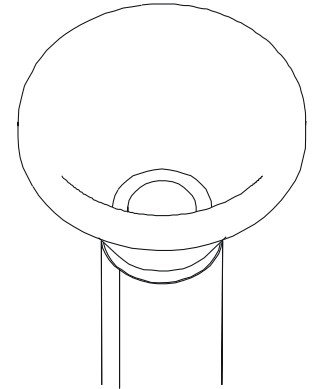
- **Symptoms = abnormal readings**
 - **Gap across the nozzle is very controlled to $\pm 0.01\text{mm}$ (0.0003")**
 - **Check for scratches or ridges on top**
 - **Seated properly in holder**
 - **Abrasion or signs of wear on sides**
 - **Debris (cottonseed, corn, etc.)**



Trouble Shooting

▶ Sleeve & Funnel

- Should be concentric - 3 legs seated properly - Not Loose
- No nicks or scratches since they will affect how the milk is spread out onto the inside of the cover
- Objects lodged inside or lower in the meter base – watch for broken baffle pieces lodged inside the rubber sleeve



Trouble Shooting

▶ Meter Body

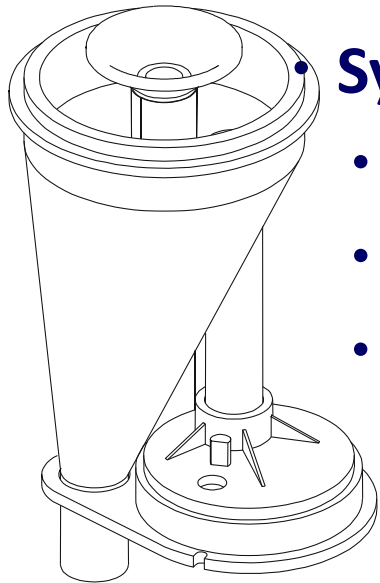
- Look for possible leaks

- Symptoms = Low Reading or Hissing

- Check rubber flask seal - Not Bunched

- Look for hairline cracks

- Is the rocker free to pivot and seal?



- Look for possible blockages

- Symptoms = slow draining, no stirring

Trouble Shooting

▶ Cracks in Body or T-piece

- Generally caused by one of three factors

- Being dropped during loading/unloading
- Chemical or alcohol attack
- Improper disassembly or handling
- Hoses put on too far (3/4" is plenty)

*** Parts that have been molded in or glued in during the assembly process are annealed to reduce the stresses**

Trouble Shooting

Milking Equipment Problems

◦ Areas to Check:

- Air admission hole in claw must be open
- Adequate vacuum pump capacity/setting
- Condition of gaskets & O-rings - Air Leaks?
- Proper installation height of Meters
- Length of hoses used to connect Meters

Worker Friendly

- ▶ **Is Your Workspace Really a Workspace?**
 - **Dedicated Work Area for Meter Repairs**
 - **Adequate Lighting and Ventilation**

- ▶ **Arrange Your Area for Efficiency**
 - **Parts within Reach**
 - **Tools Nearby and Tools You Need**
 - **Workbench Close to Meter Rig / Meter Parts**

Clean Workstation

- ▶ **Are You Stepping Over Things?**
 - **Floors Clutter Free?**
 - **Meters Stored to Prevent Damage?**
- ▶ **Are Things Put Away When You're Done?**
- ▶ **Are You Moving Yesterday's Work Out of Your Way so You Can Work Today?**
- ▶ **Are Floors Clean Dry / Non-Slip?**

Are You Sure this isn't a New Meter?

- ▶ **Turtle Wax Spray Wax**
 - **Spray on the Outside of Meter**
 - **Wipe with Clean Cloth**
 - **Spray / Wipe Again**
- ▶ **Field Tech Could Continue Monthly Applications**
- ▶ **Meter Will Be Able To Shed Water And Parlor UFO's Easier**

Organized Inventory

▶ Labeled Parts

- Do You Really Know What's What?
- How Many "Mystery" Parts Do You Have?

▶ Parts in Compartments/Bins

- Organization = Efficiency
- Efficiency = Speed

And Now for Something Incredibly Heavy

- ▶ **A Meter Technician's Job Responsibilities:**
 - **Verification**
 - **Repair and Calibration**
 - **Responsible**
- ▶ **For the Very Foundation of the Dairy Industry**
- ▶ **Be Proud of Your Job and Take Your Responsibilities Seriously**

.....On the Lighter Side

- ▶ **Job Security is Great**
 - **How Many Other People Want to Work on Cheesy Meters?**
- ▶ **Peace and Quiet**
 - **Where is Everyone?**
- ▶ **If You're a 35 Year Old Meter Tech, Rejoice!**
 - **That's a Meter Tech's Half Life!!!!!!!!!!**
- ▶ **Those of Us Who Know, Appreciate Your Hard Work**

Resources Available On-Line

QCS website is your source...

- *Current auditing guidelines*
- *List of certified meter centers*
- *List of certified meter technicians*
- *List of approved meters and scales*
- *Links to manufacturers*

www.quality-certification.com

Quality Certification Services Inc.

- Performance & Quality Standards

- Compliance Auditing of Providers

- Education, Training, & Development

A simple, yet vital mission....

Providing a reliable source of information to people interested in the U.S. dairy records industry.