



THE GLOBAL STANDARD  
FOR LIVESTOCK DATA

# ICAR Guidelines for installation of the milk meters

**Boumatic Perfection 3000**

Version June 2018

Network. Guidelines. Certification.

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## 1 Instructional Content and Purpose

### **Instructional Content & Purpose**

This instruction packet aims to aid those responsible (outlined under "Responsibilities") for installing, operating, maintaining, troubleshooting, and servicing this product.

### **Procedural Guidelines**

The Table of Contents lists the sections of this packet in the order that they should be read and procedures should be performed. Special safety messages—Danger, Warning, Caution—and notes have been provided, where needed, to aid individuals in following instructions and making decisions. Read these special messages, notes, and all instructions carefully before performing procedures and using the product/system to ensure proper results.

### **Responsibilities**

Procedures in this instruction packet are to be performed according to applicable codes (state, local, and other) by the person(s) qualified (licensed, if applicable) to do so—that is

- high-voltage AC power wiring must be done by a qualified (licensed) electrician (according to NEC),
- other installation, major maintenance, and service work must be done by the dealer.
- product/system checkout and troubleshooting steps are to be performed by the dealer or technician.
- operation steps may be performed by the owner/operator once the dealer or technician has successfully finished the product/system checkout. The owner/operator is responsible for properly operating, maintaining, and monitoring the product/system to ensure that it works properly.

Close compliance with the procedures herein is essential for the owner to get maximum benefit from the product/system.

### **Disclaimers**

No warranties are contained in this packet. The division of responsibilities, stated above, is a general reminder of those provisions in the applicable dealer contract and does not change any agreement between Bou-Matic and the dealer. Information in this packet is not all-inclusive and cannot cover all unique situations.

## 2 Introduction

The Bou-Matic® Perfection 3000 milk meter and control accurately measure the milk production of individual cows. The detacher system can function independently (stand-alone operation) or in conjunction with a ProVantage Network Controller, if automatic recording of production and other cow data is desired. (See the System manual for details.) It is intended for permanent mounting in the milking parlor.

This meter has only one moving component. It is designed for clean-in-place (CIP) washing, and to minimize restriction of milk flow. All milk passes through the measuring chamber.

See Sections 3 & 4 for a full explanation of the features and functions of this meter and control.



## 3 Preparation

### 1.1 Verifying Part and Tool Requirements

To prepare, ensure that you have the following:

Product Parts	Quantity per Stall
Meter Assy, Perfection (RH or LH) .....	1
Detacher Electronics .....	1
Assorted Brackets & Fasteners must be ordered separately.	

This meter requires the use of a fresh air package for each side of the parlor. This may be combined with pulsator air packages.

If something is missing, contact the Bou-Matic Customer Service Department immediately.

Dealer-Supplied Parts	Quantity
<sup>1,3,4</sup> Power Supply, 12- Unit .....	a/r
<sup>2</sup> Wire, type TW insulated, 12 AWG, stranded/solid .....	a/r
(For power from power supply to controls)	
Conduit, PVC, 1/2" .....	a/r

	Qty per Control
Tee Junction Box w/gasketed lid .....	1
<sup>1</sup> Connector, Strain-Relief, 1/2" Water-Tight .....	1
<sup>1</sup> Connector, Wire, Setscrew-Type .....	3
<sup>1</sup> 6-Conductor Cable 20 AWG (max. distance 100ft) ...	A/R
<sup>1</sup> Silicone Hose, 1/4", 4 feet per meter (3556372) .....	A/R

**Note:**

1. Part available from Bou-Matic. (See the Bou-Matic Equipment Catalog for ordering details.)
2. Part must comply with NEC, state, and/or local code standards.
3. Part must be CSA approved if installed in Canada.
4. See subsection 1.2 for details explaining the need for this part.
5. Abbreviation a/r means "as required."

Dealer-Supplied Parts	Quantity
Fastener, 1/4" Machine Screw .....	3/meter
(Required to fasten the wall mount bracket to the wall, curb or to existing brackets.)	

When installing parts, the dealer should have standard installation tools. Nonstandard tools are noted where used.

Other literature referenced in these instructions	Section (§)
9P-476, Lightning Arrestor Installation Instructions .....	§1.2
9ES-496, 12-Unit Power Supply .....	§2.2
9E-713, Perfection Milk Sampler Instructions .....	§4.5
9E-716, Metering Accuracy Test .....	§2.4



### 3.1 Reviewing installation specifications

Plan the installation according to these guidelines:

- One control is required for each meter.
  - The meter control can be used with 2020, 2025, and 2030, but global commands will not work.
  - The control is to be mounted to the pit side of the rump rails in the parlor (where specified in Section 2) at a height convenient for the operator. The meters must be mounted so they are accessible for maintenance and inspection.
  - To ensure consistent milk measuring, install the meters on low milk lines only. Milk traveling through raised hoses on high milk lines may have a slugging effect that could lead to inconsistent measuring.
  - The detacher control has an electrical load rating of 1 detacher unit, meaning 1/12 of the capacity of a 12-unit power supply is required for this product to operate properly.
  - The number of power supplies required depends on the electrical load to be connected. To decide how many will be needed, refer to the proper power supply instructions.
  - For this product to operate properly, slight modifications must be made to the power supply, as explained in the power supply installation instructions.
  - To operate properly, the control requires at least 12-gauge input power wires (a power supply requirement).
- 
- The minimum loaded line voltage at any control must be 9.5 VDC for the 11V circuit and 20.0 VDC for the 24V circuit. This will normally be at the control farthest from the power supply.
  - For best protection against voltage drop, keep wiring as short as possible (maximum of 50 feet to the first control).
  - Wiring must be routed through conduit for protection and aesthetic purposes. (We recommend use of PVC conduit.) AC and DC wiring must not be routed together in the same conduit. If routed together, the AC wires will couple transients onto the DC wires. That is, the DC wires will pick up electrical noise which could lead to poor or intermittent operation of some controls. Though no distance restrictions apply to conduits for AC and DC wires perpendicular to one another, parallel conduits for AC and DC wires must be a minimum of 12 inches from each other to prevent transients from coupling.
  - DC and pulsation wiring must not be routed together.
  - We recommend that wire connections be made with setscrew-type wire connectors.
  - The shield wire ends must be insulated with electrical tape to prevent accidental contact with the chassis or other grounded metal parts. If ends are left exposed and contact is made, such contact could lead to intermittent communications, caused by current flow in the shield wire. (This phenomena is called a *ground loop*.)
  - This product requires uninterrupted AC power to operate properly. Have a qualified (or licensed, if applicable) electrician evaluate the load on the farm and barn electrical service entrances before you install and use the system to ensure that it will have adequate power.

- We recommend that a battery backup be installed with each power supply to provide uninterrupted power to controls. The battery backup will prevent controls from prematurely detaching.
- We recommend using a coalescing filter on the air system because valves and cylinders supplied on Bou-Matic detachers are designed for use without oil. Also, compressor oil, dirt, and/or moisture in the air cause most valve problems. (See the *Dart-Kool/Bou-Matic Equipment Catalog* for information on the filter-regulator.)
- Before connecting power to controls or other system parts, lightning arrestors must be installed on AC power lines, main pole, and power panels serving Bou-Matic automation equipment. Refer to the instructions referenced in subsection 1.1.
- Detacher systems using milk meters require clean-in-place (CIP) washing with a Bou-Matic Jetter Washer for each detacher. (Refer to the proper washer control and Jetter Washer instructions for more details.)
- No additional wash line is required for CIP washing of the meter. The wash solution that washes the claw will also wash the meter. A vacuum-supply line is required to supply vacuum to each meter solenoid valve, located in the mounting box (Figure 1). A filtered fresh airline is also required to supply fresh air to the valves. These two lines should be 3/4 inch PVC pipe size for parlors up to 2 x 10. For longer parlors, larger diameter lines should be used (contact Bou-Matic customer service department for details). Before connecting hoses from these lines to the meters, you must remove all debris from the lines.
- Auxiliary I/O—The control has two inputs to sense a switch or relay closure. The three outputs can be used to turn on a solenoid for sweep, to turn on a relay to start a

feeder in the parlor, or to indicate that the control has detached and emptied the milk.

- ProVantage Network Controller communications lines should be connected in daisy-chain fashion. Tee-junctions can cause communications lockups.

## 4 Installation

### — Note —

- Read the instructions on page 1 under the heading “Responsibilities” and perform only those steps in this section for which you are responsible.
- Read this entire instruction booklet (paying close attention to personal safety messages and installation specifications in Section 1) before starting procedures in this section.
- Sides of the parlor are defined as the left and right, when you stand at the cow entrance and face the milking center.

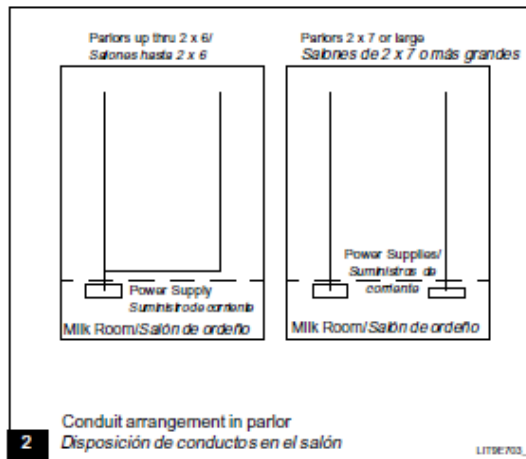
### 2.1 Mounting the Meter and Control

1. Mount the milk meter to a curb or pit wall with suitable fasteners such that it is level (within  $\pm 2^\circ$  of vertical) and at an elevation that will allow exiting milk to flow downward to the milkline without forming a trap. For sanitary reasons, the meter must be at a height that is accessible for inspection and maintenance. It is also important to keep



the samplers at a height that is easy to use. Next, mount the mounting box to the bracket. Then, secure the milk meter to the mounting box by clamping the band around the meter and to the mounting box. Several typical mounting methods are shown in Figure 3.

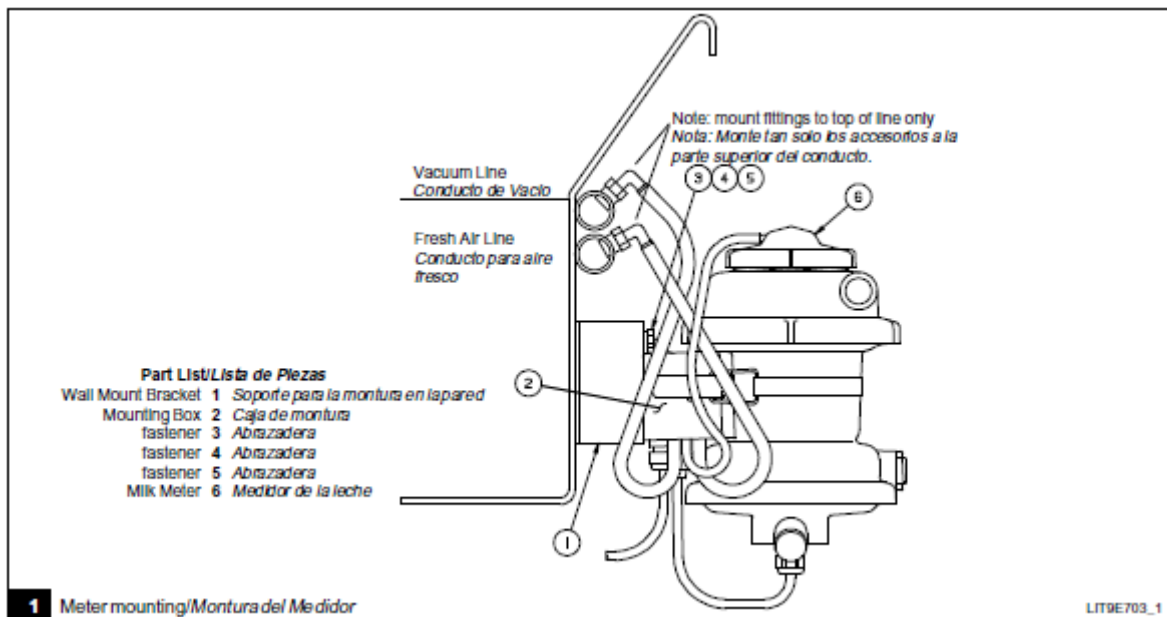
Note that the band clamp is reversible so the clamp can be easily accessible. Note that the upper section of the milk meter (the inlet, with a 3/4 inch ID nipple) can be positioned at any angle around the center axis of the meter. The 3/4 inch ID nipple of the outlet section (sloped downward at a slight angle) may be positioned at any of four directions about the center axis in 90 degree increments.



The meter requires a pinchoff valve between the meter inlet and the milking cluster. This valve is included in detacher/stall packages and discussed in their instructions.

2. **Electronics in enclosure:** Mount the cover (with electronics) to the detacher base.

**Electronics in stall:** Mount the electronic control to the stall enclosure as noted in applicable stall instructions.



#### **4.1 Installing/connecting to the power supply**

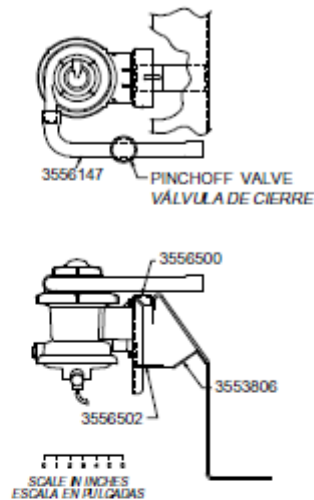
A power supply is required to convert 230 volts AC to 24 and 11 volts DC, which controls use for operation. At this time, install the needed power supplies, and connect the power source wiring from the AC power panel according to the power supply instruction booklet noted in subsection 1.1.

**— CAUTION —**

Do not apply DC power to controls served by the power supply until all connections have been made between the power supply and the control(s). If power is applied to a control before all connections have been made, an overload condition may occur, causing a fuse to blow in the power supply or damage to other products.



### Curb Mount Montura en bordillo

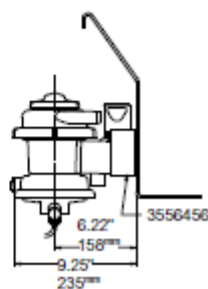
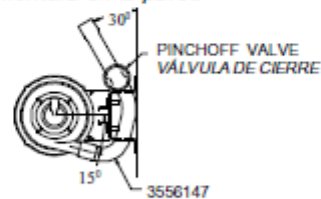


3556571 KIT, METER MTG, CURB, PERF  
EQUIPO, MONTURA MEDIDOR, BORDILLO, PERFECTION

Typical Application: curb mount where higher mounting is required to clear the milk line.

Aplicación típica: Montura en bordillo donde se requiere una montura más elevada para no rozar el conducto de leche

### Wall Mount Montura en la pared

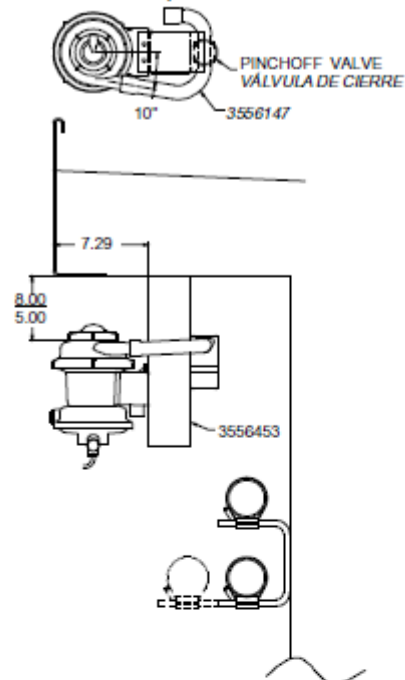


3556570 KIT, METER MTG, WALL, PERF  
EQUIPO, MONTURA MEDIDOR, PARED, PERFECTION

Typical Application: wall mounting where milk line position allows a lower mounting and on walls typical of basement parlors.

Montura en la pared donde la posición del conducto de leche permite una montura más baja y en paredes típicas de salones situados en sótanos.

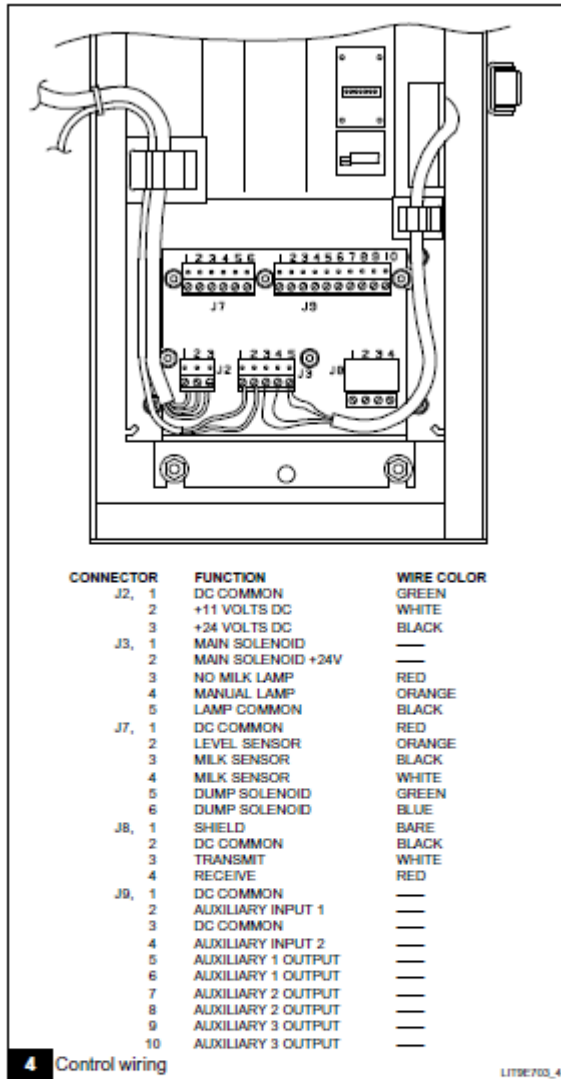
### Recessed Mount Montura empotrada



3556538 KIT, METER MTG, RECESSED, PERF  
EQUIPO, MONTURA MEDIDOR, EMPOTRADA, PERFECTION

Typical Application: installations with recessed pit walls.

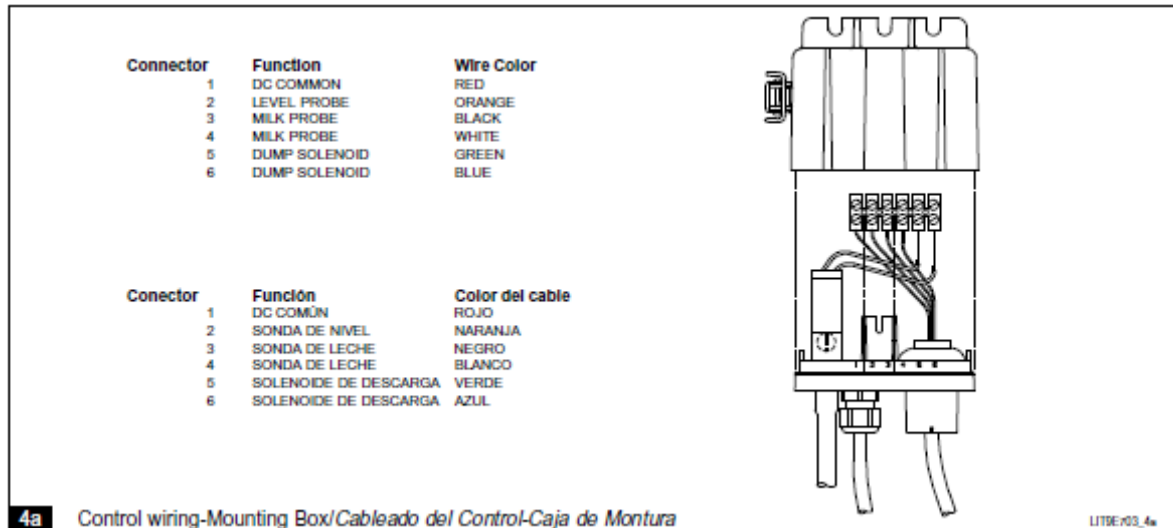
Aplicación típica: para instalaciones con paredes de fosa empotradas.



Various options are available for routing wires to controls. If they will be concealed in concrete and/or stall parts, skip step 2 (below) and refer to the applicable stall instructions for routing details. Otherwise, connect controls to the power supply as follows:

1. Turn off electricity to the power supply.
2. Route 1/2" PVC conduit overhead from the power supply to the controls, using a proper water-proof junction box at each control. (Arrangement of conduit will vary depending on the parlor setup. Figure 2).
3. Route three different-colored 12-gauge type TW wires through the entire length of conduit and into the power supply.

Leave enough wire at the power supply and at each control junction box for connections.



4. Strip the wire insulations 1/4" (6 mm) at the power supply end.
5. Connect the wires to the power supply terminals labeled Common, 11 VDC, and 24 VDC. Note the color you connect to each terminal.
6. Fasten the power cord to the control base with a connector and nut. Connect the wires in each power cord to their corresponding wires in the junction box above, using setscrew-type wire connectors only. Secure the cord to the junction box with a water-tight, strain-relief connector.
7. Unplug the Power connector from the circuit board of each control. Connect the power cord wires to it, and turn on power at the power supply. (See Figure 4 for wiring connections.)
8. Using a voltmeter, ensure that voltages at the control end of each power cord agree with these:

**Voltages at control end of Power Cord**

Place Measured	Voltage
Green (-) to white (+)	11VDC
Green (-) to black (+)	24VDC

If a voltage does not agree to within  $\pm 10\%$  (meaning green to white is 10 to 12 VDC and green to black is 21 to 27 VDC), correct it at once.

9. Connect the Power connector to the circuit board.
10. Fasten the meter cable to the detector base with a strain relief. Unplug the meter connector (J7) on the circuit board. Connect the cable wires to it (per Figure 5). Plug the connector in again. Note that the meter cable (20 AWG unshielded) is available in bulk.
11. Connect all other cables to the control following the color coding shown in Figure 4.
12. Connect the meter cable to the Mounting Box connector following the color coding shown in Figure 4A.

## 5 Level sensor and cable check

Following installation of all detacher system parts, and before using the milk meter, perform the sensor and cable check. Enter the command 8\*201# at the control to display the sensor voltage. With the vacuum off and the plunger in the normal up position, the display should be  $2.10 \pm 0.20$ . Remove the Cap Lock Ring and Top Cap (see Figure 6). Press the plunger assembly all the way down. The display should be  $2.60 \pm 0.15$ . Pull the plunger up slowly until the float is near the top of the chamber. The voltage should return to the original value (2.10), then change back to the value found at the bottom of the stroke (2.60). When you reach the upper sensor position, the voltage should be  $0.50 \pm 0.05$ . Replace the top cap.

**THIS CONTROL IS FOR THE PERFECTION METER**

**SET-UP CODES:**

DETACHER ADDRESS ..... 1 \* 9 \* (0-127) #

LET DOWN DELAY ..... 1 \* 3 \* (30-240) #

CONDUCTIVITY ..... 1 \* 97 \* (0, 40-100) #

CONFIRM ON HOLD ..... 1 \* 20 \* (0, 1) #


CONFIRM ON ATTENTION ..... 1 \* 21 \* (0-15, 100) #

UNITS 0=LBS, 1=KGS ..... 1 \* 42 \* (0, 1) #

TAKEOFF FLOWRATE + TIME ..... 2 \* (1-30) \* (1-30) #

TO DO A GLOBAL COMMAND ADD 1000 TO SECOND VALUE—  
EXAMPLE: 1 \* 1020 \* 1 #

SEE INSTRUCTION MANUAL FOR ADDITIONAL CODES



**TO UPDATE SOFTWARE:**

1. REMOVE J2.
2. REMOVE NUTS FROM TOP AND LOOSEN TWO ON BOTTOM AND REMOVE CONTROL.
3. REMOVE OLD SOFTWARE AND REPLACE WITH NEW.
4. INSTALL CONTROL ON DOOR AND TIGHTEN NUTS.
5. CONNECT J2 AND CHECK FOR PROPER OPERATION.

**LEDS: TOP TO BOTTOM**

D5 OVERLOAD

D20 MAIN SOLENOID

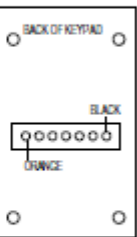
D21 DUMP SOLENOID

D22 AUXILIARY 1 OUTPUT

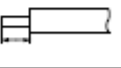
D23 AUXILIARY 2 OUTPUT

D24 AUXILIARY 3 OUTPUT

CONNECTOR	FUNCTION	WIRE COLOR
J2	1 DC COMMON	GREEN
	2 +11 VOLTS DC	WHITE
	3 +24 VOLTS DC	BLACK
J3	1 MAIN SOLENOID	—
	2 MAIN SOLENOID +24V	—
	3 NO MILK LAMP	RED
	4 MANUAL LAMP	ORANGE
J4	1 LAMP COMMON	BLACK
	2 DC COMMON	RED
	3 LEVEL SENSOR	ORANGE
J5	1 MILK SENSOR	BLACK
	2 MILK SENSOR	WHITE
	3 DUMP SOLENOID	GREEN
	4 DUMP SOLENOID	BLUE
J6	1 SHIELD	BARE
	2 DC COMMON	BLACK
	3 TRANSMIT	WHITE
	4 RECEIVE	RED
J8	1 DC COMMON	—
	2 AUXILIARY INPUT 1	—
	3 DC COMMON	—
	4 AUXILIARY INPUT 2	—
	5 AUXILIARY 1 OUTPUT	—
	6 AUXILIARY 1 OUTPUT	—
	7 AUXILIARY 2 OUTPUT	—
	8 AUXILIARY 2 OUTPUT	—
	9 AUXILIARY 3 OUTPUT	—
	10 AUXILIARY 3 OUTPUT	—



**WIRE STRIP LENGTH**  
3/16" (5 mm)



LABEL PIN 3556364  
REV B

**6** Label on electronics

LITRNF200\_5

## **2.4 Performance Check**

Following installation of all detacher system parts, and before using the milk meter, perform the metering accuracy test described in Appendix A of this document to ensure that it is calibrated properly, and check the meter's performance. Then, return to these instructions.

## **2.5 Resetting the Control**

To reset the control, press and hold down both the AUTO/MANUAL and ATTACH/DETACH buttons for at least one second, then release them. After power-up and reset the detacher must be in detach mode. The control must be reset any time you change outlet assemblies.

# **6 Features and parameter setting**

Numerous function parameters can be programmed (set) into the electronic control at its keypad. Some parameters have factory-programmed, default settings. These settings give satisfactory milking performance. System diagnostic parameters cannot be changed, but can be monitored and recalled by the user.

## **3.1 Setting Parameters**

Following are explanations of these functions and instructions on programming the electronics to enable them. (Setting instructions are also shown on the label on the electronic assembly, also shown in Figure 5.) A summary of these commands can be found at the end of this section in Table 1.

— **NOTE** —  
Control parameters set with a 1\* or 2\* command are stored in an EEPROM and saved when power is off. Operating software is stored in an EPROM that can be changed.

### **Global Commands**

A global command is one that you can enter at one control and have sent to all controls. This function is available only where controls are connected to an Agri-comp 2040 or 2045 computer with version D40N, D45N, or higher system software. When used with a 2040 computer, the **DATA COLLECT** switch must be **ON**.

To send a global command, simply add 1000 to the portion of the command that you specify in the Cow Number display. For example, to set all controls to confirm on hold, you would enter the command 1\*1020\*1# instead of 1\*20\*1#.

#### **Programmable Address Setting**

A unique address must be assigned and set at each control when used with a ProVantage Network Controller, so that the computer can identify a communicating control and cow data can be transmitted between the two. Controls used without a computer do not require addresses, so no address change is needed. The address default setting for all controls is zero (0), although any value from 0-127 can be assigned. Only addresses from 0-63 should be used with the current ProVantage Network Controllers. Addresses 0 to 127 can be used with ProVantage Software.

When assigning control addresses, you should start with the control farthest from the entry gate in double-herringbone, trigon, and parallel parlors and with the control closest to the entry gate in side-opener parlors, assigning the first control the address 0 (already set). Assign the next control the address 1. Continue assigning addresses to all controls in a consecutive order. (Although you need not match control addresses with control numbers in the parlor, it may be helpful when reading ProVantage reports.) To set the address for a single control, enter the command 1\*9\*[0-127]#.

To set addresses for all controls using the one-step Global command:

1. Enter at the first control the command 1\*1009\*[first address]#. The display of each control will show the command entered with the next consecutive address.
2. Press the # key on the next control, and proceed down the row of controls, pressing the # key on each control in order to set the addresses in consecutive order.
3. When all addresses have been set, enter the command 1\*1009# at **any** control.

#### **Unit of Measure Setting (Pounds or Kilograms)**

The control can be set to display milk weights in pounds or kilograms. To program the control to display milk weights in pounds (the default setting), enter the command 1\*42\*0#. For kilograms, enter the command 1\*42\*1#.

#### **Flowrate and Takeoff Delay Setting**

When the control detects that the flow rate has dropped below the takeoff flowrate, the NO MILK lamp will turn on. When the next milk level is detected, the milking unit will detach (for improved accuracy). If the next milk level is not detected before the takeoff delay, the milking unit will



detach. To set these functions, enter the command `2*[flowrate=1-30]*[delay=1-30]#`. Note that the settings in the control may be replaced by settings from the ProVantage Network Controller. The lowest detach flowrate that can be used by the Perfection meter is 0.6 lb/minute. Although the software allows lower values to be entered, these values will be automatically converted to 0.6 before they are used by the meter. This feature is designed to maintain command compatibility with the Precision meter and the Agri-comp computers.

**Letdown Delay**

The let-down delay keeps the unit attached to the cow even if no milk is sensed during that period. The purpose of the delay is to allow the user enough time to attach the milking unit to a cow and the cow adequate time to let down her milk without the milking unit detaching prematurely. The delay can be programmed for any time from 30 to 240 seconds (4 minutes). To set this function, enter the command `1*3*(30-240)#`.

**Confirm on Attach (requires ProVantage Network Controller)**

When the confirm on attach function is enabled and you attach a cow that meets the confirm criteria, the control will not actually attach until you press the # key on the keypad.

To set this function, enter the command `1*20*1#`. (To disable it, enter `1*20*0#`.) To set a confirm on all Attention codes, enter `1*21*100#`. (To disable it, enter `1*21*0#`.) To set a confirm on just one Attention code, enter `1*21*(attention code)#`. Note that you can only program a confirm on either one single ATTN code or on all ATTN codes.

**Smart Detach (requires ProVantage Network Controller)**

This feature programs the control to recognize early detaches (such as when a cow kicks off the claw). When this feature is enabled, by setting the threshold above 0%, the control compares the cow's production at detach to her expected average. If the production is greater than the specified threshold percentage of the average, the control will assume a normal detach. If the production is below the expected threshold value, the control assumes a premature detach and puts the control into Manual mode. The milker can ignore the AUTO/MANUAL button when reattaching the unit. If the Detach Indication output function has been programmed, it will not be signaled. When the milk production exceeds the threshold value, the control will automatically revert to Auto mode. If you want the unit to stay in Manual mode after the second attach, you must attach, wait for milk flow to resume, then press the Manual button twice (otherwise the control will revert to Auto mode when the threshold is reached). To enable this function, enter the command `1*25*(threshold, 1-100%)#`. To disable it, enter `1*25*0#`.



**Programmable Detach Display (requires ProVantage Network Controller)**

Upon detach, the COW NUMBER and PRODUCTION windows can present any of five Detach Display values: Cow Number (1), Production (2), Attach Time (3), Deviation (4), or Average Production (5). (The default settings are Attach Time, code 3, for the COW NUMBER window and Deviation, code 4, for the PRODUCTION window.)

To program the COW NUMBER window, enter the command 1\*10\*(code 1-5)#. To program the PRODUCTION window, enter the command 1\*11\*(code 1-5)#.

**Sweep Delay and Sweep Time**

A sweep function can be used with this control and meter that allows any milk that might collect in the milk hose between individual cow milkings to be drawn into the milkline before the backflush function begins, thereby minimizing the amount of milk swept away with wash water during the cleaning operation. If this feature is desired, first install the backflush sweep valve per literature 9E-705. Then return to this booklet to set the control.

The sweep occurs after each automatic detach, causing the sweep solenoid to open the milk valve. If sweep is not desired, set the delay for 0 seconds. (All controls that will use this function require a second solenoid valve and appropriate tubing.)

To enable this function, assign it one of the control's three output ports with the command 1\*7\*(1-3)#. Then set the sweep delay with the command 1\*5\*(0-60 seconds)# and the ON time with 1\*6\*(0-60 seconds)#. To disable the function, enter 1\*7\*0#.

To test this function, program all controls for a 5-second Sweep Delay and a 3-second Sweep ON Time to ensure proper operation. One at a time, set each control to Auto mode, press attach, and perform a simulated milking for the duration of a "normal detach" period. Press Detach. Ensure that the sweep valve activates 5 seconds after the pinchoff valve clamps the milk hose and that the sweep lasts 3 seconds.

**Parlor Feeding (requires ProVantage Network Controller)**

When used with an Agri-comp 2040/2045 computer (with version D40N, D45N, or higher system software) or 2045 Network Controller, the control can be used to dispense feed in the parlor. (See the System manual for details on assigning feed rations.)

To enable parlor feeding, first program the auxiliary output port that will drive the feed auger with the command 1\*40\*(1-3)#. The selected port signal can be used to activate a relay that will activate a single feed auger at the stall. To disable it, enter 1\*40\*0#.

Then calibrate the feed auger, with the command 1\*41\*0#. The auger will operate and dispense feed for one minute. Weigh the feed and enter that amount (in grams) with the command 1\*41\*(grams)#. The auger is calibrated in grams per minute.

When a cow is attached, the ProVantage Network Controller will divide the cow's daily ration for feed D by the number of milkings per day and send that portion to the control. If programmed to feed, the control will calculate the time needed to deliver the portion and start the feed auger. If you change the cow number with the 7\*[cow number]# command, the new feed amount will take precedence. When the feed delivery time ends, the auger will stop.

Upon the next attach, the control will send the amount fed (along with the milk weight) to the computer, where the amounts will be stored in the cow's record. Note that parlor feeding will work with or without ID tags.

If you wish to have the computer calculate feed costs, assign a cost to feed type 32 in the ProVantage Network Controller.

#### **Remote Attach**

Remote Attach switch, momentary contacts, normally open, (that you provide) can be installed at any desirable location to allow you to activate the attach function from a location other than the control.

To enable this function, assign it one of the control's two auxiliary input ports with the command 1\*19\*(1-2)#. To disable it, enter 1\*19\*0#.

#### **LEDs Versus Incandescent Lamps**

The control can use either incandescent bulbs or LEDs in the lamps on the front of the control. To set the control for incandescent bulbs (default setting), enter the command 1\*33\*1#. To set it for LEDs, enter 1\*33\*0#.

#### **Time Delay 1**

The time delay 1 is set by entering command 1\*4\*(0-120)#. This delay will prevent the detach indication (1\*26#) from turning on until the time has finished. If smart detach (1\*25#) is being used the delay will not start until the production goes above the threshold and the control detaches. This feature can be used for claw drop by adding a solenoid

to one of the auxiliary output ports and setting the port by entering 1\*26\*(1-3)#. If sweep is being used "time delay 1" will occur before the sweep delay starts.

#### **Detach Indication**

When enabled, this signal can be used to automatically activate an auxiliary product upon detach. For instance, it can activate group backflush, or release cows in rapid exit parlors. Note that if parlor feeding is enabled at the control, the detach signal will not be activated until after the feed has been completely delivered.

To enable this function, assign it one of the control's three Aux output ports with the command 1\*26\*(1-3)#. The port will turn on when the control is detached and will turn off when the control is attached. To make this an attach signal instead of a detach signal, enter the command 1\*26\*(11-13)#. This will cause the port to turn on when the control is attached and turn off when the control is detached. To disable this function, enter 1\*26\*0#.

#### **Wash Mode**

The control can be set to "wash" mode and display the "CIP" message when the system is washed. To prepare the detacher for wash, the milk weights for the last cows milked must be sent to the ProVantage Network Controller by pressing the "attach" button first and then the "manual" button second. Then enter 15\*1#, this will place all units in "CIP" mode and then do the "end of milking".

#### **Reset To Defaults**

To reset all parameter values to the original default settings, enter the command 8\*8\*9173#. (See Table 1 for a complete list of default values.)

### **3.2 Displaying Values at the Control**

#### **— NOTE —**

The LED display does not turn off. This feature is desirable to view the display at all times.

Certain settings can be viewed at the control display for reference and diagnostic reasons. Following are instructions for displaying them.

#### **Software Version**

To display the version of system software in the control, enter the command 8\*7#.

#### **EEPROM Check**

This function forces the control to check the setup values stored in its EEPROM to detect any that are not within the expected range. To initiate this function, enter 8\*3#.

If all values are within range, the control responds with 8:3:0.  
If a value is out of range, the response will be 8:3:(code), where "code" is the number of the setting in error.

Reset the parameter values from the Local Settings recorded in Table 1.

#### **Voltages**

To ensure that the control has the correct voltages:

- To display the communications transmit voltage, enter the command 8\*202#.
- To display the communications receive voltage, enter the command 8\*203#.
- To display the 11 volt level, enter the command 8\*211#.
- To display the 24 volt level, enter the command 8\*224#.

#### **Number of Resets**

To display the number of resets (manual and powerup), enter the command 8\*6#.

#### **Number of Attaches**

To display the number of attaches, enter the command 8\*2#.  
To reset this count to zero, enter the command 8\*2\*1#.

#### **System Diagnostics**

Each time a cow is milked, the control updates internal totals that can be used to verify the correct operation of the meter.

- The command 8\*999# or 8\*999\*0# will cause the control to respond with the total number of cows milked.
- The command 8\*999\*1# will cause the control to respond with the ratio of the total production divided by the total average (for cows without averages, the production is used as the average), which should be very close to 1.00 for correctly working meters.
- To display the average production per cow, enter 8\*999\*2#.
- To display the average time per cow, enter 8\*999\*3#.
- To display any of the above values at all controls, (so that they can be compared), enter the global command 8\*1999\*(0-3)#.

— **Note** —

If the total count reaches 10,000, the control will divide all totals by 2 to compensate for its 4-digit display window.

The above values should be consistent from meter to meter. If any meter is significantly different than the majority, check that meter to verify correct operation or correct any problem.

To reset the diagnostic totals, either enter the command 8\*999\*999#, reset the control, or remove power from the control.

**Display Percent Done**

This function displays the production as a percent of the average in the Code window. To enable this function, enter the command 1\*23\*1#. To disable it, enter 1\*23\*0#.

**Display Flow Rate**

You can display the flow rate (in kilograms per minute) in the Code window by entering the command 8\*94\*1#. Change the display to the previous setting with the command 8\*94\*0#.

**Conductivity**

The meter will measure the conductivity during each dump cycle of a cow's milking and the control will send the maximum conductivity for each cow (along with the milk weight) to the computer upon the next attach, where the amounts will be stored in the cow's record.

The maximum conductivity value can be displayed in the Code window during the milking. To display the conductivity during the milking, enter the command 8\*97\*1#. To display the conductivity for each dump, enter the command 8\*97\*2#.

— **Note** —

The first three dumps will not be measured because of possible contamination.

**Conductivity Threshold**

When the conductivity measured during the milking exceeds the conductivity threshold, the control will flash its Manual lamp, and automatically display the conductivity in the Code window.

To enable this function, set the threshold with the command 1\*97\*(40-99)#. The threshold value entered will be divided by ten (75 = 7.5 milliSiemens) when displayed. To disable this function, set the threshold to 0 or 100 (the maximum possible conductivity value is 9.9). The default setting is 0 (0.0 milliSiemens), disabled.

#### **System Adjustment Factor**

Various system conditions (vacuum level, air admission, milk foam, and so forth) can cause the meter to read slightly higher or lower than nominal. To compensate for these effects, you can change the System Adjustment Factor, using the command `1*82*(1-9)#`. A setting of 5 is nominal, lower values will decrease the readings from the meter, and higher values will increase the readings from the meter. Each setting changes the readings by about 0.5% from the next setting.

#### **— Note —**

Use the system diagnostic command `8*1999*1#` to verify that all meters are functioning properly before you change the System Adjustment Factor.

#### **User Defined Detacher Displays**

The detachers can be used to display cow record information from the 2045 ProVantage Network controller. Any desired cow data value (at least, any value that can fit in the 4 digit display) can be displayed by entering the `14*(cow number)*(parameter code)#` command. In addition to this, you can program the 2045 ProVantage Network controller to return any two desired cow data values for each of the commands `4*#`, `5*#`, and `6*#` at the detacher. For example, you could program the `4*#` command to return the LOT and AVG values, while the `5*#` command would return DIM and DHET, and the `6*#` command could return RPRO and %FED. You can enter the commands as shown, without a cow number, to get the data for the cow currently milking at the detacher, or you can use the form `4*(cow number)#`, `5*(cow number)#`, or `6*(cow number)#` to view data for any cow in the herd.

You can check the value assigned to a cow for any parameter by specifying that cow number and parameter in the following command:

`14*0*(parameter)#` (for cow at detacher)  
`14*(cow number)*(parameter)#` (for any cow)

Table 1 summarizes the commands available for this control. You should make a written record of all settings in the controls as a backup in case you need to replace a control.



**Table 1. Local Commands for the Perfection Meter**

Command	Description	Default	Local Setting
#	display Cow Number and Production		
1#	display Milking Time and Production		
1*3*(30-240)#	set Letdown Delay	[132]	
1*4*(0-120)#	set time delay 1 (dump delay)	[0]	
1*5*(0-60)#	set Sweep Delay	[2]	
1*6*(0-60)#	set Sweep ON Time	[2]	
1*7*(0-3)#	set Sweep Port (0=disable, 1-3=Aux output port)	[0]	
1*9*(0-127)#	set Address, single control	[0]	
1*1009*(0-127)#	set Address, all controls automatically	[0]	
1*10*(1-5)#	cow No. window at detach (1=Cow#,2=Prod,3=Time,4=Dev,5=Avg)	[3]	
1*11*(1-5)#	production window at detach (1=Cow#,2=Prod,3=Time,4=Dev,5=Avg)	[4]	
1*19*(0-2)#	set Remote Attach (0=disable, 1-2=Aux input port)	[0]	
1*20*(0-1)#	set Confirm On Hold (0=disable, 1=enable)	[0]	
1*21*(0-15, 100)#	set Confirm On ATTN (0=disable, 1-15=ATTN, 100=all codes)	[0]	
1*23*(0,1)#	display Production as percent of Avg in Code window (0=disable, 1=enable)	[0]	
1*25*(0-100)#	set SMART Detach Threshold (as percent of average)	[0]	
1*26*(0-3)#	set Detach Indication (0=disable, 1-3 or 11-13=Aux output port,)	[0]	
1*33*(0-1)#	set Lamp Type (0=LED, 1=incandescent)	[1]	
1*40*(0-3)#	set Parlor Feed (0=disable, 1-3=Aux output port)	[0]	
1*41*0#	deactivate feed motor for calibration		
1*41*(g/min)#	enter feed weight for feed motor calibration	[0]	
1*42*(0-1)#	set Unit of Measure (0=pounds, 1=kilograms)	[0]	
1*82*(1-9)#	system Adjustment Factor	[5]	
1*97*(0,40-100)#	set Conductivity Threshold (0=disable, 40-99=threshold, 100=disable)	[0]	
2#	display Flowrate and Takeoff Delay		
2*(1-30)*(1-30)#	set Flowrate and Takeoff Delay	[7],[13]	
4#	recall defined parameters for current cow		
4*(cow no.)#	recall defined parameters for selected cow		
5#	recall defined parameters for current cow		
5*(cow no.)#	recall defined parameters for selected cow		
6#	recall defined parameters for current cow		
6*(cow no.)#	recall defined parameters for selected cow		
7*(cow no.)#	change cow number		
7#	on rotary parlors, enter this at first occupied stall to skip empty stalls		
8*1#	display last tag number read in this ID zone		
8*1*1#	set Wash mode (CIP)		
8*2#	display number of Attaches		
8*2*1#	reset displayed Number of Attaches (when replacing inflations)		
8*3#	display EEPROM check		
8*5#	display number of Attaches (Diagnostic use)		
8*6#	display number of start-ups and times control has been reset		
8*7#	display Software Version		
8*8*9173#	reset all values to defaults		
8*71*(0,1)#	set state of AUX1 output (Diagnostic use)	[0]	
8*72*(0,1)#	set state of AUX2 output (Diagnostic use)	[0]	
8*73*(0,1)#	set state of AUX3 output (Diagnostic use)	[0]	
8*74#	display state of AUX1 input (Diagnostic use)		
8*75#	display state of AUX2 input (Diagnostic use)		
8*94*(0-1)#	display Flow Rate in kilograms per minute (0=disable, 1=enable)		
8*97*(0-2)#	display Conductivity during milking (0=disable, 1=maximum, 2=for each dump)[0]		
8*100#	plunger timer test		
8*201#	display Level Sensor voltage		
8*202#	display Transmit voltage		
8*203#	display Receive voltage		
8*211#	display 11V level		
8*224#	display 24V level		
8*999*0#	display total cows milked		
8*999*1#	display ratio of Total Prod÷Total Avg		
8*999*2#	display average production per cow		
8*999*3#	display average time per cow		
8*999*999#	reset diagnostic totals		
8*1899#	put all detachers in Manual mode, then Attach mode (global command)		
9#	return D/M address		
14*0*(parameter)#	recall parameter value for cow assigned to this meter		
14*(cow no.)*(parameter)#	recall parameter value for cow		
15*1#	end of milking		
15*30*(0-99)#	assign LOT number from parlor. Note: For all cows attached after this command.		
20*(cow no.)*(0-99)#	hold milk for this cow, number of milkings		
21*(cow no.)*(0-15)#	assign attention code to this cow		
23*(ID high no.)*(ID low no.)#	display cow number or calibration assigned to tag. Example: Cow 25 with tag number 123456. Enter 23*12*3456# and the D/M display would be:	23      3456	
		25	

**Notes:**

- 1\* and 8\* commands can only be used in the parlor to change control settings.
- 1\* and 2\* commands will be stored in the EEPROM and will be saved in case of power loss or reset. 8\* commands will need to be re-entered after a power failure.
- Any cow parameter can be assigned by using the following format: (cow parameter)\*(cow no.)(parameter value)#



## 7 Operation

### 4.1 Understanding Basic Parts

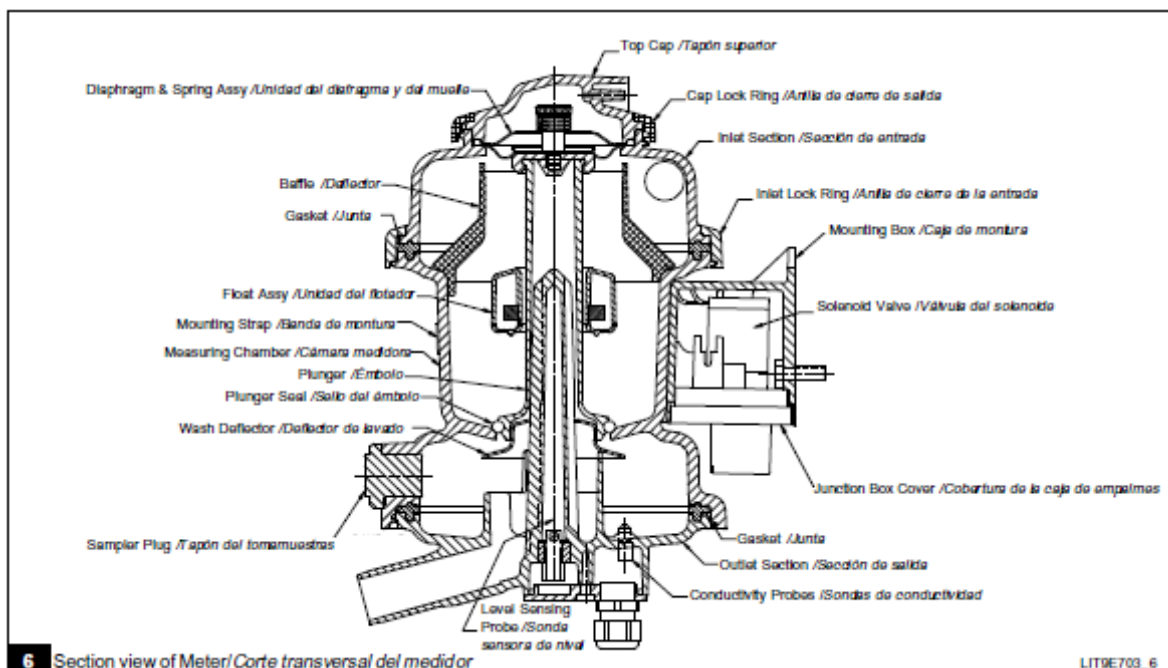
#### Milk Meter

The milk meter measures a cow's milk production, milking time, and conductivity—all of which it sends to a Pro Vantage Network Controller, if used. The meter consists of the parts shown in **Figure 6**.

Milk meter operation begins when milk and air from the claw enter the inlet of the meter. A baffle in the upper section of the meter separates the air from the milk and directs the milk down the inside wall of the measuring chamber (to reduce foaming), while air escapes through the air bypass. This separation allows the meter to maintain a stable vacuum level.

Attached to the top of the inlet is a small chamber containing a diaphragm and spring assembly. These parts raise and lower the plunger to empty and fill the chamber as determined by the electronic control.

The measuring chamber contains a seat, a plunger with rubber sealing surface, and a sealed float with a magnet inside. This chamber is transparent and cylindrical.



Conductivity probes are molded into the base. A hollow stem extends upward along the center axis of the measuring chamber. This stem houses the level sensing probe assembly which is precisely positioned to determine the level of milk in the measuring chamber.

A port in the side wall is provided for mounting a sampler. When a sampler is not used, the sampler plug must be in the port.

#### **Principle of Operation**

The milk meter is a time to fill type meter. The milk level in the measuring chamber is monitored by the position of the float. During milking, when the milk level reaches the upper point, the float causes the level sensing probe to signal the control that the chamber is full. The control then activates a vacuum solenoid valve which admits equal vacuum on both sides of the diaphragm, thus allowing the spring to raise the plunger and drain the chamber. The chamber remains open for a short period, then the plunger lowers, allowing the next portion of milk to be measured. The meter continues in this fashion, holding, measuring, then releasing milk, until the flow rate falls below the threshold for detaching. Upon detach, any remaining milk empties. If the sampler is attached to the meter, a small portion of the milk automatically diverts into the sampler jar with each cycle. The rate at which the milk cycles through the meter is monitored and this information is used as part of the detach logic.

#### **Electronic Control**

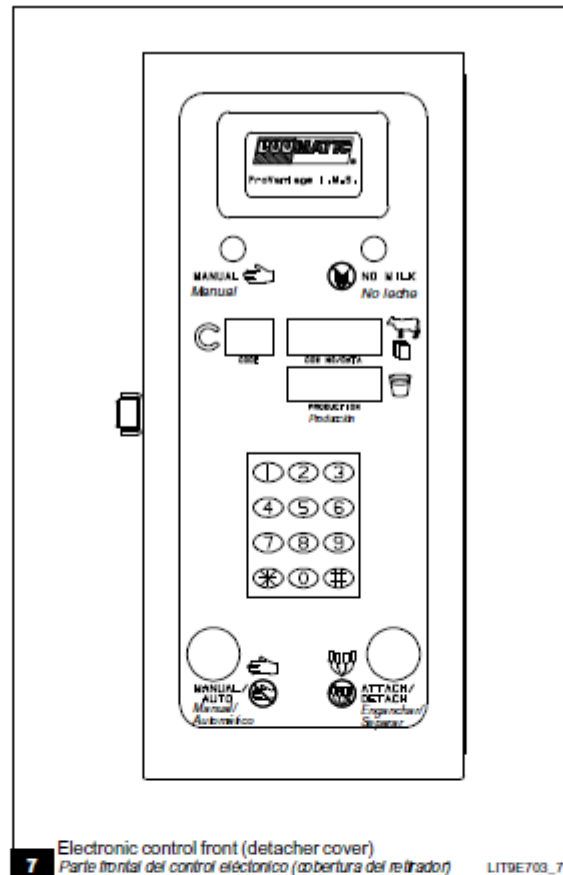
The electronic control is the central information processor and communications link among the milking system parts (milk meter, control, valve), and a ProVantage Network Controller if used. Depending on the user's choice of milking mode, the control will either automatically activate and monitor certain events of the milk meter, the pinchoff valve, and the detach mechanism or it will leave those tasks to be manually performed by the user.

The control has two control buttons, a mode operation lamp, a NO MILK indicator lamp, a keypad, and three display windows.

Both control buttons, labeled AUTO/MANUAL and ATTACH/DETACH, are dual-function activators. That is, when you press a button one time, the control will become set for one operation (say AUTO, for automatic takeoff mode). And when you press it the next time, the control will become set for the other operation (MANUAL takeoff mode, in this case). The same is true for setting the ATTACH and DETACH modes, though for both buttons, under normal milking conditions, certain default settings occur

automatically to spare the user from pressing them manually for each cow milked. (See later subsections for more details on the buttons and the operations, or *milking modes*, they activate.)

The MANUAL and NO MILK lamps are visual indicators of the milking mode or events that take place. When the control is set to the automatic takeoff mode, the MANUAL lamp will be off. And when set to the manual takeoff mode, its MANUAL lamp will be on. Similarly, when the control registers a below-minimum milk flow rate, the NO MILK lamp will be on. And when it registers a minimum or greater milk flow rate, the lamp will be off.



**7** Electronic control front (detach cover)  
 Parte frontal del control electrónico (cobertura del retirador) LIT9E703\_7

The control keypad can be used any time to enter commands for setting values, performing actions, or recalling certain data. (See §3 for more details on setting and recalling data. See the System manual for information on other available commands.)

The display windows (labeled CODE, COW NO./DATA, and PRODUCTION) provide the user with such data as a cow's individual milk production, milking time, and cow number. Also, the user can check certain control operation settings at the display through entry of a simple command at the control keypad. (See §3 for more details.)

The electronic control contains a microprocessor circuit that calculates the float position by monitoring the action of the level sensing probe imbedded in the outlet stem. The position of the float with respect to time is used to calculate

the actual milk flow rate. The control signals a vacuum solenoid valve to empty the measuring chamber when full. It also calculates the actual milk flow rate and when the target flow rate is reached, signals the detach solenoid to shut off vacuum to the cluster and retract the detach mechanism to remove the cluster. The probe assembly is **not** a repairable item.

## 8 Undersratnding the automatic/manual modes

As mentioned in Section (§) 3.2.1, the user may operate controls in either the Auto (automatic takeoff) mode or the Manual (takeoff) mode by pressing the corresponding control button.

When using the control in automatic mode, you set it to activate an automatic takeoff delay. This delay responds to low milk flow rate (calculated by the control electronics) to determine end-of-milk condition and the eventual automatic detach of the milking unit. (See information under “Automatic Mode...” subheadings for more details about this mode.)

***Operating the control in manual mode overrides milk flow monitoring, causing the control to ignore the takeoff delay and remain attached indefinitely.*** As a result, *you* must decide when to detach the milking unit and do so manually by pressing the corresponding control button. (See information under “Manual Mode” subheading for more details about this mode.)

### **Automatic Mode—Let-Down Delay**

To allow enough time for you to attach the milking unit to a cow and for the cow to let down her milk, the control features a ‘detach override’ or Let-Down delay. This delay (normally lasts 2.2 minutes (132 seconds), but can be programmed for any time from 30 seconds to 240 seconds (see §3.1). From the moment you press the ATTACH/DETACH button to milk a cow until the delay ends, this override prevents the milking unit from detaching, whether milk is measured or not.

During the delay period, whenever at least a high enough flow rate is sensed (determined by the preset flow rate), the control registers milk flow and signals the NO MILK lamp to turn off.

Anytime a low milk flow rate is calculated at or after the delay’s end, the control will detach. Depending on when the low rate occurs, the detach will either be “early” or “normal” and related events will differ accordingly.

**Automatic Mode—Early Detach, at end of Let-Down Delay**

A detach that occurs when the Let-Down delay ends is considered an early detach. Upon early detach, the pinchoff valve shuts off vacuum to the claw, gently detaches the milking unit from the cow, and retracts the link arm. The NO MILK lamp starts flashing (indicating an early detach), and the meter empties its contents.

**— Note —**

A flashing NO MILK lamp indicates an early detach. That is, the milking unit was attached to a cow for only the Let-Down period.

You may continue milking the cow after an early detach by reattaching the milking unit to the cow. If you are using a ProVantage Network Controller and you want to keep accurate milk weights, press the AUTO/MANUAL button before reattaching.

**— CAUTION —**

If reattachment (after a detach) and accurate recording of production are desired, you must reattach in manual mode.

**Automatic Mode—Normal Detach**

Since an early detach (explained above) is one when the milking unit is attached to a cow for only the let-down period, a normal detach is any that occurs after that point when a below-minimum milk flow rate exists long enough to activate the detach.

When a below-minimum milk flow is sensed, the takeoff delay will start (see §3.1 for possible delay settings). The NO MILK lamp will light constantly for the duration of the delay period, or until the level sensing probe is activated. If by the end of the delay the cow does not resume a minimum flow rate, the claw will detach. The NO MILK lamp remains constantly lit to indicate normal detach.

If normal detach occurs too soon for a cow with unusual let-down or milk-out problems, you may continue milking the cow after detach by reattaching the milking unit to the cow. (See details and cautions on reattaching under “Automatic Mode—Let-Down Delay” and “Manual Mode” subheadings.)

**Manual Mode**

Manual mode is an alternative to automatic mode that aids in keeping the milking unit attached when undesirable detaches occur, or would otherwise occur. Manual mode does so by preventing the detach that follows the takeoff delay in



automatic mode. Manual mode's use may prove advantageous after an early detach, at the start of milking a cow with unusual and regular let-down problems, or near the end of milking a cow with milk-out problems.

If a detach occurs in automatic mode before the cow is done milking, and accurate milk weights are desired at the control and ProVantage Network Controller, you must reattach the milking unit in manual mode. To reattach the unit, you would press the AUTO/MANUAL button (to set manual mode), then the ATTACH/DETACH button, and reattach the milking unit to the cow. The MANUAL lamp will light constantly. The NO MILK lamp will turn off when a minimum or greater milk flow rate is measured, and the display will continue its "Time" and "Production" incrementing as if no detach had occurred.

You may finish milking the cow in manual mode or, at any time, change the mode back to automatic (by pressing the corresponding button). If finishing the milking in manual mode, you must closely monitor the milking to decide the best time for takeoff (after a reasonable period of constantly lit NO MILK lamp) and press the ATTACH/DETACH button (to detach the unit manually) at such time. If you set the control to automatic mode, events will occur (as explained above for automatic mode) according to the time of setting.

If a cow with let-down problems frequently detaches early, you may want to consider milking her in manual mode until her milk flow rate is consistent enough to avoid the tedious chore of reattaching. In this case, you would first attach the unit in automatic mode (to send the last-milked cow's data to the computer), then set the control to manual mode. The MANUAL lamp will light and the NO MILK lamp will turn off when a minimum or greater milk flow rate is measured. When, after a series of on/off occurrences, the NO MILK lamp remains off constantly for a substantial period, you may set the milking mode to automatic and be fairly sure that the milking unit will stay attached and have a normal detach. Or, if desired, you may milk the cow entirely in manual mode.

---

**— CAUTION —**

**Close observance of milking is required at any control set to manual mode, since the milking unit stays attached and continues milking until the user manually detaches the unit (or resets it to automatic mode).**

If a cow with milk-out problems experience a normal detach before one or more udder quarters finishes milking out, you may finish milking her in manual mode. Just reattach as explained above for a cow that detaches early, closely monitor her milking, and manually detach the unit when you have decided she is milked out.

When the cow is milked out, the NO MILK lamp will light constantly, but the takeoff delay sequence will not start. Also, the milking unit will stay attached to the cow and continue milking until you press the ATTACH/DETACH button. Pressing the button this time causes the control to retract and detach the milking unit, turns off MANUAL lamp, and restores automatic mode. The NO MILK lamp remains on constantly (not flashing) until you attach the milking unit to the next cow to be milked and the minimum milk flow is measured.

*If an early detach occurs, you can prevent restarting the let-down delay again by placing the control in Manual mode first, then reattaching, and finally pressing the AUTO/MANUAL button to take it out of Manual mode.*

## 9 Using the keypad and display

The control keypad can be used any time to enter commands for setting values, performing actions, or recalling certain data. (If using a ProVantage Network Controller, see the System manual for information on other available commands.)

Three commands can be entered at the keypad to recall (view) data stored in the control:

- # to display the cow number and production
- 1 # to display the time and production
- 2 # to display the flow rate and takeoff delay

Requested data will appear in the three display windows. The CODE window shows the code parameter (0,1, 2,...) selected to display data at the control. The COW NO./DATA window shows the cow's number (if entered), the time (in tenths of minutes), or the milk flow rate, depending on the command entered. And the PRODUCTION window shows the milk production or takeoff delay, depending on the command entered. The following examples will better explain each command.

When you enter the command for "Cow Number and Production" at a control while it is in the attach mode, the control display should read:

Parameter	<div>0</div> <small>CODE</small>	<div>0</div> <small>COW NO./DATA</small>	Cow No.
		<div>0.0</div> <small>PRODUCTION</small>	Production

The "0" shown in the CODE window is the code parameter used to display data at the control. Specifically, 0 means *display cow number at attach*.

A "0" appears in the COW NO./DATA window of controls not connected to a ProVantage Network Controller. The number of the cow being milked appears in place of the zero if a ProVantage Network Controller is used.



The PRODUCTION window, showing an initial 0.0 pounds of milk, will start incrementing in tenths of pounds (or kilograms) as the meter fills.

Whenever you press the ATTACH/DETACH button to start a cow's milking or you enter the command for "Time and Production" at a keypad (to return the control to its default setting after selecting another parameter), the control opens the cow's production record and the display should read:

Parameter	<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">1</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">.0</div>	Time
	<small>CODE</small>	<small>COW NO./DATA</small>	
		<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">0.0</div>	Production
		<small>PRODUCTION</small>	

The "1" shown in the CODE window is the code parameter used to *display time since attach*.

"0", appearing in the COW NO./DATA window, is the milking time. This number will start to increment in tenths of minutes immediately after you press the ATTACH/DETACH button, and it will stop incrementing when the milking unit detaches.

The PRODUCTION window for code parameter 1 displays the initial 0.0 pounds of milk and increments the increasing milk weight the same as it does for code parameter 0.

— **NOTE** —  
The controls' default setting of "Time and Production" can be changed at a ProVantage Network Controller, if used. (Refer to the System for details on how to change the default setting.)

When you enter the command for "Flow Rate and Takeoff Delay" at a control while it is in the attach mode, the control display should read:

Parameter	<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">2</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">.7</div>	Flow Rate
	<small>CODE</small>	<small>COW NO./DATA</small>	
		<div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">13</div>	Takeoff Delay
		<small>PRODUCTION</small>	

Here again, the CODE window shows the code parameter used to display data at the control—2 meaning *display flow rate at attach*.

The ".7" and "13", appearing in the COW NO./DATA and PRODUCTION windows, are the factory-set flow rate and takeoff delay settings, explained in §3.1.

#### 4.4 Using the Milking System

The milking procedure is simple, merely press the Attach/Detach button to start a milking. When the button is pressed, the display will show 0.0 production and vacuum will be supplied to the cluster and the control chain or cord will be released. As milk enters the meter the milk level will start to increase, once the meter has started cycling the display will start to increment. When the milk flow drops below the detach threshold, the electronic control signals the control to

retract the cluster and end the milking for that cow. At detach, any remaining milk is released from the meter and the display is updated once more for that amount of milk. The detach threshold and time delay can be programmed to other values. The initial time delay for milk letdown can also be changed.

To milk a cow using a meter control:

1. Set the control to the desired milking mode (automatic or manual) and check the MANUAL lamp to ensure proper selection.

Controls automatically default to automatic mode after every detach, so you need not set that mode before milking each cow (if that is the mode you intend using). However, a good practice to develop is checking that the MANUAL lamp is off (for automatic mode). See §4.2 for details on using the AUTO/MANUAL control button to set the milking mode and on understanding the lamp.

2. While holding the claw in your hand, press the ATTACH/DETACH button.

The control will release the claw and open the pinchoff valve to admit vacuum to the claw. The NO MILK lamp will turn on, indicating that no milk is yet being measured.

3. Position the claw under the cow's udder, clear of her leg. Attach the claw's teat cups to the cow's teats.

Remember, if the milking unit stays attached longer than the Let-Down delay period (normal milking), the NO MILK lamp remains on continuously, in either mode, after detach. But if the unit detaches at the delay's end (early detach), the NO MILK lamp flashes after detach. When an early detach occurs, check the cow to find out the problem, and correct it.

When each cow finishes milking, events occur in the following sequence:

1. The display window showing "time" stops counting.
2. The pinchoff valve closes.
3. The cylinder retracts, pulling on the chain (or cord), which detaches the claw.
4. The CODE window displays a "25," meaning *detach*.

#### **4.5 Understanding Warning Messages at the Detacher**

Warning messages and attention values will automatically appear at detacher displays (during milkings only) if values for them were entered into the 2045 ProVantage Network Controller (as explained in various subsections of the manual). The 2045 ProVantage Network Controller will recognize an error immediately as the cow passes through the ID antenna and will sound the parlor alarm (if installed and enabled) at that moment, or it will flash a warning message on the

detacher display and sound the alarm when the operator presses the ATTACH button to begin milking the cow. The display also blinks if the total number of cows exceeds the 2045 ProVantage Network Controller's capacity. The alarm will sound briefly when the detacher blinks.

Warning messages are displayed when ATTACH is pressed and may appear in combination with the error conditions described on the following pages.

A brief description of the error warning messages and attention codes, their meanings, and the detacher display responses will be given here.

**HOLD**

HOLD at the detacher display indicates that the cow's milk is to be collected separately from the milk that enters the bulk milk tank and discarded or that the cow is to be placed in the holding pen after she is milked out.

**ATTN**

Attention (ATTN) codes should alert the operator to look for problems that a cow might have, such as mastitis, sore feet, injuries, or signs of estrus. These codes are user defined.

**ATTN and HOLD**

Both attention code and HOLD messages can appear together, as shown here.

**OHOH**

OHOH in the detacher display indicates that the cow's ID tag number was not assigned to a cow number and was, therefore, not recognized by the 2045 ProVantage Network Controller.

You can program the 2045 ProVantage Network Controller to ignore or accept ID tag numbers (see 2045 ProVantage Network Controller manual). The 2045 ProVantage Network Controller will print the production data of a cow whose ID tag number was ignored on the MILK Report, assigning Cow #0, but it will not store the data in memory.

Other error warnings may occur in addition to those mentioned above. The following list suggests possible reasons for these errors and the action you should take to correct them:

- If all detacher display windows are flashing, it is possible that the EOM command was not entered after the last milking. Check the current milking number, and enter the EOM command if required.
- If a detacher display flashes after you enter a cow number or press ATTACH/DETACH in a system with Automatic ID, one of the following errors may have occurred:
  - The cow number has already been used during this milking. Verify that the cow number shown at the detacher agrees with the cow's identification (ear) tag, and correct by entering the command 7\**Cow no.#*
  - The cow number (or ID tag #) was not entered or does not exist in the 2045 ProVantage Network Controller memory.

This data will not be stored in the 2045 ProVantage Network Controller's memory. Enter the command 7\*cow No.# if the cow is in memory, otherwise ignore.

- The cow has a reproductive status (RPRO) value of 7, 8, or 9 (heifer or dry cow). Check to see if she was identified properly. If so, check her RPRO value.
- On a system with Automatic ID, the number of tags read was less than the total number of stalls in the ID zone. Beginning with the first detacher, verify that the cow number displayed agrees with the cow's actual number. When you find the cow whose tag was not read, enter her number into the detacher with the command 7\*Cow No.#.

Though the detacher will display the cow number and production for all of these error warnings, the display will flash and the parlor beeper will sound in the same manner that they do for the warning messages explained earlier. Determining the reason for the warning and taking appropriate action will be the responsibility of the operator.

You can milk the cow while any warning message flashes, or you can stop the display from flashing by entering 1# for "Time and Production" or just # for "Cow No. and Production" at the detacher. Note that the error or warning cannot be retrieved after pressing 1# or #, so you should pay close attention to HOLD warnings.

#### **4.6 Entering Commands at the Detacher**

The detacher is an independent unit, meaning that it can be used to milk cows and display production data without the aid of a 2045 ProVantage Network Controller. You can issue commands for setting values, performing actions, and viewing certain data at the detacher keypad at any time. When used with an 2045 ProVantage Network Controller, the detacher can perform the same functions mentioned above with information stored in the detacher, as well as with much of the information stored in the 2045 ProVantage Network Controller, at any time.

##### **— Note —**

Any automatic displays such as errors, warnings, and deviation are lost at the detacher if you use these commands.

To perform a function at the detacher, enter one of the following commands at the keypad.

- |                                |  |
|--------------------------------|--|
| #                              | displays Attach Display mode "Cow Number & Production"   |
| 1#                             | displays Attach Display mode "Time & Production"         |
| 2#                             | displays Flow Rate & Takeoff Delay settings              |
| 4*#                            | displays two cow parameter values                        |
| 5*#                            | displays two cow parameter values                        |
| 6*#                            | displays two cow parameter values                        |
| 7*(Cow no.)#                   | changes current cow number at detacher without detaching |
| 9*#                            | displays the detacher address                            |
| 14*(Cow no.)*(parameter code)# | displays cow value                                       |
| 15*30*(lot,0-99)#              | assigns lot numbers from parlor                          |

#### 4.7 Using the Milk Sampler

The Perfection milk sampler is a fluid-collecting vessel, which mounts to the Perfection milk meter and permits you to collect a test sample of a cow's milk while milking her. Collection occurs throughout the cow's milking upon each dump cycle to give you the best cross-section sample of the cow's milk.

Refer to literature 9E-713 for installation and operation instructions.

## 10 Trouble shooting

Table 2 provides helpful suggestions on troubleshooting some problems that the dairyman might have with this product or other system parts. Troubleshooting should be done only by an authorized Bou-Matic dealer or technician.

<b>Table 2. Troubleshooting</b>		
<b>Guide</b>		
<b>Symptom</b>	<b>Possible Cause</b>	<b>Action</b>
Detacher will not attach.	Solenoid is miswired.	Check solenoid wiring.
	Control button is not making contact with the switch on the Detacher board.	Adjust circuit board up or down so that switch makes contact.
	Electronics have malfunctioned.	Manually reset the control as explained in §2.5.
	No vacuum at meter.	Turn on vacuum.
Detacher will not retract.	Control is in manual mode, but MANUAL lamp is not lit.	Press AUTO/MANUAL button for automatic operation and check bulb.
	Control is not getting power.	Verify that voltages to control are 11 and 24 VDC.
	Solenoid valve is not getting power.	Verify that voltage to solenoid is 24 VDC. If not, check cable connections and Control circuit board using board diagnostic LED.
	Control is not getting enough air pressure or vacuum.	<ol style="list-style-type: none"> <li>1. Check air-supply or vacuum system; air pressure should be 65 to 70 psi. With a vacuum system, start up half at a time.</li> <li>2. Verify cylinder function.</li> </ol>
Detacher retracts too soon.	Takeoff delay is incorrectly set.	Check setting at control (2 #).
	Meter contains excessive foam, preventing float from rising properly.	Check vent in Visi-Nipples. If enlarged (more than .020" diameter), replace the Visi-Nipple. Check claw vent size.
	Meter not functioning properly.	Repair meter.
Detacher does not retract soon enough.	Takeoff delay is incorrectly set.	Check setting at control (2 #).
	Unit in Manual Mode.	Check lamp or put in Auto.
Cylinder speed is too slow or too fast.	Cylinder speed control is out of adjustment.	<ol style="list-style-type: none"> <li>1. Turn clockwise to decrease speed, counterclockwise to increase speed.</li> <li>2. Check air-supply or vacuum system; air pressure should be 65 to 70 psi.</li> <li>3. Check for kinked tubing, restricted vacuum line, or bad fittings.</li> <li>4. Check condition of cylinders.</li> </ol>
Vacuum to claw does not shut off.	Pinchoff valve is not getting enough air pressure or vacuum.	<ol style="list-style-type: none"> <li>1. Check for pinched or plugged lines.</li> <li>2. Check for correct pressure or vacuum.</li> </ol>
	Milk hose through pinchoff valve is too stiff.	<ol style="list-style-type: none"> <li>1. Check for correct hose.</li> <li>2. Replace dried or cracked hose</li> </ol>
	Pinchoff leaking.	Replace or rebuild the valve.
Keypad bulges when attached.	Solenoid exhaust air not vented out of box.	Route exhaust line to outside.
<i>Continued</i>		



*Troubleshooting guidelines continued*

Symptom	Possible Cause	Action
Lamps and/or display will not light.	Lamp bulb(s) are burned out.	1. Check for continuity. Replace as necessary. 2. Check for 24V at lamp holder (black wire).
	Board misaligned with buttons.	Realign.
	Control and/or power supply are not getting power.	1. Verify that voltages to control are 11 and 24 VDC. 2. Check breakers or fuses in AC power panel. Correct the problem and check for shorted parts in power supply and control. 3. Check for loose or stranded power cable connections.
	Control is "locked up."	Manually reset control as explained in §2.5 or remove voltage and reapply.
	Control circuit board is defective.	Replace circuit board.
Display shows incorrect or unusual characters.	Control is "locked up."	Manually reset control as explained in §2.5.
	Electronics have malfunctioned.	Manually reset control as explained in §2.5. Then, enter 88*8888*8888 at keypad. If display is still incorrect, replace Control circuit board.
Display dims and stays dim. If using the Pro Vantage Network Controller...	DATA COLLECT switch at Agri-comp computer is off, communications cable is pinched or broken, or computer has failed.	Turn on DATA COLLECT switch at Agri-comp computer), check cables.
If not using the ProVantage Network Controller...	The 4-position terminal block is missing from the computer connector on the Control circuit board.	Ensure that terminal block is in place and pins 3 and 4 are jumpered together on the computer connector.
Meter will not empty after detach.	Control circuit board is defective.	Manually reset control as explained in §2.5. Then, check cable for loose or broken leads using a test module. If cable is OK, replace Control circuit board.
	Vacuum from wash line to top of meter is not shutting off.	Check air system and detacher unit shutoffs.
Manual and No-Milk lamps are always lit.	Control is set for incandescent lamps.	Set for LEDs with 1*33*0#.
	DATA COLLECT switch at Agri-comp computer is off.	Turn on DATA COLLECT switch.
Control will not communicate with Agri-comp computer.	Pins 3 and 4 are jumpered together for controls without Agri-comp computer.	Remove jumper.
	Electronics have malfunctioned or a connection is faulty.	Unplug all connectors at control electronics, according to the order specified on the electronics label. (Remove terminal block for easier troubleshooting.) Then, reattach connectors in order one at a time, checking for communications each time until the malfunction is found.
	Communications cable is shorted or open.	Check for poor connections or a worn-through cable.
	Detach threshold is set too high.	Lower the detach threshold or disable the feature (1*25*0#).
Control switches to Manual mode after automatic detach, and cannot be switched back to Automatic mode.		<i>Continued</i>

*Troubleshooting guidelines continued*

Symptom	Possible Cause	Action
Voltage at power supply does not read 11 and/or 24 VDC.	Power supply is not getting power.	1. Verify that voltage to the power supply is 207V to 253V. 2. Check breakers/fuses in AC power panel. Correct the problem and check for shorted parts in power supply and control. 3. Check for loose or stranded power cable connections.
	Power supply transformer is not getting power.	Check fuses and transient protectors in power supply. Check for a possible open switch.
	Transformer is open.	Check for 11 and 24 Volts AC with wires disconnected from rectifier. If either voltage is not present, replace transformer.
	Rectifiers are open.	Verify that there is continuity from top lead to (+) and no continuity from top lead to (-). Then, reverse the meter leads and try again. The results should be opposite. If not, replace rectifier.
	Output voltage protectors are shorted.	Disconnect one end of voltage protector and check with voltmeter. If continuity is indicated, replace protector. (Voltage protectors will indicate an open circuit if good.)
	Capacitor is shorted.	Check capacitor with voltmeter at a setting of R x 1000 or higher. The needle should go up the scale and fall back down if the capacitor is good. If needle goes up but stays or does not move at all, capacitor is bad and should be replaced.
Control does not respond to global commands.	DATA COLLECT switch on 2040 is off.	Turn on DATA COLLECT switch.
	Faulty communications cable or connection.	Check the communications voltages (8*202#, 8*203#) at the problem control and adjacent controls. Verify wire connections and cable continuity. Replace Tee junctions with daisy-chain.
	Incorrect software version in the Agri-comp computer.	Install D40N/D45N or newer version software.
Display stays dim on attach.	Communications failure.	Check the communications voltages (8*202#, 8*203#) at the problem control and adjacent controls. Verify wire connections and cable continuity. Replace Tee junctions with daisy-chain.
	Confirm on Attach is set. (Note: if controls are not connected to an Agri-comp 2040/2045, do not use the Confirm on Attach feature.)	Check settings for Confirm on Hold and Confirm on Attention. Disable them (1*20*0# and 1*21*0#).
Manual lamp blinks on attach to all cows.	Conductivity threshold set too low so all cows trigger the warning.	Raise the conductivity threshold or disable threshold checking (1*97*0#).
Control is locked up and does not respond to command entries or pressed buttons.	Voltage is too low.	Verify minimum 20 VDC at 24V line and 9.5 VDC at 11V line. Wire size should be 12 AWG or larger.
	Intermittent voltage supply.	Work with power (Utility) company for improvements. Install battery backup if necessary.
	Control is locked up.	Manually reset control as explained in §2.5, or remove and restore power.



Symptom	Possible Cause	Action
Meter will not attach in Automatic mode.	Plunger not functioning properly.	Look for an obvious mechanical problem: 1. Disconnected hose or cable at the meter. 2. Plunger not connected to the diaphragm. 3. Loose diaphragm assembly. 4. Diaphragm leaking – signs of mixed water or milk. 5. Float upside down. 6. Dirty solenoid - try clearing by removing the fresh air line to the solenoid and connecting the vacuum line to it to suck out any debris or water in the solenoid. Test plunger performance using the procedure described below.
	Defective probe in the outlet assembly.	Test the probe using the procedure listed below.

<b>Plunger Timing Test - results are in milliseconds (ms)</b> Starting Conditions: 1. Detacher in detached position. 2. Plunger in up position. 3. System vacuum on.	Enter command 8*100# at the control keypad. This causes the control to time the plunger as it cycles closed and open once. The Production (lower) window will display the close time and the Cow Number (upper) window will display the open time.	The plunger must cycle closed and open one time. Normal results are: close in 50 to 300 ms, open in 200 to 400 ms. 1. If the close time is 300 ms or higher the solenoid controlling the plunger movement is operating too slowly. Check for line restrictions or a dirty or faulty solenoid. 2. If the open time is 400 ms or higher, the vacuum line may be plugged or leaking. 3. If the open time is normal but the close time is 1 ms, make sure the control is detached and redo the timing test. 4. If the plunger is stuck closed so that it cannot cycle, the closed time will be 1 ms and the open time will be 0. Look for a mechanical problem described above. 5. If the plunger is stuck open and will not cycle, the close time will be 0 and the open time will be 1 ms. This will be the result if the system vacuum is off.
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<b>Test For Defective Probe in the Outlet</b> Starting Conditions: 1. Detacher in detached position. 2. Plunger in up position. 3. System vacuum on.	1. Enter command 8*201# at the control keypad to monitor the voltage from the probe. Upper sensor position = .45 - .55 volts Lower sensor position = 1.9 - 2.3 volts No sensor active = 2.45 - 2.75 volts  2. Press the Manual button, then the Attach button. Re-enter the 8*201# command to display the probe voltage.	1. The Production (lower) window will show a voltage in the range 1.9 to 2.3 volts DC, indicating the lower probe sensor is activated.  2. The plunger must drop to its closed position. If the probe is functioning correctly, the Production display should show a reading higher than 2.45 volts DC. If this does not occur, the probe assembly is defective and should be replaced. If the plunger does not drop, look for a mechanical problem as described above.
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## 11 Maintenance

### — Note —

- To maintain this product, address the needs of the items in this section at their specified intervals.
- Unless otherwise noted, procedures in this section are to be performed by the owner.
- Carefully read and follow pertinent instructions and safety messages in this section before starting any procedure in this section.

### After Every Milking

Proper cleaning of the pipeline milking system is essential to remove bacteria and soils left in the lines and equipment after milking, which could spoil milk or harm milking equipment.

Wash milk-contact surfaces of milk lines and milking units after every milking, as follows:

1. **Press the ATTACH button to send the last milk weight to the ProVantage Network Controller. Then press the MANUAL button to put the control in Manual mode.**
2. **Attach the teat cups to the jettors and open the jetter wash valve.**
3. **If you are using a ProVantage Network Controller, enter 15\*1# at only one control. This will send a global CIP command and then end the milking. If you are not using a ProVantage Network Controller, enter 8\*1\*1# at each control to set CIP mode.**

Once the CIP command is entered, the letters CIP will display at the control (or controls if a global command was used).

4. **Start the rinse and wash routine.** (Refer to your washer instructions for details.)

Just before the next milking, sanitize the lines and milking units according to your washer instructions.

5. **To end the CIP mode and start the next milking, press the Attach/Detach button after removing the jettors.**

### As Needed

As needed, clean non-milk-contact (outside) surfaces of controls, hoses, and plastic housings using a sponge and mild detergent, followed by a clear water rinse.

— **CAUTION** —

Certain materials contain ingredients that will attack the milk meter's and valve's plastic parts. Do not expose the plastic parts to the following:

- Iodine teat dips
- Fly sprays, oil-based
- "Super" glues
- Gasoline, turpentine, brake fluids, and ethers
- Refrigerants
- Loctite and similar adhesive compounds
- Phenols
- Alcohol, ethanol, and isopropanol

If parts become accidentally exposed, thoroughly wash them immediately and at the end of milking.

Also, use of cleaners other than those recommended by Boumatic and excessive concentrations of those recommended is not advised.

Use of nonrecommended chemicals will be done at the owner's risk, and damages to the plastic parts resulting from improper cleaning will nullify any warranty covering those parts.

— **CAUTION** —

Do not use high-powered spray nozzles to clean the control. Water could enter the enclosure and damage electronic parts.

**Yearly**

Change the meter's two milk-contact gaskets yearly.

Change the meter's O-ring seal on the end of the plunger yearly.

**As Necessary**

The meter's diaphragm is designed for long life and can be changed in a few seconds if needed. If cracks, splits or holes are visible, replace the diaphragm.

## 7. *Service*

— **Note** —

- Review the instructions on page 1 under the heading "Responsibilities" and perform only those steps in this section that you are responsible for performing.
- Review the personal safety messages and installation specifications in Section 1 and instructions throughout this packet before starting the procedure(s) in this section.

This section covers replacement of simpler control and meter parts and assemblies. Instructions for more complicated parts and assemblies are in the repair kits for those parts.

#### **Replacing the Control Circuit Board**

Use the Troubleshooting Guide (Table 2) to find out whether the control is defective. If defective, replace the Control circuit board inside the case.

To replace the Control circuit board:

1. Open the control cover.
2. Disconnect the cables from the electronics assembly according to the order specified on the electronics label, pulling on their connectors—not the wires.
3. Remove the top two mounting nuts that secure the electronics to the cover, and loosen the bottom two.
4. Lift the electronics assembly up and out of the enclosure.
5. Securely assemble the new electronics to the cover such that the detacher's control buttons align with their switch plungers on the circuit board and all display segments are visible through the display windows.
6. Reassemble the top mounting nuts, and tighten all four nuts to secure the electronics in place.
7. Reconnect all cables.
8. Restore the address and all parameter settings to match the settings in the other detachers.

#### **Meter Maintenance**

All user serviceable parts are accessible without the use of tools. There are only two gaskets, one O-ring seal, and one diaphragm assembly to maintain.

To replace the diaphragm assembly:

1. Shut off vacuum to the meter.
2. Loosen the top lock ring by twisting counterclockwise 1/4 turn.
3. Remove the ring and the top cap.
4. Grasp the exposed spring, oscillate slightly to break the seal and pull upward. The diaphragm assembly and the plunger will come out together.
5. Hold the plunger in one hand and twist off the diaphragm assembly from the top of the plunger. It may be necessary to squeeze the sides of the plunger near the top to relieve pressure on the fingers that secure it.
6. Replace the diaphragm assembly by simply snapping the new one on to the top of the plunger.
7. Always replace the plunger O-ring when replacing the diaphragm assembly.

8. Replace in meter by dropping into opening in the top and replacing the cap and tightening the lock ring.
9. Replace the vacuum tube, if it came loose.

To replace the O-ring seal on the bottom of the plunger:

1. Remove the diaphragm and plunger assembly as noted above.
2. Remove and replace the O-ring by hand only, tools may scratch the plastic. The O-ring must not be twisted, or the meter will not function correctly. Dip the O-ring in soapy water before applying to the plunger.
3. Reassemble plunger and diaphragm assembly in meter.

To replace the upper gasket between the inlet section and measuring chamber:

1. With vacuum off, twist the large lock ring counterclockwise 1/4 turn.
2. Remove the upper section of the meter and remove the gasket.
3. Clean both mating surfaces with soap and water.
4. Dry both surfaces.
5. Install new gasket, checking that it is properly seated in the housing groove.
6. Reinstall the upper section and tighten the lock ring.

To replace the lower gasket between the outlet section and the measuring chamber:

1. With vacuum off, remove the outlet milk hose from the meter.
2. Support the housing with one hand and twist the bottom 1/4 turn counterclockwise (looking from bottom) with the other hand.
3. Remove the gasket.
4. Clean the grooves in both parts with soap and water.
5. Dry both surfaces.
6. Install the new gasket, checking that it is properly seated in the groove.
7. Reinstall the outlet on the housing, twisting until the stop is contacted.
8. Reinstall the milk outlet hose.

## 12 Appendix A: Meter Accuracy Test Procedure

Dealer-Supplied Parts	Quantity
<sup>1,2</sup> Flask, Erlenmeyer, 4000ml (3552279—glass) .....	1
Hose, Milk, 2-Foot Long .....	2
5-Gallon Bucket or Milk Pail .....	1
<sup>1</sup> Orifice, Test (3556645) <b>NEW</b> (white color) .....	1
Thermometer .....	1
Level (spirit level) .....	1
Gauge, Vacuum .....	1

**Note:**

1. Part available from Bou-Matic. (See the Bou-Matic Equipment Catalog for ordering details.)
2. Abbreviation 'air' means as required.
3. The flask used in this test must be glass, since a plastic flask may not be accurate. If a 4-liter (4000 ml) flask other than the Erlenmeyer (specified above) will be used, also required is a 1-liter Class "A" (TD) volumetric flask to perform the flask calibration. Calibration is not required for the Erlenmeyer flask.

### Flask Calibration for NonBou-Matic Flask

**— Note —**

Review the instructions in the first paragraph on this page and perform only those steps in this section that you are responsible for performing.

For results of the metering accuracy test to be accurate, an accurately calibrated four-liter glass flask (such as the Erlenmeyer flask, available from Bou-Matic) must be used. If a flask of any other type will be used, recalibrate it according to the procedure below (as it may not be calibrated accurately enough for the test):

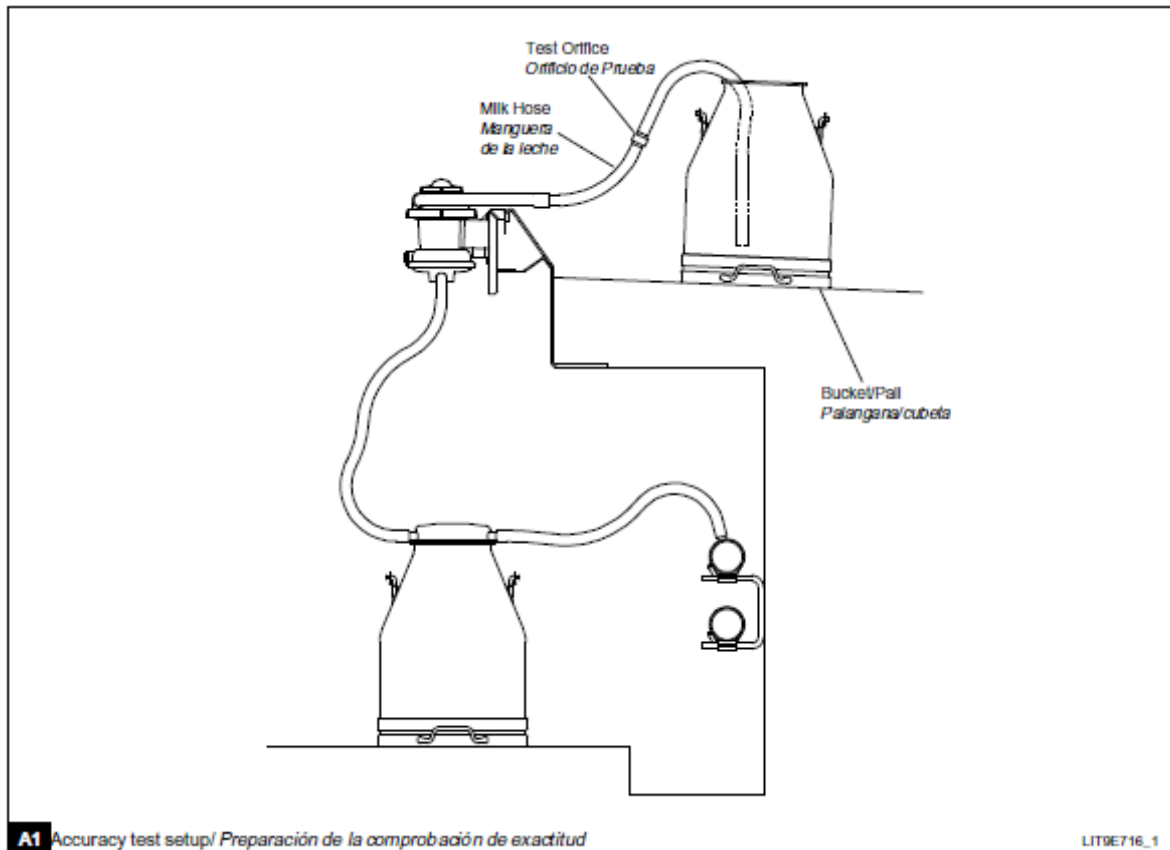
1. Fill a one-liter Class "A" (TD) volumetric flask four times with 70°F ± 10°F (21°C ± 5°C) water and empty the water into the four-liter flask.
2. Indelibly mark the four-liter flask at the water line.

### Test Procedure

To test the meter for accuracy:

1. Turn off the vacuum supply.
2. Rinse the meter with water and remove all debris from its inside surfaces. Check the perimeter of the baffle to ensure that it is clean.
3. Ensure that the meter is level and that the float moves freely on the plunger.





4. Attach a two-foot-long hose to each end of the test orifice. Then, attach one hose to the meter inlet, and allow the other hose to hang temporarily. (See Figure A1.)
5. Position the bucket so that its bottom is not more than 12 inches above or below the meter inlet. (The location shown in Figure A1 is best.)
6. Measure and pour 12 liters of 70°F ±10°F (21°C ±5°C) water into the bucket using the four-liter flask.

**Note**

Water in the bucket must be maintained at the temperature noted in step 6 throughout the entire test.

7. Turn on the vacuum supply, and ensure that it is set to 12.5 to 13.5" mercury (Hg) (42-46 kPa) of vacuum.
8. Reset the electronic control to display 0.0 lb (0.0 kg) and ensure that the control is set to the Attach mode.
9. Place the loose end of the hanging hose in a 5-gallon bucket, and allow the water to be drawn into the meter.

10. When all water is drawn from the bucket, and the detacher has detached, the control should display the value shown in Table 3. For example, if the System Adjustment Factor (SAF) was set at 5, the water rest value is  $26.5 \pm 0.6$  lb ( $12.0 \pm 3$  Kg). If the SAF is set at other values, the water test results should match the values shown across from that SAF value in the table. If the value is not within tolerance, rinse the meter and repeat the test until two readings are within 0.2 lb (0.1 Kg) of each other. The average of these must be within tolerance of the above value. If you cannot get a proper reading, replace the plunger seal and repeat the test procedure.

**Table 3.** Acceptance Criteria for 12 Liter Water Test / Criterio de Aceptación para la prueba de agua de 12 litros.

System Adjustment Factor Factor de Ajuste del Sistema	Readings in Kgs/Tolerance Lecturas en Kg./Tolerancia	Readings in Pounds/Tolerance Lecturas en libras/Tolerancia
1	11.8 / $\pm 0.3$	26.0 / $\pm 0.6$
2	11.8 / $\pm 0.3$	26.1 / $\pm 0.6$
3	11.9 / $\pm 0.3$	26.2 / $\pm 0.6$
4	11.9 / $\pm 0.3$	26.4 / $\pm 0.6$
5	12.0 / $\pm 0.3$	26.5 / $\pm 0.6$
6	12.1 / $\pm 0.3$	26.6 / $\pm 0.6$
7	12.1 / $\pm 0.3$	26.8 / $\pm 0.6$
8	12.2 / $\pm 0.3$	26.9 / $\pm 0.6$
9	12.2 / $\pm 0.3$	27.0 / $\pm 0.6$

## 13 Appendix B: Perfection meter CIP Recommendations

Design and install the parlor CIP system using the Bou-Matic Guidelines for the Design, Layout and Performance of Milking Systems. A single jetter wash line is required to clean both the cluster and meter.

It is generally recommended that the milk/wash line be equipped with an air injector controller and that the jetter wash line be allowed to flood without air injection.

Use Bou-Matic jetter distributors that include an air admission orifice.

The objective when setting up a parlor is to have a uniform flow through all milking units. Install flow restrictors (part #8518076) at each jetter unit to insure an even flow at a **minimum average flow rate of 1.2 GPM (4.5 L/min) to each meter**. To obtain these flow rates, field results show that flow restrictors should be drilled to an orifice size of 5/32" to 9/32" (4 to 7 mm) depending on the jetter location and parlor size.

Use the following procedure to check flow to each meter:

1. Begin a normal wash or sanitize cycle with the milking units in the wash position, but allow the meter to operate in the standard milking mode (attached, manual mode with CIP not displayed). Verify that all meters read 0.00 in the production window.
2. Start a stop watch when a steady flow rate of water develops in the meter.
3. During the wash cycle, verify that the meter plunger seals while the meter is filling by verifying that no water leaks into the lower chamber. If system vacuum drops, water may leak past the o-ring making the test invalid. Insure proper vacuum pump capacity.

4. Stop the watch when the steady flow rate finishes, near the end of the wash cycle.
5. Calculate and record the average flow rate to each meter by dividing each meter production by the test time. Multiply the flow rate in #/min by 0.12 to obtain GPM. Kg/min equals L/min.

**Example 1:** Time of steady water flow is 3 min and 36 seconds.

Time = 3 + (36 ÷ 60); therefore,  
Time = 3.6 min  
Meter 1 reads 35.1 #

Flow rate = 35.1 # ÷ 3.6 min = 9.75 #/min  
Flow rate = 9.75 #/min x 0.12 = 1.2 GPM

**Example 2:** Time of steady water flow is 3 min and 36 seconds.

Time = 3 + (36 ÷ 60); therefore,  
Time = 3.6 min  
Meter 1 reads 16.1 kg

Flow rate = 16.1 kg ÷ 3.6 min = 4.5 kg/min  
Flow rate = 4.5 L/min

Add the calculated flow rates of all meters together to determine the total rate of wash water entering the jetter wash line.

If the average flow rate to each meter (total rate of wash water entering the jetter wash line/number of meters) does not exceed 1.2 GPM (4.5 L/min), modifications of the wash system will be required to increase the rate at which water enters the system. These changes could include elimination of any air leaks in the system, splitting the wash system into groups, increasing the diameters of the wash lines, and/or decreasing the vertical lift above the wash vat.

If the average rate is above 1.2 GPM (4.5 L/min) but some individual meters exhibit rates below this limit, reduce the flow restrictor diameter on meters with rates above 1.2 GPM and increase the flow restrictor diameter on meters with rates below 1.2 GPM.

## 14 Addendum: Instructions 9ES-703, 9EF-703 and 9EG-703

### — NOTE —

The purpose of this addendum is to clarify particular sections or explain new features.

#### **Installing/Connecting to the Power Supply** (Refer to sections 1.2 and 2.2)

Use 10 gauge wire for the DC common wire (green) on very large parlors, 66 detachers or larger. The DC common must be connected on all detachers, in the parlor, to insure proper detacher communications and for the use of auxiliary inputs or outputs. See figure 1 for wiring.

#### **Level Sensor and Cable Check** (Refer to section 2.3)

The following sensor voltages should be displayed when using command 8\*201#.

- 2.57 to 2.67 volts for the plunger all the way down.
- 2.12 to 2.22 volts for the plunger in the normal position.
- .49 to .54 volts when the float is near the top.

#### **Local Commands for the Perfection Meter** ( Additions to Table 1 )

Command	Description	Default
1*8*(0-2,11,12,21,22)#	set CIP start to the auxiliary Input port (0=disable, 1,2,11,12,21,22) .....	[0]
1*15*(0-255)#	set Timer 15 .....	[0]
1*16*(0-255)#	set Timer 16 .....	[0]
1*17*(0-3,11-13)#	assign Timers 15 and 16 to an output port ( 0=disable, 1-3 or 11-13).....	[0]

#### **Auxiliary Output Timers**

(The remainder of the addendum refers to section 3 in general )

##### **Timer 4**

Timer 4 - 1\*4\*(0-120)#, formerly called dump delay,

will change the state of the auxiliary port being used after a preset time, the time is adjustable from 0 to 120 seconds in 1 second increments. The auxiliary output will not change states if feeding in the parlor, 1\*40\*(1,2 or 3)#, is enabled and feed is being dispensed. After the cow is done milking and the feed is dispensed the timer will start. If Smart Detach is enabled, 1\*25\*(0-100)#, the timer will not start until a detach occurs above the threshold setting. Timer 4 must be used with the 1\*26# command. See figure 3 for the timing diagram.

#### **Timer 5**

Timer 5 - 1\*5\*(0-60)#, formerly called sweep delay, will add a delay before the auxiliary output changes states. This time delay is used with timer 6. The time is adjustable from 0 to 60 seconds in 1 second increments. Use 1\*7(1-3)# to assign the timer to an auxiliary output. See figure 3 for the timing diagram.

#### **Timer 6**

Timer 6 - 1\*6\*(0-60)#, formerly called sweep on time, will turn on the auxiliary output for a preset time. This timer is used with timer 5. The on time is adjustable from 0 to 60 seconds in 1 second increments. Use 1\*7(1-3)# to assign the timer to an auxiliary output. See figure 3 for the timing diagram.

#### **Timer 15**

Timer 15 - 1\*15\*(0-255)#, will add a time delay to the auxiliary output after an attach. This timer is used with timer 16. The delay time is adjustable from 0 to 255 seconds in 1 second increments. Use 1\*17\*(0-3, 11-13)# to assign the timer the auxiliary output. Use of 1 to 3 will turn the auxiliary output on after the time delay. Use of 11 to 13 will turn the auxiliary output off after the time delay. See figure 3 for the timing diagram.



Use 1\*17\*(0-3,11-13)# to assign timers 15 and 16 to an auxiliary port. The various configurations are described below:

0 = turns off timers 15 and 16.  
1 = uses the auxiliary output port number 1 and turns the output on after the time delay.  
2 = uses the auxiliary output port number 2 and turns the output on after the time delay.  
3 = uses the auxiliary output port number 3 and turns the output on after the time delay.

11 = uses the auxiliary output port number 1 and turns the output off after the time delay.  
12 = uses the auxiliary output port number 2 and turns the output off after the time delay.  
13 = uses the auxiliary output port number 3 and turns the output off after the time delay.

#### **Timer 16**

Timer 16 - 1\*16\*(0-255)#, will add a time delay to the auxiliary output after every detach. This timer is used with timer 15. The delay time is adjustable from 0 to 255 seconds in 1 second increments. Use 1\*17\*(0-3, 11-13)# to assign the timer the auxiliary output. Use of 1 to 3 will turn the auxiliary output off after the time delay. Use of 11 to 13 will turn the auxiliary output on after the time delay. See figure 3 for the timing diagram.

Use 1\*17\*(0-3,11-13)# to assign timers 15 and 16 to an auxiliary port. The various configurations are described below:

0 = turns off timers 15 and 16.  
1 = uses the auxiliary output port number 1 and turns the output off after the time delay.  
2 = uses the auxiliary output port number 2 and turns the output off after the time delay.  
3 = uses the auxiliary output port number 3 and turns the output off after the time delay.  
11 = uses the auxiliary output port number 1 and turns the output on after the time delay.  
12 = uses the auxiliary output port number 2 and turns the output on after the time delay.  
13 = uses the auxiliary output port number 3 and turns the output on after the time delay.

## 15 Auxiliary Applications

### Remote Attach

Remote attach uses a normally open switch ( momentary contacts ) to Attach or Detach the detacher. One water proof switch is required per detacher and can be installed at any desirable location using 18 gauge wire.

To use this feature the following command must be used, 1\*19\*(0, 1)#. The various configurations are described below:

0= turn off this feature.

1= uses the auxiliary input port number 1, J9, pins 1 and 2.

2= uses the auxiliary input port number 2, J9, pins 3 and 4.

### Detacher Setup for CIP

To place the control in to the CIP mode for dairies having multiple parlors or a dairy not using a ProVantage Network Controller a normally open switch can be wired to the detacher meter controls. When ending the milking the milkers must send the milk weights in by doing an Attach at all detachers first before pushing the switch to place the detachers in CIP. See figure 2 for wiring.

To enable this feature the following command must be used, 1\*8\*(0, 1, 2, 11, 12, 21 or 22)#. The various configurations are described below:

0 = turn off this feature.

1 = uses the auxiliary input port number 1 and places the control in to CIP.

2 = uses the auxiliary input port number 2 and places the control in to CIP.

11 = uses the auxiliary input port number 1 and places the control in to the Manual mode and CIP.

12 = uses the auxiliary input port number 2 and places the control in to the Manual mode and CIP.

21 = uses the auxiliary input port number 1 and places the control in to the Attached position, Manual mode and CIP.

22 = uses the auxiliary input port number 2 and places the control in to the Attached position, Manual mode and CIP.

Auxiliary input port 1 is J9, pins 1 and 2.

Auxiliary input port 2 is J9, pins 3 and 4.

### **Auxiliary Output**

#### **Sweep for Backflush**

Use 1\*17\*(0-3)# to assign timers 5 and 6 to an auxiliary port. The various configurations are described below:

0 = turns off the sweep function (timers 5 and 6).

1 = uses the auxiliary output port number 1, J9 pins 5 and 6.

2 = uses the auxiliary output port number 2, J9 pins 7 and 8.

3 = uses the auxiliary output port number 3, J9 pins 9 and 10

#### **Starting Group Backflush**

Group backflush can be started when a group of cows is done milking. Typically group backflush is done on 4 to 8 detachers. On larger parlors this could start backflush on the front of the milking string as they usually finish first. By starting this group early the backflush cycle will be done before the next string of cows.

It is important that all the detachers have the DC common connected together in the parlor, see figure 1 for the DC common wiring.

Set timer 4, 1\*4\*(0-120)#, to 30 seconds. By having the time at 30 seconds it will allow for the milking unit to be put back on if necessary before the backflush cycle starts. Set Detach indication, 1\*26\*(0-3)#, to an unused output port by entering 1, 2 or 3. Connect the auxiliary ports together using 18 gauge wire. Connect one end of the relay coil to the auxiliary port and the other to 24 V DC. Connect the normally closed contacts of the relay to the group backflush control. Set Smart Detach, 1\*25\*(0-100)#, to a value of 80-90 per cent. This will prevent early detaches from starting the group backflush control.

### **Parlor feeding**

Use 1\*40\*(0-3)# to assign Parlor feeding to an auxiliary port. The various configurations are described below:

- 0 = turns off parlor feeding.
- 1 = uses the auxiliary output port number 1, J9 pins 5 and 6.
- 2 = uses the auxiliary output port number 2, J9 pins 7 and 8.
- 3 = uses the auxiliary output port number 3, J9 pins 9 and 10

### **Claw Drop**

Claw drop is used typically in parallel stalls to “drop” the claw in to the milking pit. This makes it faster for the milker to place the claw on the next cow. A small solenoid is used to turn off the air to the cylinder and allowing the claw to “drop”. The solenoid can be connected to one of the unused auxiliary output ports. Timer 15, 1\*15\*(0-255)#, is typically set to 1 or 2 seconds to prevent the chain from jumping when attached. Timer 16, 1\*16\*(0-255)#, is typically set to 10 seconds. This will insure that the claw is detached and is away from the cow before the “drop” is done. Claw drop is done after every detach. See figure 3 for the timing diagram.

Use 1\*17(0,11-13)# to assign timers 15 and 16 to an auxiliary port. The various configurations are described below:

- 0 = turns off timers 15 and 16 for claw drop.
- 11 = uses the auxiliary output port number 1, J9 pins 5 and 6.
- 12 = uses the auxiliary output port number 2, J9 pins 7 and 8.
- 13 = uses the auxiliary output port number 3, J9 pins 9 and 10

### **Auto Tandem Stall Exit Gate**

Tandem parlors (side openers) should use the following commands to set the detacher to automatically send a signal to the gate control that will open the exit gate of the stall after the cow is done milking.

Set timer 4, 1\*4\*(0-120)#, to 30 seconds. This period can be changed if needed. A 30 second interval will allow the milking unit to be put back on or post dipping to occur, if needed, before the exit gate opens. Set Detach indication, 1\*26\*(0-3)#, to an unused output port by entering 1, 2 or 3. Set Smart Detach, 1\*25\*(0-100)#, to a value of 80-90 per cent. This will also reduce the chance of the exit gate opening early, if an early detach occurs. See figure 3 for the timing diagram.

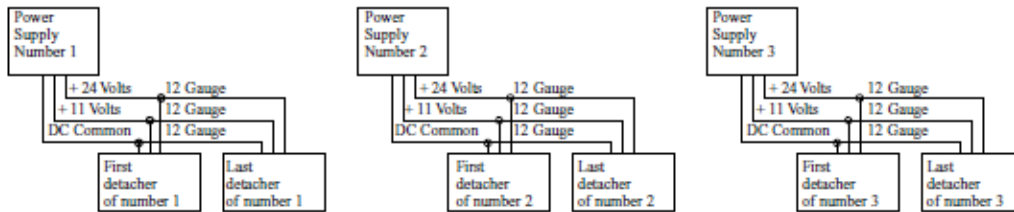
### **Auto Exit for Parlor**

Auto exit can be used to automatically “exit” the cows after they have been milked.

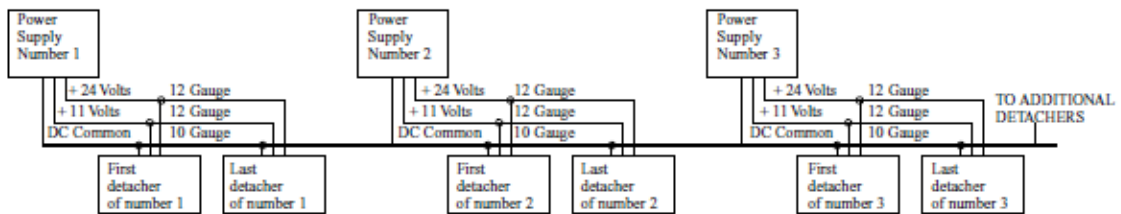
Set timer 4, 1\*4\*(0-120)#, to 30 seconds, the 30 seconds can be changed if required. By having the time at 30 seconds it will allow for the milking unit to be put back on or post dipping if necessary before the auto exit occurs. Set Detach indication, 1\*26\*(0-3)#, to an unused port by entering 1, 2 or 3. Connect the auxiliary ports of all the detachers. Connect one end of the relay coil to the auxiliary port and the other to 24 V DC. Connect the normally open contacts of the across the exit button. Set Smart Detach, 1\*25\*(0-100)#, to a value of 80-90 per cent. This will reduce the chance of on early detach exiting all the cows.

## Power supply wiring for Perfection meter

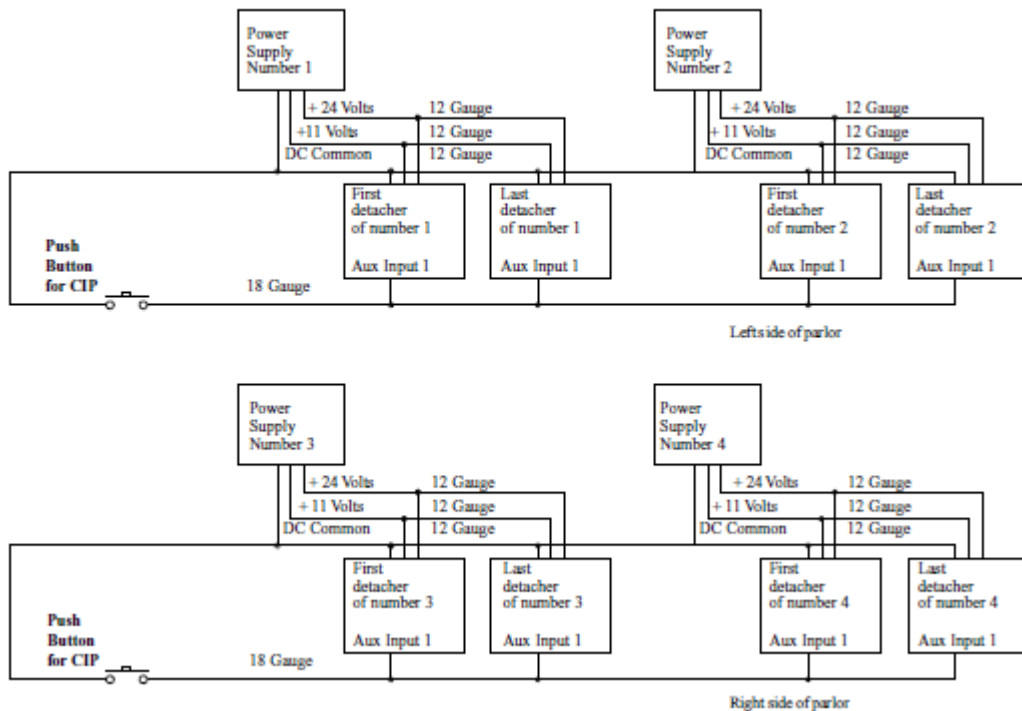
### Previous wiring for Perfection meter



### Wiring for Perfection meter



## Wiring for auxiliary input number 1 for CIP





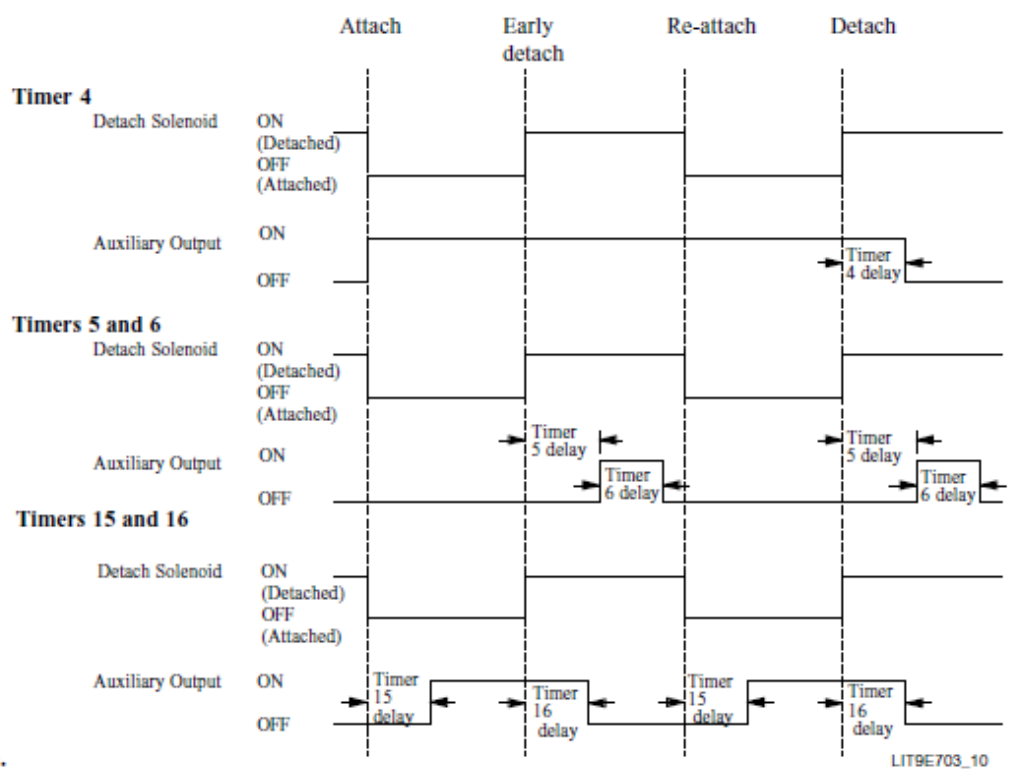


figure 3.