afimilk®

AfiFree 155i

Milk Meter

Installation Manual

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Product P/N 4199400
Manual P/N 9040322
Version: 1.1, May 2009

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- It is the customer's responsibility to install, operate, and maintain the system in accordance with all applicable codes, regulations, and safety measures
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- Use electrical equipment only in a manner specified by the manufacturer. Improper use impairs the protection provided by the equipment.
- Do not use *AfiFree155i* for any purpose other than those detailed in this manual

CAUTION

This system has been checked for viruses prior to supply.

If in the course of a service call a virus is detected, removal of the virus, and any software or hardware repairs resulting from it, will be charged to the purchaser.

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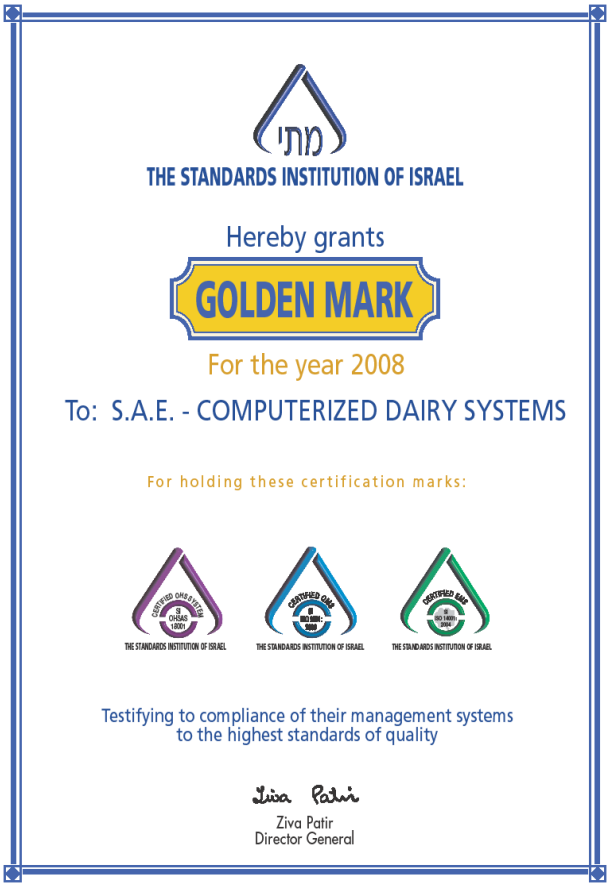

Revision History

Version	Date	ECR	Pages	Description	SME	Writer
1.1	May 2009		All	First version	Avi ben Joya	Jonathan Matt

Referenced Documents

P/N	Document Title
9040150	*AfiCom* 1 Installation Manual
9040646	*AfiWash* Installation Manual
9040610	*AfiPass64* Installation Manual
4022900	*IDeal* Installation Manual
	AfiShepherd (AfiSheep, AfiGoat) User Manual
9040148	*AfiFarm* 3 Configuration Manual

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List of Tables

Manual Overview

This manual contains information and instructions for a technician to mount, wire, and configure the *AfiFree* Body, Terminal 155i, and Wash Controller system. The manual follows the sequence of procedures for installation and configuration of the system.

The appendices contain information regarding how to use AfiFree 155i, and especially Terminal 155i.

How this Manual Is Organized

Chapter 1 System Objectives and Functions – purpose, features, operating basics, and included components

Chapter 2 Site Preparation Requirements – The physical and electrical infrastructure, utilities, and supplies that must be ready before starting installation

Chapter 3 Mounting and Wiring – Instructions for physical mounting and electrical wiring of components

Chapter 4 System Configuration – Software configuration, Wash Control setup, and performance testing

Chapter 5 Troubleshooting – Instructions for troubleshooting potential installation and configuration faults

Chapter 6 Corrective Maintenance – Instructions on parts requiring annual replacement, replacing *AfiFree155i* units, and updating software

Chapter 7 Parts Lists – Inventory of replaceable components

The following appendices are provided:

Appendix A User Information and Instructions

Appendix B Milking System Cleaning Guidelines

Conventions Used in this Manual

Important information is highlighted in a frame, as explained below:

WARNING

Actions requiring special attention to avoid a possible hazard to personnel.

For example, working with high voltage components.

CAUTION

Actions requiring special attention to avoid possible damage to equipment or livestock.

For example, avoiding the use of detergent, that may damage the *AfiFree* Body.

NOTE

Hints and recommendations for working efficiently.

For example, optimal cleaning techniques.

Abbreviations and Terms

Abbreviation	Meaning
ACR	Automatic Cluster Removal
AWG	American Wire Gauge
LED	Light Emitting Diode
NC	Normally Closed
NO	Normally Open
PICB	Plug-in Connection Box
Rx	Receive
Tx	Transmit
VAC	Alternating Current Voltage
VDC	Direct Current Voltage

Chapter 1 System Objectives and Functions

This chapter contains the following sections:

Purpose

AfiFree155i is a milk meter and data-monitoring system that can function either as part of a computerized flock management system or as a stand-alone system. Both uses are described below.

AfiFree155i in a Computerized Flock Management System

When connected to AfiSheep/ AfiGoat, *AfiFree155i* performs many tasks essential to a profitable dairy operation, such as:

- Real time presentation of milk flow quantity
- Supplying milk yield data to the computerized flock management system
- Releasing the cluster when milk flow drops below a predetermined rate (automatic cluster removal)
- Monitoring the quantity of milk provided by a specific animal

Figure 1 (below) illustrates AfiFree 155i connected to AfiSheep/ AfiGoat.

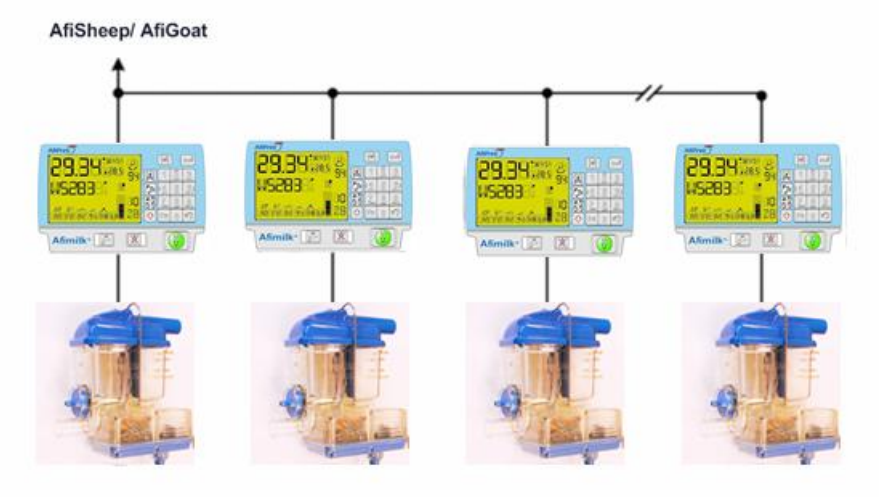


Figure 1: Terminal 155i units connected to AfiSheep/ AfiGoat

AfiFree155i Stand-Alone System

A stand-alone system is one in which the *AfiFree155i* milk meters are not connected to a flock management computer and software. In this type of system *AfiFree155i* milk meters are factory programmed with a default software program, which performs two functions:

- Real time presentation of milk flow quantity
- Releasing the cluster when milk flow drops below a predetermined rate (automatic cluster removal)

Figure 2 (below) illustrates AfiFree 155i not connected to AfiSheep/ AfiGoat.

Figure 2: Terminal 155i units not connected to AfiSheep/ AfiGoat

Principle of Operation and Installation

AfiFree155i has the following main components:

- *AfiFree Body*
- Terminal 155i
- *AfiFree* Wash Controller and Wash Control Valve
- *AfiFree* Connection Box or Plug-in Connection Box
- Valve Installation Kit for *AfiFree* (optional)

The use of each of the main components is described on the following pages.

Figure 3 shows a typical *AfiFree155i* layout.

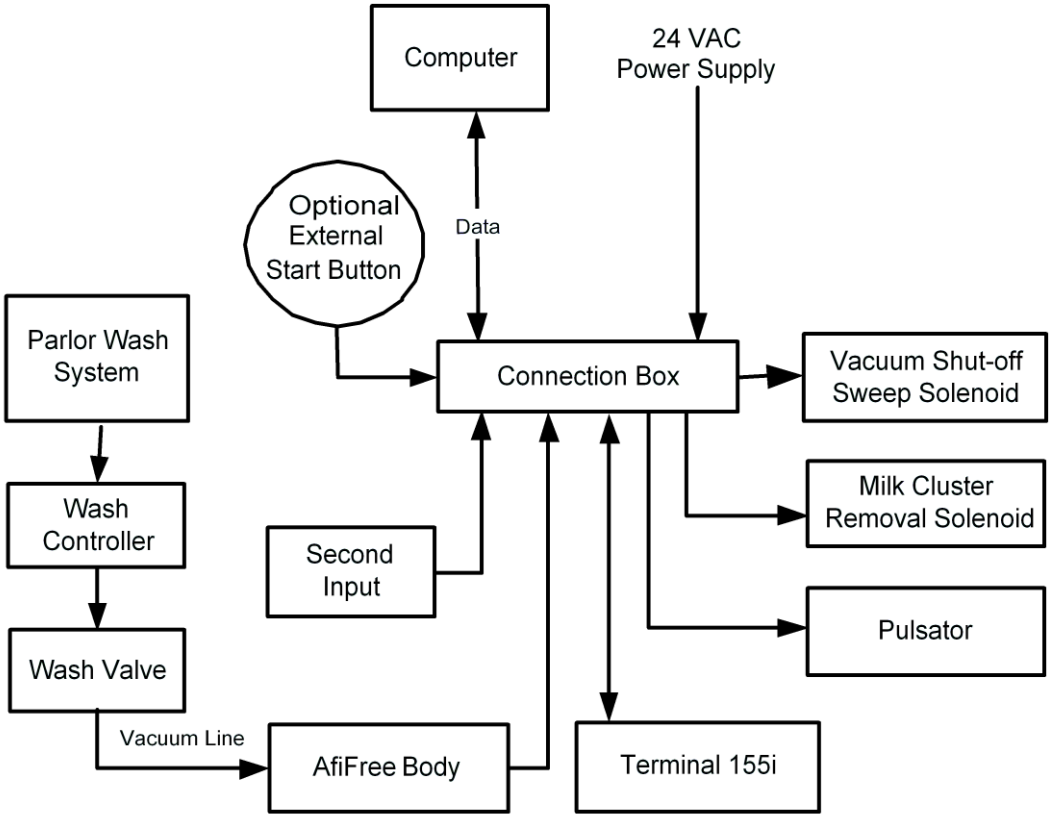


Figure 3: Typical *AfiFree155i* Layout

AfiFree Body

The *AfiFree Body* (Figure 4) measures the volume of milk in real time as the milk flows through it. It has a milk chamber and an electronics compartment.

- The milk chamber collects, measures and transfers the milk to the receiver vessel.
- The electronics compartment manages operation of the *AfiFree Body*.

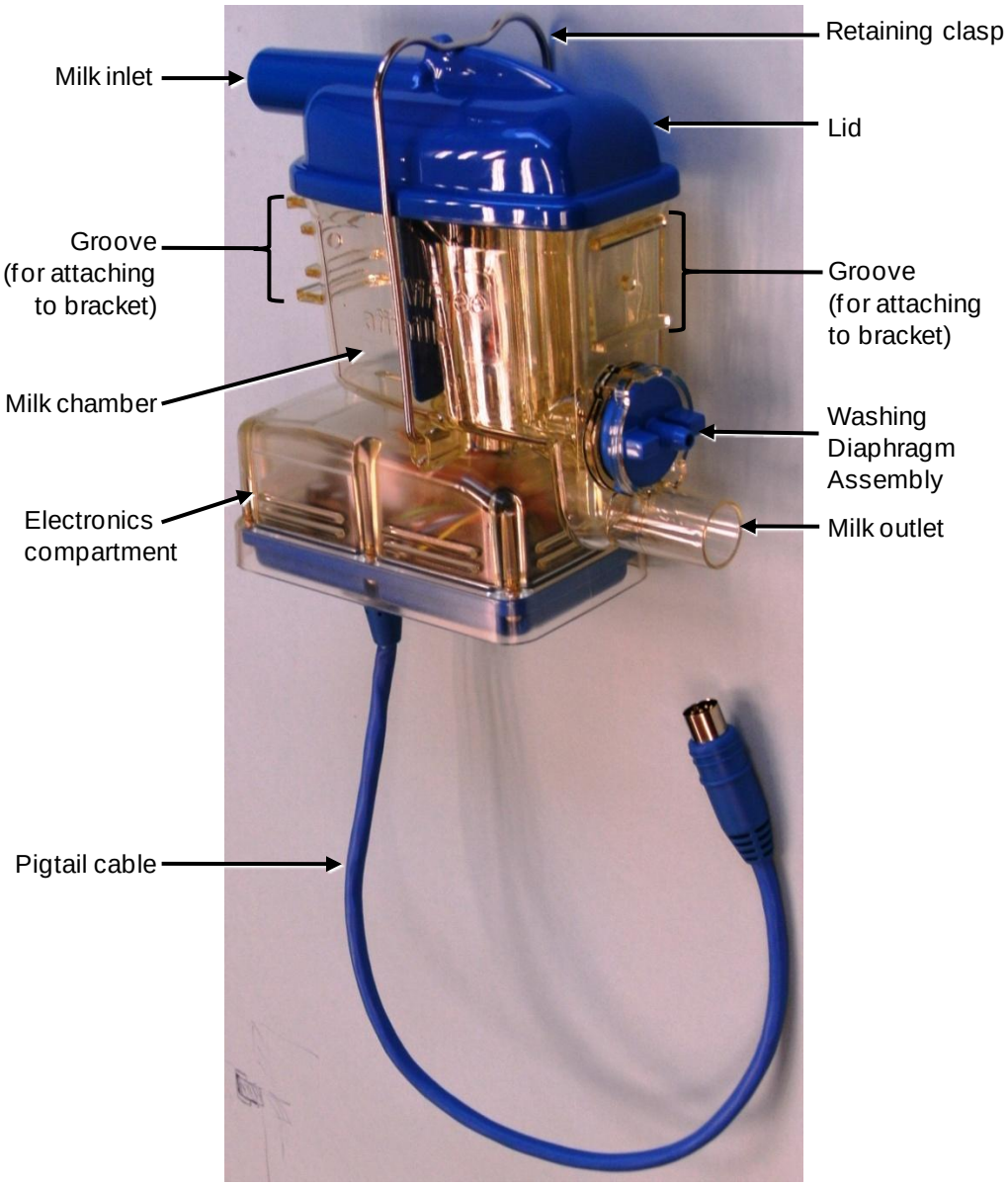


Figure 4: The *AfiFree Body*

Terminal 155i

The user operates the *AfiFree155i* milk meter with the buttons on Terminal 155i. Terminal 155i also displays data about the animal being milked, such as health codes, conductivity, and milk yield.

Inputs and outputs

The inputs are as follows:

- Optional external start
- Swing-over parlor

The programmable outputs are as follows:

- Vacuum shutoff valve
- Cluster remover
- Pulsation control (two outputs)

The RS485 ports are as follows:

- PC communication line
- Milk meter communication line

Display and keyboard

The front panel (Figure 5 and Figure 6) of Terminal 155i has sophisticated indicators and keyboard elements that allow you to monitor and control milking events. The LED indicators are as follows:

- Critical alerts
- Milking status and non-critical alerts
- ACR (Automatic Cluster Remover) cancelled
- Washing mode ON
- Keyboard

At the bottom of Terminal 155i is a socket for its power and communication cable.

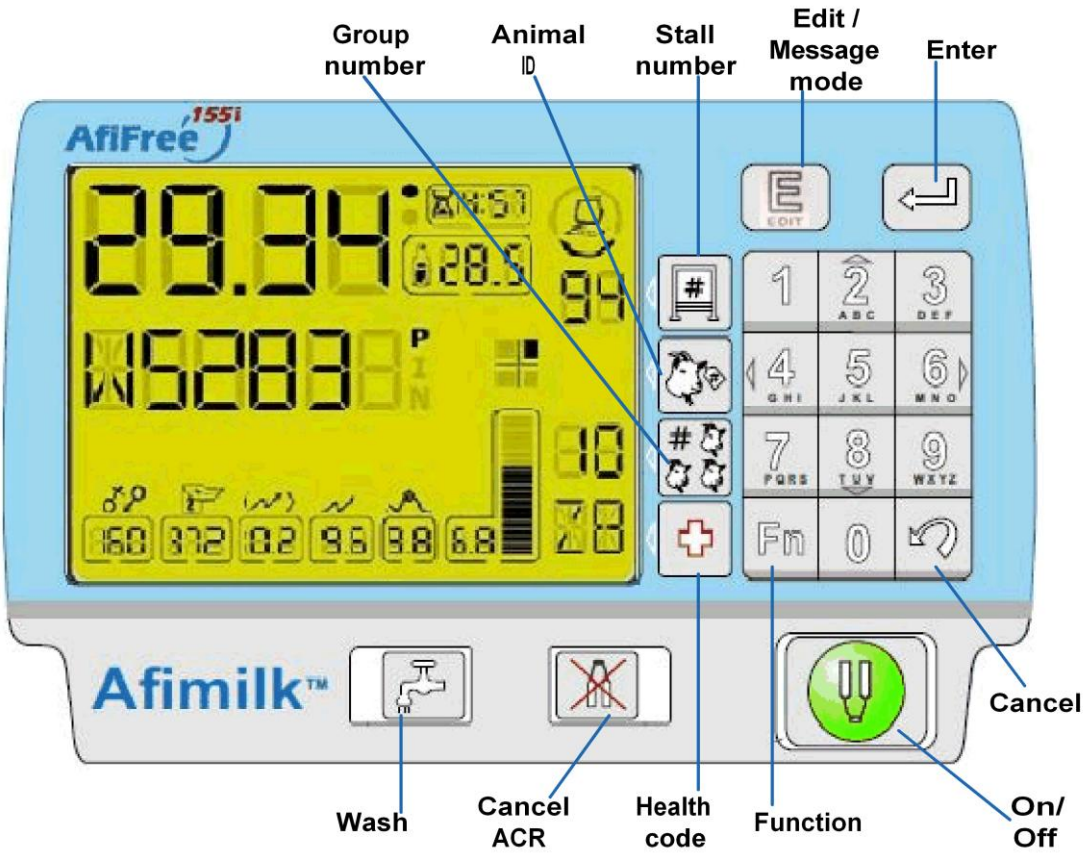


Figure 5: Terminal 155i Panel

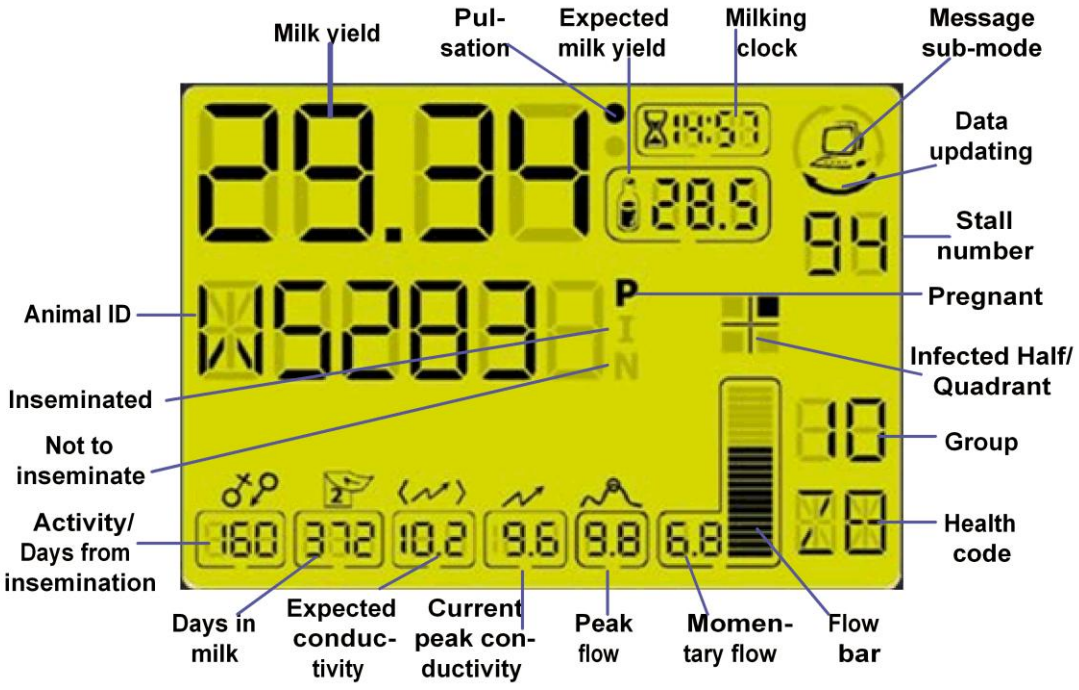


Figure 6: Terminal 155i LCD Display

AfiFree Wash Controller and Wash Control Valve

The parlor washing system cleans the *AfiFree155i* bodies via the *AfiFree* Wash Controller (below) and Wash Control Valve (page 17).

The *AfiFree* Wash Controller

During milking the *AfiFree Body* operates with a continuous flow of milk through the unit. This continuous flow does not allow the *AfiFree Body* to completely fill. During the cleaning cycle it is necessary to completely fill the *AfiFree Body* to ensure that all milk residues are washed out. The *AfiFree* Wash Controller (Figure 7) operates the *AfiFree* Wash Control Valve, which controls the diaphragm to close and open the outlet from the *AfiFree Body*. This allows the *AfiFree Body* to completely fill and drain alternately.

Wash Controller setup is explained on page 70.

Figure 7: *AfiFree* Wash Controller

The *AfiFree* Wash Control Valve

The Wash Control Valve (Figure 8) opens and closes the Washing Diaphragm Assembly on up to 20 *AfiFree155i* Bodies. This causes cleaning liquids to fill the *AfiFree Body* and then drain. The cycle is repeated a number of times under the control of the Wash Controller.

If more than 20 units are installed in the parlor, the parlor cleaning plumbing must be divided into two or more sub-systems, each with its own Wash Control Valve.

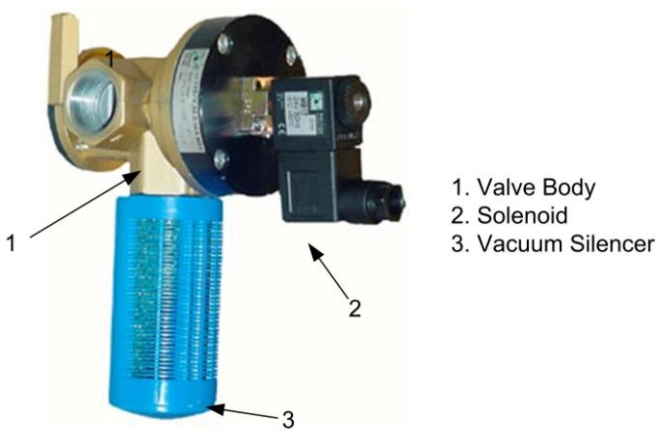


Figure 8: *AfiFree* Wash Control Valve

Connections Boxes

There are two alternative types of connection boxes for wiring *AfiFree*:

- *AfiFree* Connection Box (below)
- Plug-in Connection Box (PICB) (page 19)

AfiFree Connection Box

The *AfiFree* Connection Box (Figure 9) is a watertight junction box with terminal blocks for connecting power and communication wires. The following equipment is interconnected through the *AfiFree* Connection Box:

- *AfiFree Body*
- 24 VAC power supply
- Milk cluster removal solenoid
- Vacuum shut-off sweep solenoid
- Communication - with the computer that manages the flock database
- Terminal 155i
- External start button (optional)
- Second input (optional—for example, input from a side detector in a Swing-Over parlor)
- Pulsator

Figure 9: *AfiFree* Connection Box

Plug-in Wiring System

The Plug-in Wiring System is an improved alternative to wiring cables to a standard *AfiFree* Connection Box. It saves time and wiring errors. Wiring connections are made as follows:

- The components of *AfiFree155i* connect to the Plug-in Connection Box (PICB—see Figure 10) entirely by means of ready-wired plugs and sockets.
- The power and communication cables (Figure 11) have extension tails that plug into the PICB for each stall. Cables are available with three lengths of spacing between extension tails (see Figure 12 and Table 3).

Figure 10: Plug-in Connection Box (PICB)

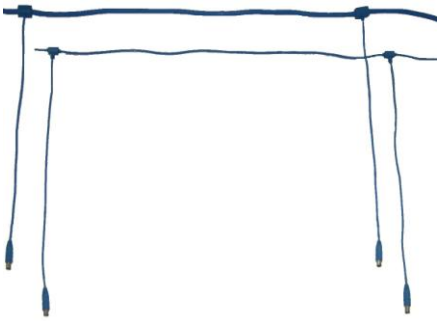


Figure 11: Power and Communication Cables

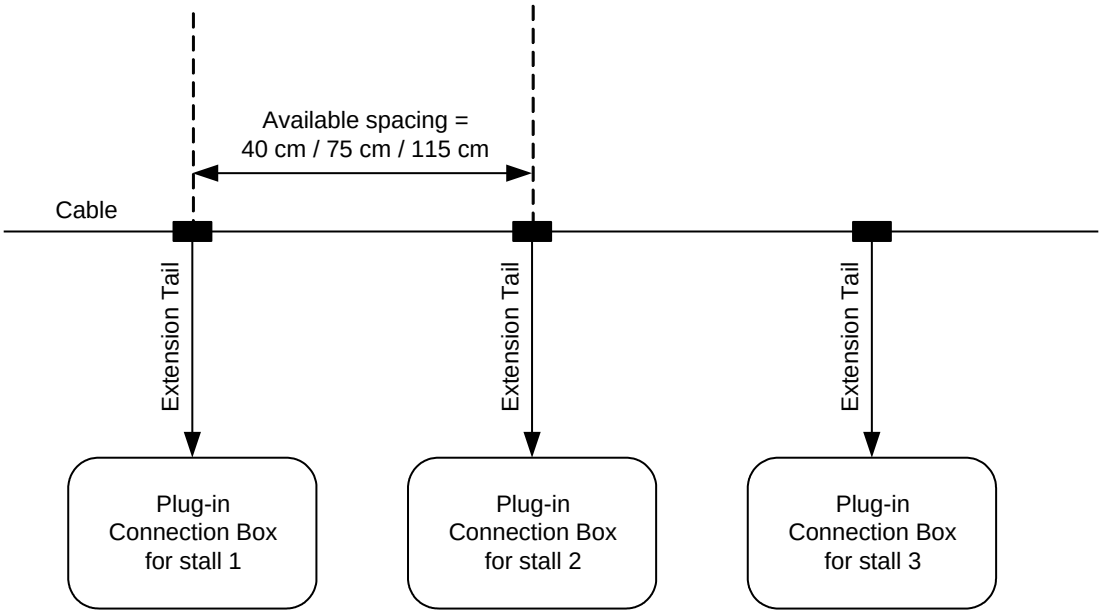


Figure 12: Extension Tail Spacing on Power/Communication Cable

Valve Installation Kit for *AfiFree*

The valve installation kit for *AfiFree* contains all the parts necessary for mounting the **shut-off valve** and connecting it to the *AfiFree Body*. It also includes a generic milk meter bracket for distancing the *AfiFree Body* from the parlor wall, if required.

The valve installation kit enables mounting the shut-off valve at an angle from the vertical, if vertical installation is not possible because of a physical limitation (such as a low milking platform). **However, vertical installation is recommended wherever possible—see caution on page 48.**

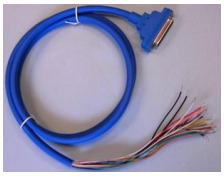
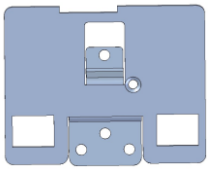
The valve installation kit is for use with the following valves:

- Vacuum operated (P/N 5077001/5077018)
- Air operated (P/N 5077002/5077011)
- Vacuum Normally Open (NO) operated (P/N 5077017/5077015)

System Components

- Table 1 shows the main components for installing the *AfiFree Body* and Wash Controller system.
- Table 2 shows accessories for *AfiFree* connection box wiring.
- Table 3 shows components of the Plug-in Wiring System (see page 19 for an explanation of the Plug-in Wiring System).

Table 1: *AfiFree155i* Components

Name	Picture	Function	Catalog No.		Details
AfiFree Body and Bracket Set	 *AfiFree Body*	Measures milk quantity, and controls cluster removal	4299120	4299130	See page 14
	 *AfiFree15i5* Body Bracket	Secures *AfiFree Body* to parlor wall (or to generic milk meter bracket)	4099080		See page 34
Terminal 155i		Operation of milk meter, and data display	4097335		See page 41
Connection Cable		Connects Terminal 155i to *AfiFree* connection box (for connection cable to Plug-in Connection Box, see Table 3)	4000400		See page 42
Terminal 155i Bracket		Secures Terminal 155i to parlor structure	4097343		See page 39.
Wash Controller		Operates the Wash Control Valve(s)	4099400		See page 17

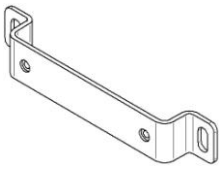
Name	Picture	Function	Catalog No.	Details
Wash Controller Mounting Plate		**Required** to secure Wash Controller to wall.	4088016	See page 50
The *AfiFree* Wash Control Valve		Controls vacuum/clean air	5099010	See page 17
AfiCom1 Plus Port Complete		Communication adapter between PC, *AfiFree 155i,* and identification system (includes *AfiPort*, P8 Connector Cable, and Termination Resistor)	4098550	See *AfiCom1 Installation Manual*
Generic Milk Meter Bracket (optional)		Distances *AfiFree Body* from wall. Secures *AfiFree* body bracket to wall.	4033534	See page 34
Valve installation kit for *AfiFree* (optional, includes generic milk meter bracket.)		For mounting shut-off valve	5077054	See page 20
External Start Button (optional)		Used to start *AfiFree155i*	4099310	See page 44

Table 2: Accessories for *AfiFree* Connection Box Wiring

Name	Picture	Function		Catalog No.	Details
AfiFree Connection Box		Interconnection of cables		40973800	See page 18
AfiFree Body Connection Cable		Connects between *AfiFree155* body pigtail cable and connection box	2.8 m long	4093506	See page 38
			15 m long	4093506D	
RS485 Communication Cable		Connects PC. 3 lengths of junction spacing available.	40 cm spacing	4097323-40	1 junction per stall
			75 cm spacing	4097323-75	
			115 cm spacing	4097323-115	
Power Cable		Connects power. 3 lengths of junction spacing available.	40 cm spacing	5200000-40	1 junction per stall
			75 cm spacing	5200000-75	
			115 cm spacing	5200000-115	

Table 3: Plug-in Wiring System

Name		Function	Length/ Extension Tail Spacing	Catalog No.	Quantity
Plug-in Connection Box		Saves wiring time and errors by enabling plugging-in of ready-wired connectors and cables (alternative to *AfiFree* Connection Box)		4097333	One per stall
AfiFree Body Connection Cable		Connects pigtail cable of *AfiFree Body*	2.80 m length	4097314	One per stall
			5 m length	4097314B	
			10 m length	4097314C	
			15 m length	4097314D	
			20 m length	4097314E	
Terminal 155i Connection Cable		Connects Terminal 155i	2 m length	4097310	One per stall
			5 m length	4097310B	
			10 m length	4097310C	
AfiMilk Pre-wired Solenoid Assembly	Vacuum/ Vacuum Operated	*AfiMilk* vacuum shut off sweep solenoid and removal solenoid with connection cables for plugging the solenoids into the Plug-in Connection Box	1.5 m length	4197020	One per stall
	Air/Air Operated		1.5 m length	4197023	
	Vacuum/ Air Operated		1.5 m length	4197025	
Connection Cables for Non-*AfiMilk* Solenoids	Cluster Removal Solenoid Connection Cable	Connects non-*AfiMilk* DC Cluster Removal Solenoid	1.5 length	4097327	One per stall
	Vacuum Shut-off, Sweep Solenoid Connection Cable	Connects non-*AfiMilk* Vacuum Shut-off, Sweep Solenoid	1.5 length	4097327	One per stall
Connection Cables for Pulsator		Connects non-AfiMilk Pulsator	1.5 length	4097327	One per stall
Connection Cable for Optional External Start Button		Connects external start button	4 m length	4097309	One per stall

Name	Function	Length/ Extension Tail Spacing	Catalog No.	Quantity
Power Cable	Connects power supply	40 cm extension tail spacing	4097313-40	One extension tail per stall
		75 cm extension tail spacing	4097313-75	
		115 cm extension tail spacing	4097313-115	
RS485 Communication Cable	Connects PC	40 cm extension tail spacing	4097312-40	One extension tail per stall
		75 cm extension tail spacing	4097312-75	
		115 cm extension tail spacing	4097312-115	
Power Cable Extension Kit	Connects between power cable and power supply	20 m length	4097315	One per parlor
RS485 Extension Kit	Connects between RS485 communication cable and PC	20 m length	4097316	One per parlor
Communication Line Termination	Resistor for termination of communication line (reduces noise)		9030544	One per line
Connection Kit for 18 AWG Wires	Heat shrink terminals for connecting existing output wires		4097374	
Electrical Protective Paste (set of 5 tubes)	Seals plug		9030819	One tube per two plugs.

Minimum Requirements

- *AfiSheep/AfiGoat* 3.06
- Vacuum lines and washline as specified in *Physical Infrastructure Requirements*, page 30
- Acid wash three times a week (see page 120)

Chapter 2 Site Preparation Requirements

This chapter contains the following sections:

Component Positioning Requirements

This section explains the positioning requirements for the following components:

AfiFree Body Positioning

Position the *AfiFree Body* as follows:

- Below the milking platform
- Above the milk line, to allow gravity to control the flow of milk
- Where it can be level
- So that the hose connecting the *AfiFree Body* to the milk line can have a downward slope of 1.5^{o} in the direction of the flow of milk
- Protected from mechanical damage
- In accordance with the distances specified in Table 4

Table 4: Distance between *AfiFree Body* Outlet and Milk Line

Distance (mm)	Minimum	Maximum
Vertical	To top edge of milk line—110	To bottom edge of milk line—350
Horizontal (to milk line inlet)	200	300

Terminal 155i Positioning

Terminal 155i is mounted on a bracket, which can be fixed to a suitable wall or pipe. Position Terminal 155i according to the following guidelines:

- Where it is convenient for the milker to use the buttons and see the display
- With minimum exposure to animals and water
- Consistently throughout the parlor, so that each Terminal 155i is clearly associated with its *AfiFree Body*.

Connection Box Positioning

Each *AfiFree Body* connects to other components through an *AfiFree* Connection Box or a Plug-in Connection Box (PICB). During normal operation, there is no need for access to the connection box. It can be placed high above the parlor floor, for example on the overhead cable trough (wire duct).

Position the connection box according to the following guidelines:

- High above the milking point to protect it from mechanical damage, excessive dirt, and water
- Located directly above the associated *AfiFree155i* milk meter
- Out of reach of livestock
- With at least 20 cm (8”) clearance above the *AfiFree* Connection Box for the lid to open
- With the *AfiFree* Connection Box cover facing up for ease of opening

Wash Controller Positioning

Position the Wash Controller as follows:

- On a wall or other location where its LEDs can be seen clearly from the parlor floor
- Shaded from direct sunlight (all hours of the day) and protected from water (e.g., rain and leaking pipes)
- Clearance of at least 19 cm (7½ ”) above the Controller , so that the lid can be opened and kept open above the unit
- Safely accessible for wiring and maintenance
- Out of the reach of livestock
- In addition to the above general guidelines, the Wash Controller location depends on how it is activated:
    - If the Controller is manually activated via the manual start button, it must be mounted within easy reach of the operator, so that the button is easily accessible
    - If the Controller is activated remotely or automatically, it can be mounted higher up. However, the Controller remote activation button must be mounted within easy reach of the operator.

Wash Control Valve Positioning

Position each Wash Control Valve as follows:

- Connected to the main vacuum line
- So that it is convenient to install the *AfiFree155i* diaphragm line between it and the *AfiFree155i* Bodies

Positioning Optional External Start Buttons

In installations with an External Start Button, position it according to the following guidelines:

- The button facing the milking pit
- Within arm’s reach of the milking operator
- Consistently throughout the parlor, so that each *AfiFree* unit is clearly associated with its control button. For example, if you install a button on the right side of the first *AfiFree* unit, maintain this layout in all other stalls.

Physical Infrastructure Requirements

The following physical infrastructure is required for operation of *AfiFree155i*:

- Milk Line
- Vacuum Line
- Washline

Milk Line

A stainless steel milk line is required to transport the milk to the milk tank.

Vacuum Line

A separate OD 50 mm PVC vacuum line is required in the parlor for the operation of the *AfiFree* Wash Valve. See pages 55–57 for full details of installation.

Washline

A separate OD 50 mm pipe is required in the parlor to wash the *AfiFree155i* bodies. It must be connected to a water source, a washing sink, and a drain.

Physical Interfaces to Components

The ***AfiFree Body*** is usually attached to the Generic Milk Meter Bracket which is itself welded to the stainless steel side of the milking curb.

Terminal 155i is usually attached to a metal plate that is itself fixed to a pipe, wall, or cabinet.

The ***AfiFree* Connection Box** should be secured to the metal-work above the milking point.

The **Wash Controller** can be attached to a suitable surface by means of the mounting plate (P/N 4088016), or directly screwed to a suitable surface.

The **External Start Button** can be attached to a 5 cm (2”) diameter vertical column using the clamps provided, or attached to any convenient surface.

Electrical Requirements

WARNING

If installed incorrectly, the power supply can damage equipment and injure users. The power supply system must be installed by a qualified electrician.

The installation must meet national safety codes and must make use of suitable circuit breakers.

Electrical requirements has the following parts:

- Power Supply Requirements (page 31)
- Wiring Requirements (page 32)
- Grounding Requirements (page 32)

Power Supply Requirements

For a basic parlor installation (*AfiFree155i* milk meters and cluster removal pistons, without additional outputs), the power supply must meet the following requirements:

- 24 ± 2.4 VAC power supply, 50 VA to each milking point
- 24 ± 2.4 VAC power supply, 75 VA to the wash controller

Table 5 specifies the power requirements for installations with different quantities of *AfiFree155i* milk meters.

SAE recommends the use of a separate transformer and separate 24 VAC wiring for each side of the milking parlor, for two reasons:

- If one transformer fails, the second side of the parlor remains operational
- Troubleshooting is easier

In installations using the Plug-in Wiring System, *AfiMilk* recommends using one 1,000 VA transformer for up to 18 stalls.

Table 5: Power Cable Specifications and Minimum Power Requirements

Number of *AfiFree155* Milk meters	Minimum Power Required (VA)	Power Cable	
		AWG	Cross Section (mm^2)
4 + 4	400	13 + 13	2.5 + 2.5
6 + 6	600	10 + 10	4 + 4
8 + 8	800	10 + 10	6 + 6
10 + 10	1000	10 + 10	10 + 10
12 + 12	1200	8 + 8	10 + 10
14 + 14	1400	8 + 8	16 + 16
16 + 16	1600	6 + 6	16 + 16
20 + 20	2000	6 + 6	16 + 16

Transformer Specifications

Power supply transformers:

- Must have CE approval
- Must be double-insulated and equipped with suitable protective circuit breakers (type C6)

- Must supply power only to the *AfiFree155i* milk meters and to outputs operated by the *AfiFree155i* milk meters
- Do not connect either the secondary winding of the transformer or any of the loads to ground

Wiring Requirements

The power cables must be of sufficient size to carry the load without causing a voltage drop from the first to the last milking point. Table 5 (page 31) specifies the power cables requirements for installations with different quantities of *AfiFree155i* milk meters. The table assumes a basic parlor installation (*AfiFree155i* milk meters and cluster removal pistons, without additional outputs).

Table 6 shows the required specifications for solenoid wiring and communication wiring to the *AfiFree* Connection Box.

Table 6: Specifications for Wiring Connected in Control Box

Cable	From	Type	Notes
Communication	P8 Connector Cable	2-wire Twisted 2x0.75 mm^2 (2x18 AWG)	Impedance 100–120Ω
Solenoid	Removal and Vacuum Solenoid	2-wire double insulated 2x0.75 mm^2 (2x18 AWG)	

Grounding Requirements

The *AfiFree155i* milk meter does not require grounding.

Computer Requirements

The *AfiFree155i* milk meters connect to the computer with the *AfiSheep/AfiGoat* software. They require:

- *AfiSheep/AfiGoat* version 3.06 or higher
- One RS485 port on *AfiCom1* or *AfiHub*

Chapter 3 Mounting and Wiring

This chapter contains the following procedures:

Checking Jumpers in the Plug-in Connection Box

The Plug-in Connection Box has four sets of jumper pins, JP1, JP2, JP3, and JP4.

1. Remove the right-hand side cover of the Plug-in Connection Box and take the PCB out of the box.
2. Make sure the jumpers are connected as in Table 6.

Table 7: Jumper Configuration in Plug-in Connection Box

Jumper Set	Pins Connected
JP1	3
JP2	3
JP3	1 and 2
JP4	1 and 2

Mounting the Connection Box

NOTE	The *AfiFree* Connection box has molded mounting points on its back. Two or more of these can be drilled through as required for screws or bolts. Before mounting a Plug-in Connection Box, make sure its jumpers are configured correctly (see *Checking Jumpers in the Plug-in Connection Box*, page 33).

1. Determine the best location for the *AfiFree* Connection Box or Plug-in Connection Box in accordance with *Connection Box Positioning* (page 28).
2. Screw or bolt the connection box in the location determined.

Mounting and Wiring the *AfiFree Body*

NOTE	The *AfiFree Body* must be mounted level to ensure accurate milk volume calculations. The pipe connecting the *AfiFree Body* to the milk line must have a downward slope of 1.5° in the direction of the flow of milk.

Mounting and wiring the *AfiFree Body* has the following parts:

- Mounting the AfiFree Body Bracket (below)
- Leveling the AfiFree Body Bracket (page 36)
- Mounting the AfiFree Body (page 37)
- Wiring the AfiFree Body (page 37)

Mounting the *AfiFree Body* Bracket

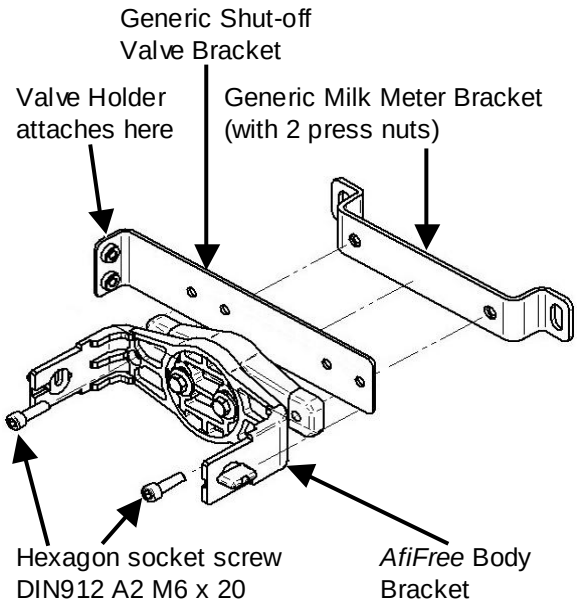
NOTE	There are two ways of mounting the *AfiFree* body bracket: • Attach the *AfiFree* body bracket directly to the pit wall • Attach a generic milk meter bracket to the wall, and mount the *AfiFree* body bracket on the generic milk meter bracket

1. Determine the best location for the *AfiFree Body* in accordance with *AfiFree Body Positioning* (page 27).
2. When using a generic milk meter bracket, attach the generic milk meter bracket to the wall securely.

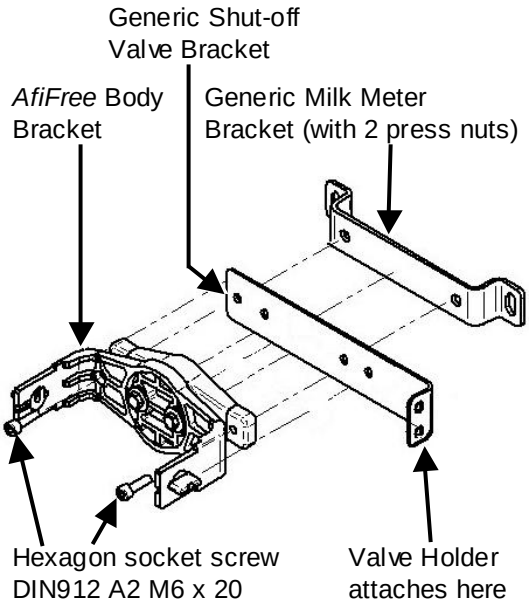
   The generic milk meter bracket can be bolted or welded to the wall.

3. Mount the *AfiFree* body bracket as follows:

When a valve installation kit for *AfiFree* …	And when the *AfiFree Body* is being installed with its milk inlet positioned on its …	See:	Do this:
Is being used for installation of the shut-off valve	Left	Figure 13 **A**	Attach the generic shut-off valve bracket and the *AfiFree* body bracket to the generic milk meter bracket (or wall) using two hexagon socket screws DIN912 A2 M6 x 20
	Right	Figure 13 **B**	
Is **not** being used for installation of the shut-off valve	Left or right	—	Attach the *AfiFree Body* bracket direct to the generic milk meter bracket (or wall) using two hexagon socket screws DIN912 A2 M6 x 20



A: For *AfiFree Body* with Milk Inlet on <u>Left</u>



B: For *AfiFree Body* with Milk Inlet on <u>Right</u>

Figure 13: Mounting the *AfiFree* Body Bracket with a Valve Installation Kit

Leveling the *AfiFree* Body Bracket

1. Slightly loosen both leveling screws (Figure 14).
2. Place a spirit level on both arms of the bracket and level the bracket manually along the roll axis (Figure 14).
3. Place a spirit level on one bracket arm and level the bracket manually along the pitch axis (Figure 15).
4. Repeat steps 2 and 3 as necessary until the bracket is level.
5. Fasten the leveling screws securely.

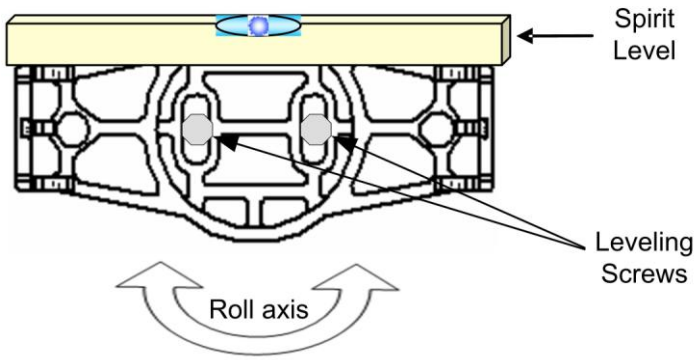


Figure 14: Leveling the *AfiFree* Body Bracket – Roll Axis

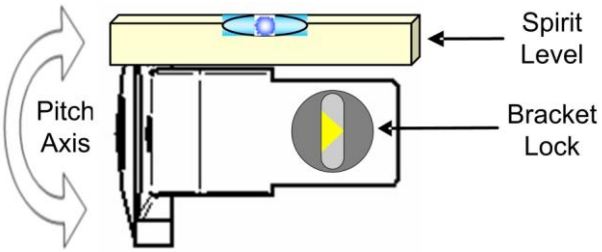


Figure 15: Leveling the *AfiFree* Body Bracket – Pitch Axis

Mounting the *AfiFree Body*

The *AfiFree Body* has a groove on each side (Figure 4, page 14) that fits the bracket arms.

1. Make sure that the bracket locks are open on both sides of the bracket arms (Figure 16).

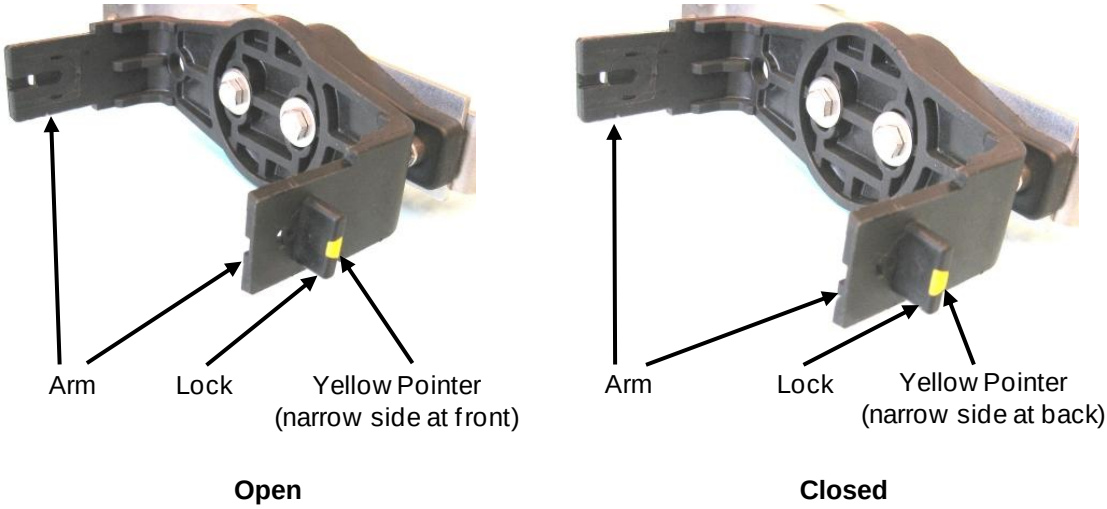


Figure 16: Bracket Lock

2. Slide the *AfiFree Body* into position by guiding the grooves on its sides (Figure 4, page 14) along the bracket arms; do not force the *AfiFree Body* into place.
3. Rotate both bracket locks 180° (Figure 16) to lock the unit into place.
4. Connect the milk outlet to the milk line and check the following:
   - Make sure that all connections are tight.
   - Make sure that the line connecting the *AfiFree Body* to the milk line maintains a 1.5° downslope.

Wiring the *AfiFree Body*

WARNING

- Take appropriate precautions to prevent injury from electric shock.
- Wrap and seal a supplied adhesive-warning label (P/N 9040455) around the *AfiFree* body connection cable

The *AfiFree Body* is supplied with a short pigtail cable terminated in a plug (Figure 4, page 14). Connect this as follows:

- Installations using *AfiFree* Connection Boxes—see *Wiring to an AfiFree Connection Box* (below)
- Installations using (PICB)—see *Connecting to a Plug-in Connection Box* (below)

Wiring to an *AfiFree* Connection Box

1. Plug the *AfiFree Body* pigtail cable into the *AfiFree* body connection cable (for available lengths and part numbers refer to Table 2 on page 21).
2. Route the *AfiFree* body connection cable to the connection box.
3. Wire the *AfiFree* body connection cable to the connection box according to Figure 17. 0

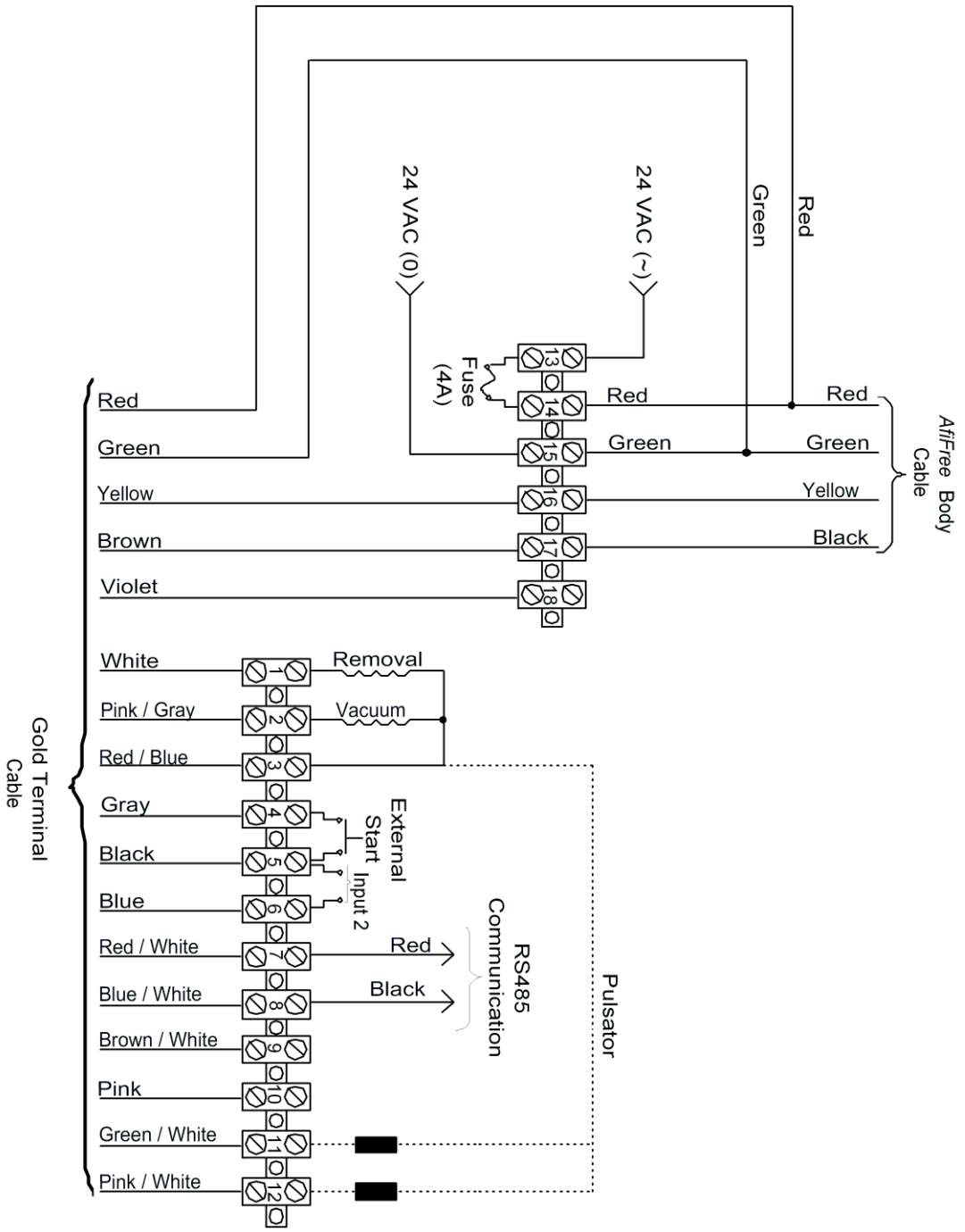


Figure 17: *AfiFree155i* Wiring

Connecting to a Plug-in Connection Box

1. Plug the *AfiFree Body* pigtail cable into the *AfiFree* body plug-in connection cable (for available lengths and part numbers see Table 3, page 21).
2. Route the *AfiFree* body plug-in connection cable to the PICB.
3. Plug the *AfiFree* body plug-in connection cable into socket 9 of the PICB.

Mounting and Wiring Terminal 155i

Mounting and wiring Terminal 155i has the following parts:

- Terminal 155i Bracket Mounting (below)
- Mounting the Terminal 155i (page 40)
- Wiring Terminal 155i (page 41)

Terminal 155i Bracket Mounting

The options for mounting the Terminal 155i bracket are described in these sections.

Mounting the Terminal 155i Bracket Welded to a Pipe

1. Determine the best location for Terminal 155i bracket in accordance with Terminal 155i Positioning (page 28).
2. Position the mounting bracket, and secure it in place with a clamp.
3. Weld the bracket in place at the points illustrated in Figure 18.

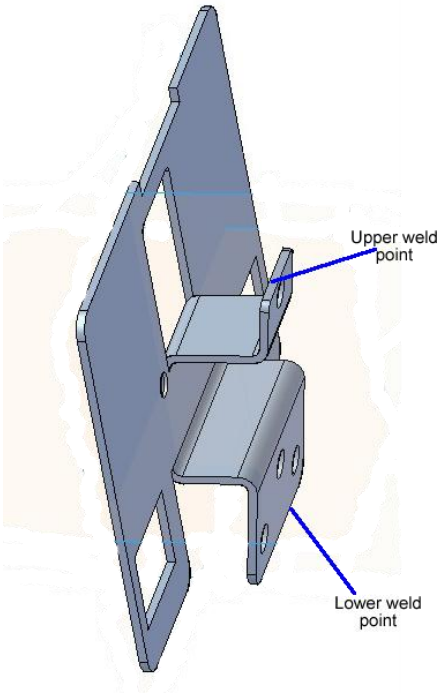


Figure 18: Welding the Terminal 155i bracket to a pipe

Mounting the Terminal 155i Bracket with Bands to a Pipe

1. Determine the best location for Terminal 155i bracket in accordance with Terminal 155i Positioning (page 28).
2. Attach the Terminal 155i bracket to a pipe with suitable bands, as shown in Figure 19.

Figure 19: Terminal 155i bracket attached with bands to a pipe

Bolting the Terminal 155i Bracket to a Cabinet

NOTE	The current procedure explains how to affix the bracket to the outside of the cabinet with nuts and bolts. Among your additional options are the following: • You can affix the bracket to a pipe (rather than a cabinet), using the vertical attachment option rather than the horizontal attachment option. • You can use 6.2mm self-drilling screws, rather than bolts.

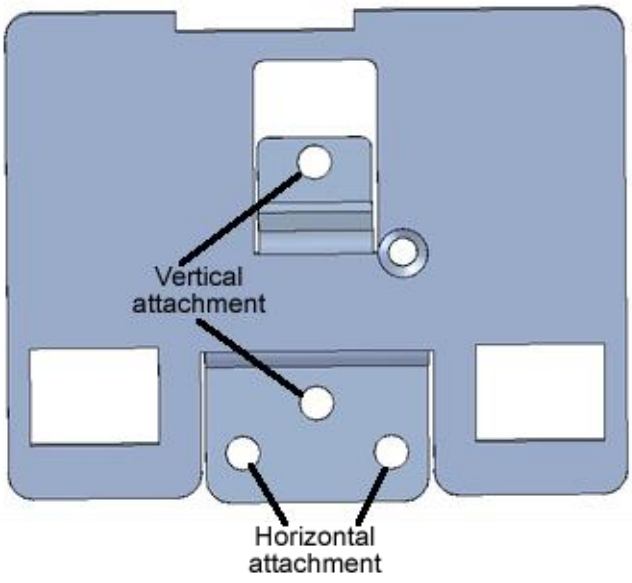


Figure 20: Terminal 155i bracket bolted to a cabinet

1. Determine the best location for Terminal 155i bracket in accordance with Terminal 155i Positioning (page 28).
2. Mark the two horizontal holes to be drilled in the cabinet, as shown in Figure 20.
3. Drill the holes, using a 6.5 mm. drill bit.
4. Secure the Terminal 155i bracket to the cabinet with M6 bolts, lock washers, and nuts.

Mounting the Terminal 155i

Figure 21: Orienting Terminal 155i to its bracket

1. With two hands, push the two lower clips on the back of Terminal 155i through the rectangular holes of the mounting bracket.
2. To make sure that the top clip is above the bracket, while maintaining firm pressure, slide the Terminal 155i up.
3. While maintaining firm pressure, slide the Terminal 155i down.

   The top clip now secures the Terminal 155i to the bracket.

Wiring Terminal 155i

WARNING

- Take appropriate precautions to prevent injury from electric shock.
- Wrap and seal a supplied adhesive-warning label (P/N 9040455) around Terminal 155i cable.

Terminal 155i is supplied with a cable terminated in a D-connector. Connect this as follows:

- Installations using *AfiFree* Connection Boxes—see *Wiring Terminal 155i to an AfiFree* Connection Box (below)
- Installations using PICBs—see *Connecting Terminal 155i to a Plug-in* Connection Box (below)

Wiring Terminal 155i to an *AfiFree* Connection Box

1. Plug the D-connector on the Terminal 155i cable into the socket on the bottom of the Terminal 155i.
2. Route the cable to the connection box.
3. Wire the Terminal 155i cable to the connection box according to Figure 17 (page 38).

Connecting Terminal 155i to a Plug-in Connection Box

1. Plug the D-connector on the Terminal 155i cable (P/N 4000400) into the socket on the bottom of the Terminal 155i.
2. Route the Terminal 155i cable to the PICB (plug-in connection box).
3. Plug the Terminal 155i cable into socket 13 of the PICB.

Wiring the Power Cable

WARNING

- Take appropriate precautions to prevent injury from electric shock.
- Wrap and seal a supplied adhesive-warning label (P/N 9040455) around the power cable.
- If the installation does not use the *AfiFree* Connection Box or the PICB, you **must** install a 4A-rated fuse in the phase line of the 24V power supply line.

Connect the power cable as follows:

- Installations using *AfiFree* Connection Boxes—see *Wiring the Power Cable to an AfiFree* Connection Box (below)
- Installations using PICBs—see *Connecting the Power Cable to a* Plug-in Connection Box (below)

Wiring the Power Cable to an *AfiFree* Connection Box

1. Connect the power cable to the transformer and route it to the connection boxes.
2. Wire the power cable to the connection boxes according to Figure 17.

Connecting the Power Cable to a Plug-in Connection Box

NOTE

The power cable is 8 AWG (16 mm^2). Therefore, no more than 18 milking points may be connected to one length of power cable. The power cable must thus be cut into lengths with no more than 18 extension tails each. Where there are more than 18 milking points, use more than one length of power cable.

AfiMilk recommends using one 1,000 VA transformer for up to 18 stalls.

Connect the power cable as in Figure 22.

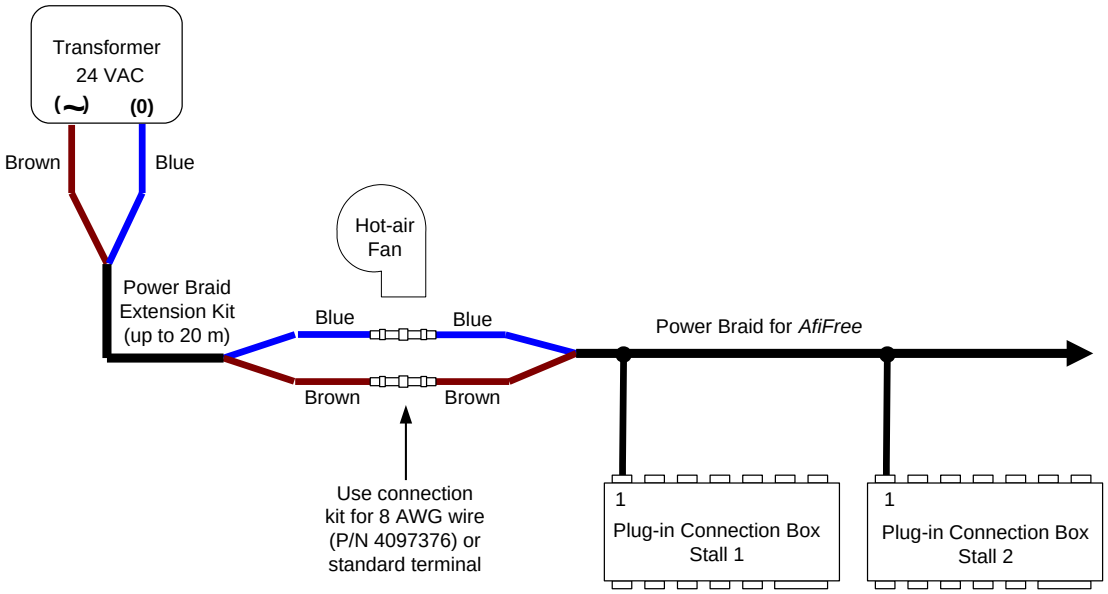


Figure 22: Power Cable Wiring

Wiring the Solenoids

WARNING

Take appropriate precautions to prevent injury from electric shock.

Connect solenoids as follows:

- Installations using *AfiFree* Connection Boxes—see *Wiring Solenoids to an AfiFree Connection* Box (below)
- Installations using PICBs—see *Connecting Solenoids to a Plug-in Connection* Box (below)

Wiring Solenoids to an *AfiFree* Connection Box

Wire the Cluster Removal Solenoid and the Vacuum Shut-off Sweep Solenoid to the connection box according to Figure 17 (page 38).

Connecting Solenoids to a Plug-in Connection Box

When connecting solenoids to a PICB, use the appropriate procedures of the following:

- For installations using *AfiMilk* solenoids—see *Connecting AfiMilk Solenoids to a Plug-in Connection Box* (page 44)
- For installations using non-*AfiMilk* solenoids—see *Wiring Non-AfiMilk Solenoids to a Plug-in Connection Box* (page 44)

Connecting *AfiMilk* Solenoids to a Plug-in Connection Box

1. Plug the Cluster Removal Solenoid cable into socket 3 of the PICB.
2. Plug the Vacuum Shutoff, Sweep Solenoid cable into socket 4 of the PICB.

Wiring Non-*AfiMilk* Solenoids to a Plug-in Connection Box

Wire a non-*AfiMilk* Cluster Removal Solenoid or non-*AfiMilk* Vacuum Shut-off Sweep Solenoid, as follows:

1. Cut off the solenoid connection cable's yellow wire.
2. Wire the blue and brown wires to the solenoid (Table 8).
3. Plug the connector of the solenoid connection cable into the PICB as follows:
   a. Plug the cable from the Cluster Removal Solenoid into socket 3.
   b. Plug the cable from the Vacuum Shut-off Sweep Solenoid into socket 4.

Table 8: Wiring a Non-*AfiMilk* Solenoid

Color of Wire on Connection Cable (P/N 4097327)	Function of Wire	
	DC Cluster Removal Solenoid	**Vacuum Shut-Off, Sweep Solenoid**
Blue	DC Removal Output	Vacuum Shut-off, Sweep
Brown	+VBR	+VBR
Yellow	None	None

Wiring the Pulsator

WARNING

Take appropriate precautions to prevent injury from electric shock.

Connect the pulsator as follows:

- Installations using *AfiFree* Connection Boxes—see Wiring the Pulsator to an *AfiFree* Connection Box (below).
- Installations using PICBs—see Connecting the Pulsator to a Plug-in Connection Box (below).

Wiring the Pulsator to an *AfiFree* Connection Box

Wire the Pulsator to the connection box according to Figure 17 (page 38).

Connecting the Pulsator to a Plug-in Connection Box

When connecting solenoids to a PICB, use the appropriate procedure of the following:

- For installations using *AfiMilk* solenoids—see Connecting an *AfiMilk* Pulsator to a Plug-in Connection Box (below)
- For installations using non-*AfiMilk* solenoids—see Wiring a Non-*AfiMilk* Pulsator to a Plug-in Connection Box (page 45)

Connecting an *AfiMilk* Pulsator to a Plug-in Connection Box

Plug the Pulsator cable into socket 5 of the PICB.

Wiring a Non-*AfiMilk* Pulsator to a Plug-in Connection Box

Wire a non-*AfiMilk* pulsator as follows:

1. Cut off the pulsator connection cable's yellow wire.
2. Wire the blue and brown wires to the pulsator, as described in Table 9 (below).
3. Plug the connector of the pulsator connection cable into socket 5 of the PICB.

Table 9: Wiring a Non-*AfiMilk* Pulsator

Color of Wire on Connection Cable (P/N 4097327)	Function of Wire
Blue	Pulsator
Brown	+VBR
Yellow	None

Mounting and Wiring an External Start Button

Mounting and wiring an external start button has the following parts:

- Mounting an External Start Button (below)
- Wiring an External Start Button (below)

Mounting an External Start Button

1. Determine the best location for the external start button in accordance with *Positioning Optional External Start* Buttons (page 29).
2. Mount the external start button in the location determined.

Wiring an External Start Button

Connect an external start button as follows:

- Installations using *AfiFree* Connection Boxes—see *Wiring to an AfiFree Connection Box* (below)
- Installations using *AfiMilk* Pre-wired External Start Buttons with PICBs—see *Connecting an AfiMilk Pre-wired External Start* Button (below)
- Installations using non-*AfiMilk* external start buttons with PICBs—see *Connecting a Non-AfiMilk External Start Button to a Plug-in Connection Box* (page 46)

Wiring to an *AfiFree* Connection Box

Wire the Cluster Removal Solenoid and the Vacuum Shut-off Sweep Solenoid to the connection box according to Figure 17.

Connecting an *AfiMilk* Pre-wired External Start Button

Plug the external start button's cable into socket 12 of the PICB.

Connecting a Non-AfiMilk External Start Button to a Plug-in Connection Box

Wire a non-*AfiMilk* external start button as follows:

1. Cut off the external start button connection cable's unused wires (Table 8) and isolate them from electrical connection.
2. Wire the red and brown wires to the Normally Open contacts of the external start button.
3. Plug the connector of the External Start Button Connection Cable into socket 12 of the PICB.

Table 10: Wiring a Non-*AfiMilk* External Start Button

Color of Wire on Connection Cable (P/N 4097309)	Function of Wire
Yellow	Future use
Black	
Green	
Red	Normally Open contact
Brown	

Wiring the Communication Cable

Connect the communication cable as follows:

- Installations using *AfiFree* Connection Boxes—see *Wiring to an AfiFree Connection Box* (below)
- Installations using PICBs—see *Connecting to a Plug-in Connection Box* (page 48)

Wiring to an AfiFree Connection Box

1. Route the communication cable from the computer to the connection boxes.
2. Wire the communication cable to the connection boxes according to Figure 17.
3. In the last connection box on the communication line, install a 120Ω resistor across contacts 7 and 8 of the connection box.

   This serves as a termination for the communication line.
4. Install an *AfiPort* to the desired port of *AfiCom1*.
5. Connect the communication cable to the P8 connector cable (Figure 23).
6. Connect the P8 connector cable's pre-wired D-type connector to the *AfiPort* installed in step 3.

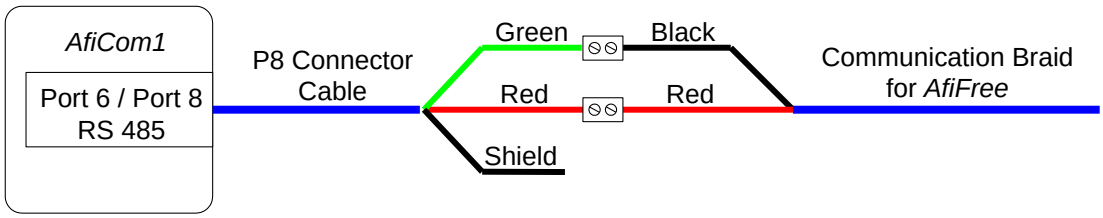


Figure 23: Connecting the PC

Connecting to a Plug-in Connection Box

NOTE	No more than 64 milking points may be connected to the same *AfiCom1* port. The communication cable must therefore be cut into lengths with no more than 64 extension tails each. Where there are more than 64 milking points, use more than one length of communication cable.

1. Install an *AfiPort* to the desired port of *AfiCom1*.
2. Connect the communication cable as in Figure 24.

NOTE	The last PICB in the line must have a Communication Line Termination (P/N 9030544). This connects between socket number 10 and the RS485 line. It reduces noise.

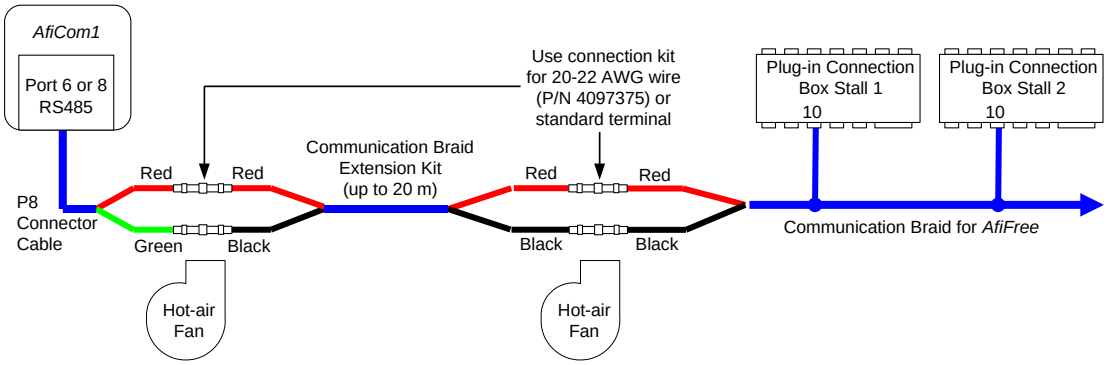


Figure 24: Communication Cable Wiring for a PICB

Installing a Shut-off Valve Using the Valve installation kit for *AfiFree*

CAUTION	A valve installed at an angle from the vertical cannot drain completely. • Water in the valve at the end of the washing cycle can be a source of bacteria • In sub-zero temperatures the water might freeze.

AfiMilk recommends that the shut-off valve be installed vertically.

Where vertical installation is not possible because of a physical limitation (such as a low milking platform) the shut-off valve can be installed at an angle of up to 90° from the vertical.

Install the shut-off valve and holder as follows:

- When the *AfiFree Body* has its milk inlet on the left—see Figure 25
- When the AfiFree Body has its milk inlet on the right—see Figure 26

1. Attach the Generic Shut-off Valve Holder to the generic shut-off valve bracket using the two hexagon socket screws.
2. Remove the shut-off valve from its packaging.

CAUTION	A vacuum NO operated valve must have washers between it and its holder, as in Figure 25 and Figure 26. This stops the valve pressing against its holder.

   Attach the shut off valve to the Generic Shut-off Valve Holder using the two hexagon head bolts, washers, spring lock washers, and nuts.
3. Connect the milk pipe between the shut-off valve's outlet and the *AfiFree Body*'s inlet.
4. Connect the shut-off valve's inlet to the long milk tube.

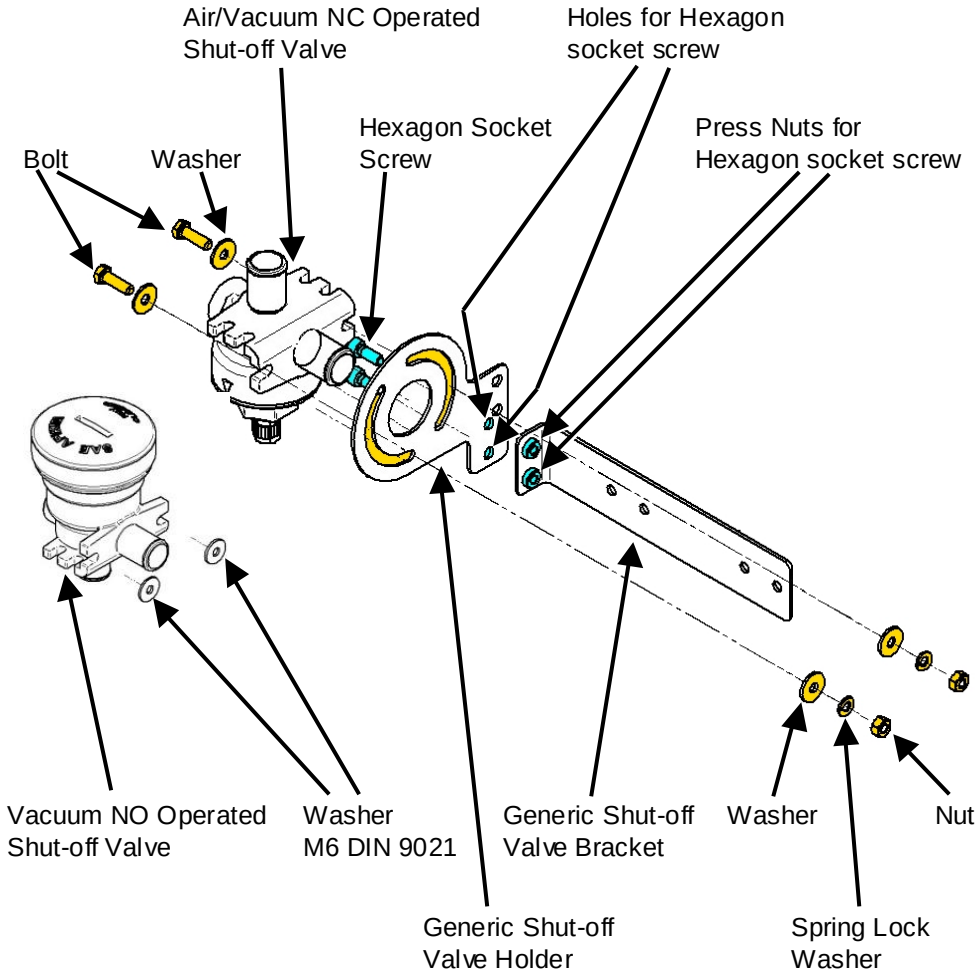


Figure 25: Mounting Shut-off Valve for *AfiFree Body*—Milk Inlet on Left

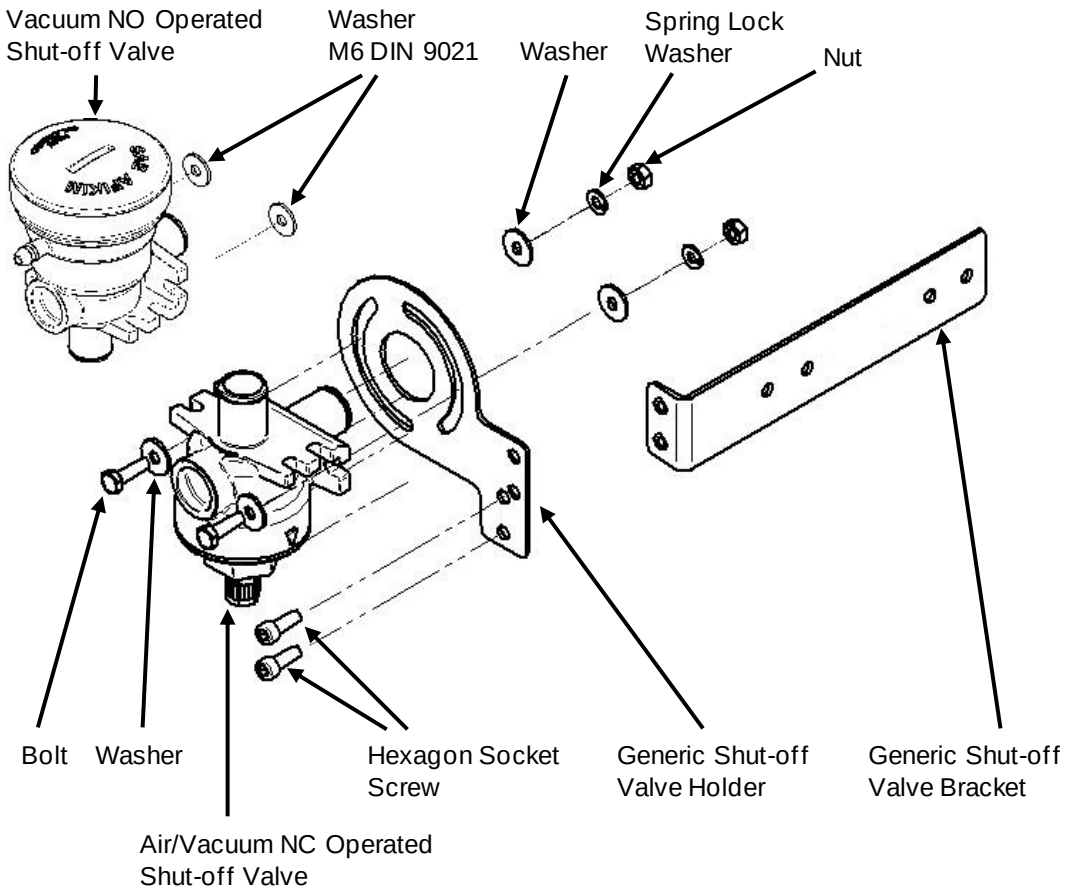


Figure 26: Mounting Shut-off Valve for *AfiFree Body*—Milk Inlet on Right

Mounting and Wiring the Wash Controller

Mounting and Wiring the Wash Controller has the following parts:

- Mounting the Wash Controller (below)
- Wiring the Wash Controller and Setting DIP Switches (page 52)

Mounting the Wash Controller

The Wash Controller can be installed using mounting plates (P/N 4088016) or directly screwed to a suitable surface

The mounting plates can be attached to the Wash Controller with the mounting points above or below the Controller. Selection of the attachment method depends on the location and type of surface available (wall, beam or other surface).

The mounting plates protrude 6.5 cm ($2^5/_8$") from the edge of the Controller. Use M6 screws of a suitable length to secure the mounting plates to the wall or beam.

To Mount the Wash Controller

The Wash Controller is supplied with mounting hardware (Table 11).

Table 11: *AfiFree* Wash Controller Hardware

Description	Catalog No.	Quantity
Allen screw, M6, 20 mm	9020383	4
Star washer	9010386	4
Nut, M6	9020212	8

1. Determine the best location for the Wash Controller in accordance with *Wash Controller Positioning* (page 29.)
2. Attach the mounting plates to the box as shown in Figure 27.

   The mounting points can be above or below the Wash Controller.

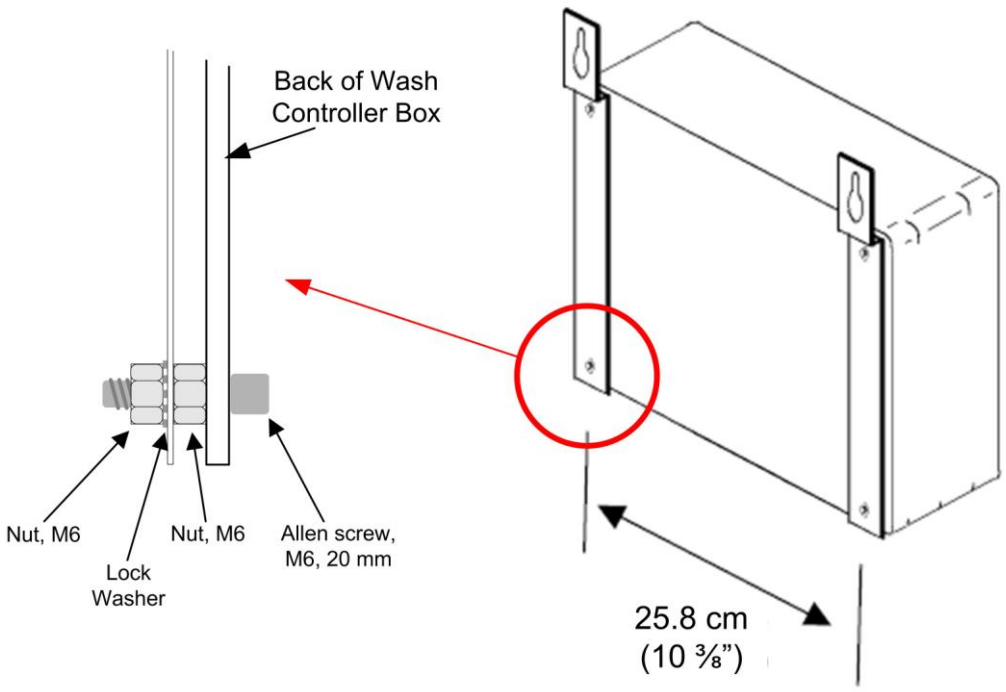


Figure 27: Mounting Wash Controller

3. Bolt the Wash Controller firmly in the place determined.

Wiring the Wash Controller and Setting DIP Switches

NOTE	Refer to the label on the inside of the lid for wiring and dipswitch settings.

This section has the following parts:

- Power Input (below)
- Wash Control Valve Output (below)
- Automatic/Manual Mode Activation – Connections and Settings (below)

Power Input

Connect a 24 VAC (75 VA) dedicated power source to J5.

Wash Control Valve Output

The number of Wash Control Valves depends on the number of *AfiFree155i* bodies in the parlor. Each valve can operate the diaphragms of up to 20 *AfiFree155i* bodies.

Connect wires and configure the DIP switch for the Wash Control Valves as in Table 12.

Table 12: *AfiFree* Wash Controller Wiring and DIP Switch Positions

Quantity of *AfiFree155i* Bodies	Quantity of *AfiFree155i* Bodies	Valve Wire Connection	DSW4 Dipswitch Positions (Figure 28)
1–20	1	J1	1 - OFF 2 - OFF
21–40	2	1st to J1 2nd to J4	1 - ON 2 - OFF

Automatic/Manual Mode Activation – Connections and Settings

In **automatic mode** the Wash Controller receives activation and shut-off commands from the Parlor Wash System. The command can be either:

- 24V AC/DC
- Dry contact

In **manual mode** the Wash Controller is activated by the activation button at the bottom of the Wash Controller case.

Wiring, jumper, and DIP Switch settings are listed in Table 13 and illustrated in Figure 29.

Table 13: Wash Controller Activation – Connection and Settings

Activation Mode	Activation Type (Input Command)	Connect the Command Lines to J8 Pins	Jumper JP1 Pins	Set DIP Switch DSW4 *
Automatic	24V AC/DC	2, 4	1-2	4 – OFF **
Automatic	Dry Contact	1, 2	2-3	4 – OFF **
Manual	Wash Controller Activation Button	No connections	1-2	4 – ON

* Set the DIP switch as shown in Figure 28.

** In automatic mode DIP switch DSW3 is neutralized.

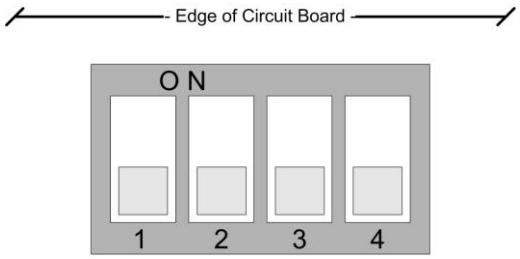


Figure 28: States of DIP Switches DSW1, DSW2, DSW3, and DSW4

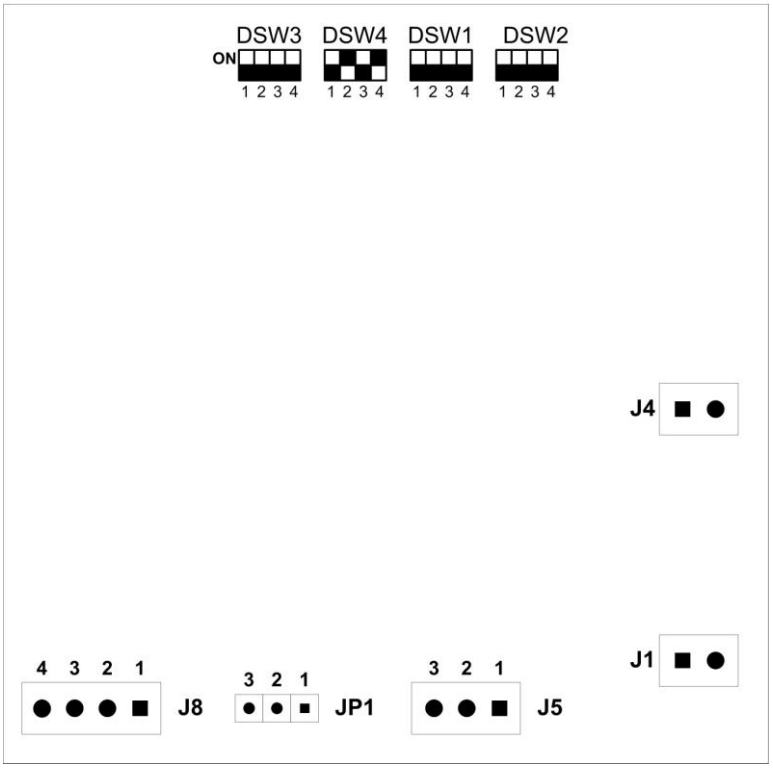
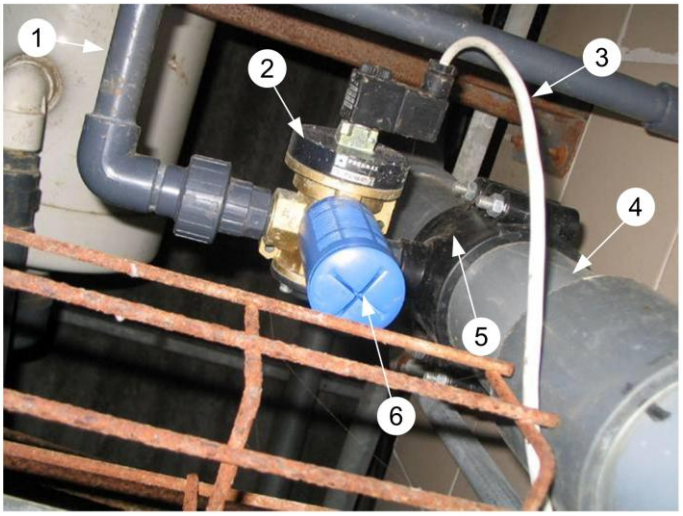


Figure 29: Socket and DIP Switch Locations

Mounting the Wash Control Valve

The Wash Control Valve (Figure 8, page 18) is supplied pre-assembled.

1. Use a saddle clamp with a ¾" female connector to connect the Wash Control Valve to the main vacuum line (Figure 30, Detail 3).
2. Connect the solenoid to the vacuum wires in the Switch Box.



1. Vacuum Distribution
2. Valve Body
3. Valve Wiring (J1 or J4)
4. Main Vacuum Line
5. Saddle Clamp
6. Vacuum Silencer

Figure 30: Wash Control Valve Attached

Installing the Vacuum Line for the Wash Control Valve

All references in the following explanation refer to Figure 31 and Table 14.

1. Position the vacuum line (Item 1) above the milk line. Maximum length of the pipe (Item 2) is 50 cm (19”).
2. Secure the vacuum line to the wall (or to brackets supporting the milk line) with pipe clamps (item 8). Place a pipe clamp at each milking station (to prevent the line from sagging). The vacuum line should be positioned with an angle of 1.5-2.0° toward the drain valve (Item 6 in Detail D).
3. Drill ∅11 mm holes in the vacuum line (Detail C), slightly off center from each *AfiFree Body*. Ensure that the holes are in a uniform position on the line and relative to the *AfiFree Body*.
4. Press the nipple (Item 3) into the ∅11 mm holes in the vacuum line.
5. While holding the black bushing around the nipple, pull the hard plastic portion out. This locks the nipple in place and seals the hole.
6. Connect the pipe (Item 2) between the diaphragm on the *AfiFree Body* and the nipple on the vacuum pipe.
7. Assemble and mount the vacuum line drain (Items 4, 5, 6, and 7, Detail D) at the lowest point in the vacuum line, so that when the drain valve (Item 7) is open, fluids drain from the vacuum line to the floor.

NOTE	Clean the Wash Control Valve’s vacuum line in the same manner, and at the same time, as the Pulsator vacuum line.

Table 14: *AfiFree* Wash Control Valve Vacuum Line Parts List

Reference No (Figure 31)	Part Name	P/N
1	Pipe Meridor Ø50 mm PN16 PVC	5000377
2	Pulsator pipe (single)	5100001
3	Nipple on vacuum distribution line (assembly)	5200027
4	Tee PVC cemented, 90°, 50 mm, gray	1600C0007
5	Short Reducer, PVC bush cemented,50 X 25 mm, gray	5001520
6	Hose PVC glue connector,1/2 inch X 25 mm	5000634
7	Drain valve with Ball G-12	5235571
8	Pipe clip 50	5001058
9	*AfiFree* wash control valve	5099010
10	Valve, ball thread galvanized, 1/2 inch MXF	5300009

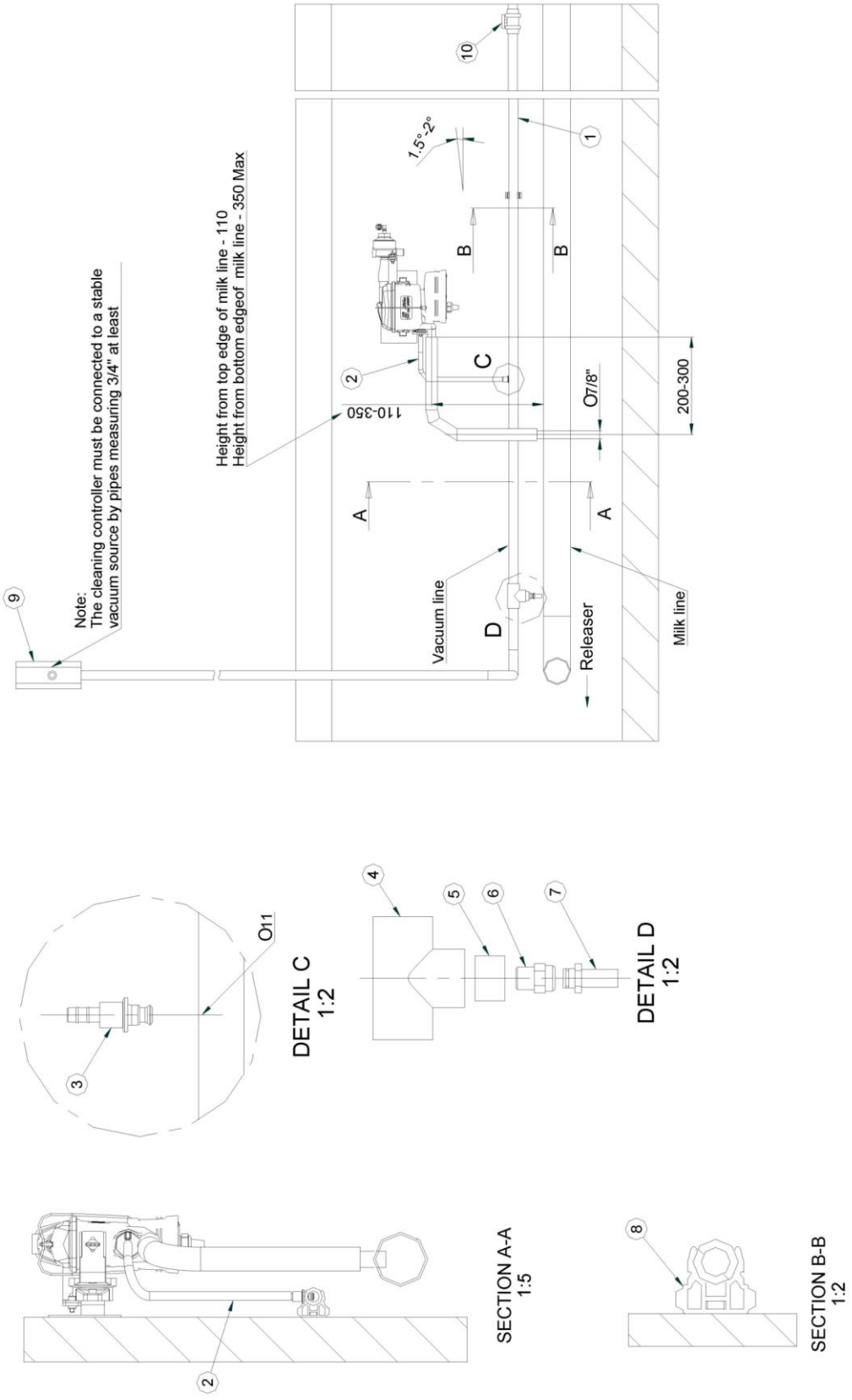


Figure 31: *AfiFree* Wash Control Valve Vacuum Line

Chapter 4 System Configuration

NOTE	Terminal 155i supports a variety of parlor types. The Terminal 155i configurations for the various parlor types will be documented in a separate document.

System configuration has the following steps:

1. Configuring *AfiSheep/AfiGoat* (below)—only necessary when *AfiFree 155i* milk meters are **connected to a flock management computer**
2. Configuring Milk Meters (page 61)
3. Setting Up the Wash Controller (page 70)
4. Testing AfiFree155i Performance (page 73)
5. Configuring *AfiFree 155i* Parameters (page 74)

Configuring *AfiSheep/AfiGoat*

Configuring *AfiSheep/AfiGoat* has the following steps:

1. Configuring the *AfiCom1* card—see the *AfiFarm Configuration Manual* (P/N 9040148)
2. Configuring the Parlor—see below

Configuring the Parlor

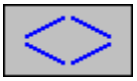
1. Make sure *AfiSheep/AfiGoat* and *AfiMen* are closed.

   For instructions on closing *AfiMen*, see the *AfiFarm User Manual*.
2. Open Config.
3. In the Config window, select Station/Add/Parlor.
4. Choose from:

The following dialog box appears:	Do this:
Select PC	Select the PC to which the parlor is connected, and go to step 5.
Parlor Configuration (Figure 32)	Go to step 5.

5. In the Parlor Configuration dialog box (Figure 32), select:
   - the parlor type (Table 15 and Figure 32)
   - the number of stalls in the parlor (Figure 32)
   -  under Milk Meter Type

Table 15: Parlor Type Icons

Name of Parlor	Icon
Herringbone	
Polygon	
Rotary—Entrance Identification	
Rotary—Stall Identification	
Swing-over—Stall Identification	
Swing-over—Stall Identification—MM Input	
Tandem	
Tie Stall	
Trigon	
User-Defined	

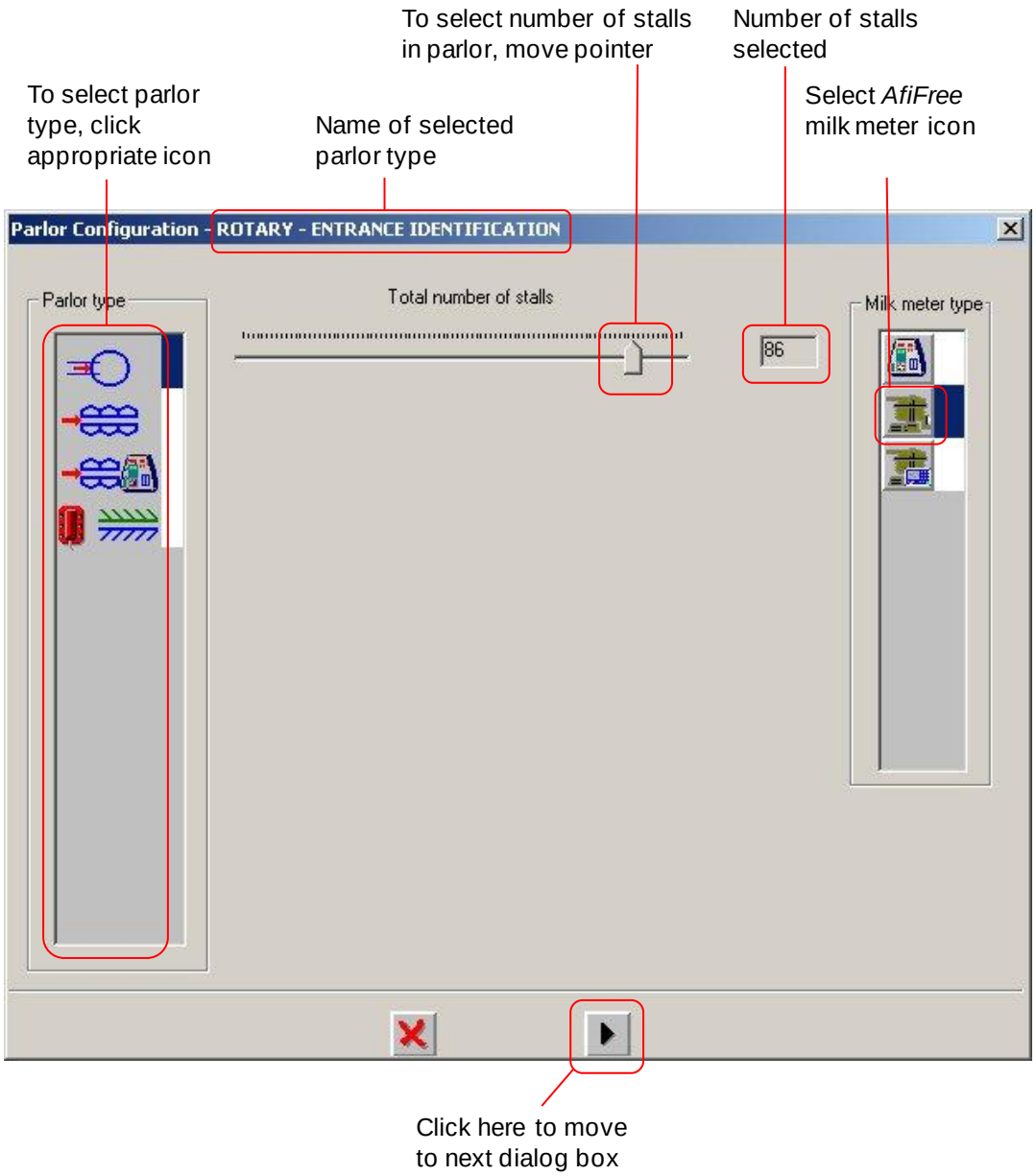


Figure 32: Parlor Configuration Dialog Box

6. Click  .

   The Ideal Setting dialog box appears.

7. In the Ideal Setting dialog box, select the desired Ideal setting, and click OK.

8. The dialog box for the parlor type selected in step 5. Click  to save the configuration and exit.

Configuring Milk Meters

Configure milk meters as follows:

- When *AfiFree 155i* milk meters are **connected to a flock management computer** – refer to Configuring Milk Meters in a Computerized Flock Management System, below.
- When *AfiFree 155i* milk meters are used as **stand-alone units** (not connected to flock management computer) – refer to Configuring Milk Meters in a Stand-alone System, page 68.

Configuring Milk Meters in a Computerized Flock Management System

NOTE	Some of the processes described below take up to 5 minutes to complete. You must wait for one step to complete before progressing to the next one.

Configuration of *AfiFree 155i* milk meters connected to a flock management computer requires the following operations:

- Assigning Identification Numbers to Milk Meters (below)
- Loading Software and Parameter Values (page 66)

Assigning Identification Numbers to Milk Meters

There are two steps to assigning identification numbers:

1. Setting Up AfiMen for Configuration of Milk Meters, page 61
2. Automatic Identification Number Assignment, page 64

Setting Up AfiMen for Configuration of Milk Meters

The *AfiMen* Real Time module of the Flock Management software (i.e., *AfiSheep/AfiGoat*) will assign an identification number and load software to all *AfiFree 155i* milk meters.

1. Unplug the Terminal 155i cable from every Terminal 155i.

2. Open *AfiMen*.

   The *AfiMen* Real Time window (Figure 33) appears. Red fill inside a blue *AfiFree155* milk meter icon indicates that the *AfiFree155* milk meter is not assigned an identification number yet.

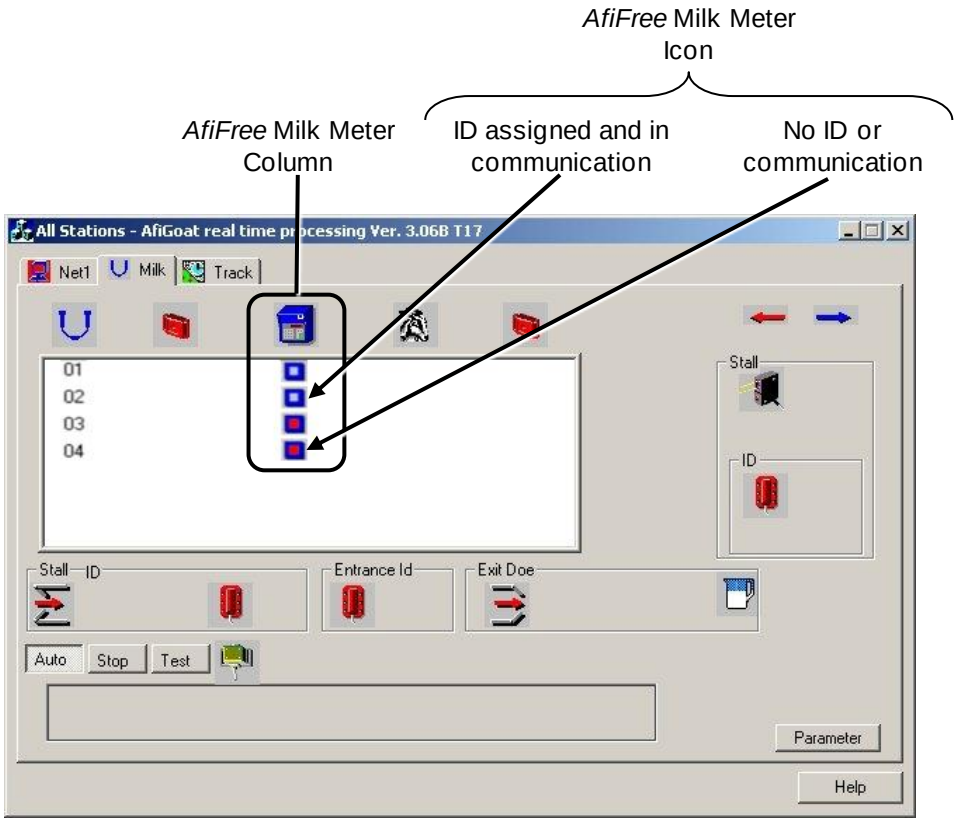


Figure 33: *AfiMen* Real Time Window - Milk Tab

3. In the *AfiMen* Real Time window, select the Milk tab.
4. Click **PARAMETER.**

   The Milk Parameters dialog box (Figure 34) appears.

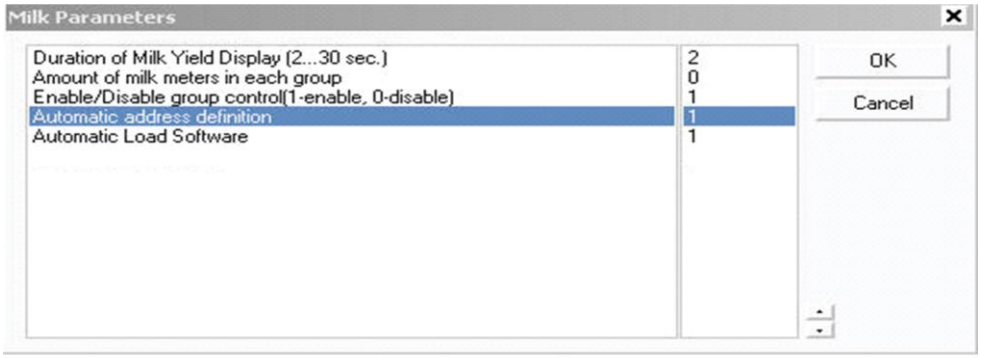


Figure 34: Milk Parameters Dialog Box

5. Set two parameter values as follows:
   a. Automatic Address Definition - 1
   b. Automatic Load Software – 0
6. Click **OK.**

   The AfiMen Real Time window (Figure 33) appears.
7. Select the Track tab (Figure 35).

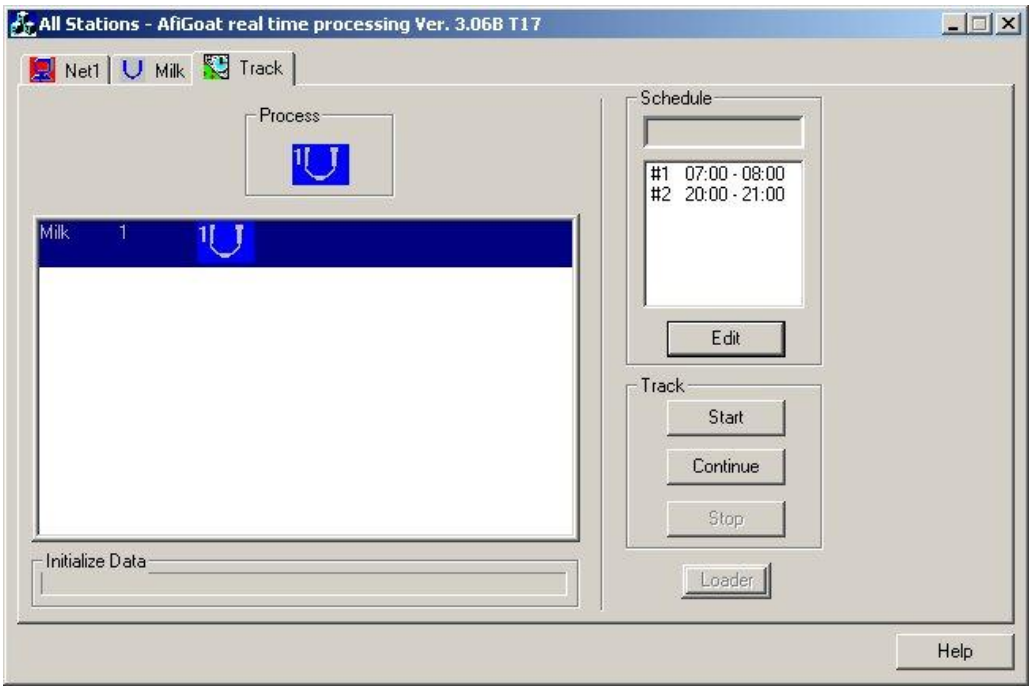


Figure 35: *AfiMen* Real Time Window - Track Tab

8. Make sure the milk station is in session.

   If the milk station is not in session, click **Continue** to put it in session.

   The system is now ready to assign identification numbers to the *AfiFree 155i* milk meters.

Automatic Identification Number Assignment

NOTE	Identification numbers are assigned in the order that the *AfiFree 155i* milk meters are powered on and detected. Make sure to plug in the Terminal 155i's cables in ascending order.

1. Plug the Terminal 155i cable into the first Terminal 155i.

   Id-- appears on the Terminal 155i display, and identification number assignment starts automatically.

   The *AfiFree 155i* milk meter enters Test mode, and the Terminal 155i displays the following indications several times (for about 10–60 seconds):

   - Terminal 155i software version (for example, 2.05)
   - Parlor configuration (for example, CF01)
   - Table version (for example, tbCo)
   - PuPd (Parameter Update)

   At the conclusion of identification number assignment, the *AfiFree 155i* milk meter enters Cleaning mode and the display shows **CL** followed by the stall number.

   In the *AfiMen* Real Time window (Figure 33) the fill in the icon representing the milk meter changes from red to grey, indicating that the *AfiFree 155i* milk meter has an identification number and communication is correct.

NOTE	The cleaning cycle is not performed at this time. Cleaning mode is the default mode that the *AfiFree 155i* milk meter enters after it has been assigned an identification number. Do not disconnect *AfiFree 155i* milk meters during this procedure. Disconnecting milk meters will cause an incorrect identification number assignment. For recovery procedure, see *Recovering from a Malfunction during Identification Number Assignment*, below.

2. Connect the next Terminal 155i.

   AfiMen assigns the next sequential identification number to the unit.

3. Repeat step 2 until all *AfiFree 155i* milk meters have received identification numbers.

Recovering from a Malfunction during Identification Number Assignment

There are two options for recovery:

- Wait at least 5 minutes. Automatic address definition (identification number assignment) restarts automatically.
- Assign identification number manually (see *Manual Identification Number Assignment*, below).

Manual Identification Number Assignment

If there was a malfunction during automatic identification number assignment, or one or more identification numbers were incorrectly assigned, you can assign identification numbers manually.

NOTE	The highest possible stall identification number is 64.

1. On the Terminal 155i, simultaneously press  and  until Id appears on the display.

   The Terminal 155i is now in Settings mode.

   Id is short for Stall Identification Number. If the stall has an Identification Number, the Identification Number appears after Id (for example, Id23). If the stall has no identification number, Id_ _ appears on the display.

NOTE	When the Terminal 155i is in Settings mode, if you press  for four seconds, the Terminal 155i saves the current settings and exits Settings mode.

2. Press  .

   The display flashes.

3. Display the desired number as follows:

   - To increase the displayed number by one, press  for less than four seconds.

     The highest possible stall identification number is 64. When the display reads Id64, pressing  displays Id01.

   - To decrease the displayed number by one, press  .

4. When the display shows the desired number, press  for four seconds.

   The Terminal 155i sets the stall identification number and exits Settings mode.

Loading Software and Parameter Values

NOTE	This procedure uploads software first to the *AfiFree155* body, then to the Terminal 155i. This includes upload of *AfiFree 155i* parameter values. If you want to change any *AfiFree 155i* parameter value in *AfiSheep/AfiGoat* from its default before uploading to the milk meter, see *Entering a Parameter Value in AfiSheep*/AfiGoat, page 81. For a description of the parameters, see *Introduction to the AfiFree 155i* Parameters, page 74.

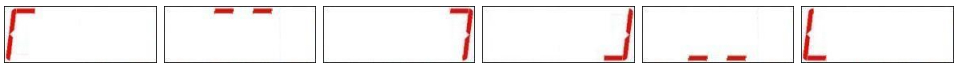
1. In *AfiSheep/AfiGoat*, make sure that Auto Program is enabled (see *To enable Auto Program:* page 80)
2. In the *AfiMen* Real Time window, select the Track tab
3. Make sure that the milk station is in session.

   If the station is not in session, click **Continue** to put it in session.
4. Select the Milk tab.
5. Click **PARAMETER.**

   The Milk Parameters dialog box (Figure 34) appears.
6. Set the *Automatic Load Software* parameter value to 1:
7. Click **Stop** or **Auto**.
   - In a shared parallel parlor, software upload begins automatically after 15 seconds.
   - In a parallel parlor with entrance identification, software upload begins after you open the exit gate.

NOTE	A display starting with an E (e.g., E074) indicates a malfunction during software upload (caused by communication or power failure, etc.). For recovery procedure, see *Recovering from a Malfunction during Data Upload*, page 67.

During software upload to the *AfiFree155* body, the following cycle of indications appears on the display several times:



During software upload to the Terminal 155i, the following appear on the display:

- LOad
- Strt
- A sequence of numbers, increasing in value by one approximately every second:

   and so on.

At the conclusion of software upload, each *AfiFree 155i* milk meter automatically enters Cleaning mode and the display shows CL followed by the stall number.

Recovering from a Malfunction during Data Upload

There are two options for recovery:

- Wait at least 5 minutes.
  - In a shared parallel parlor, software upload restarts automatically.
  - In a parallel parlor with entrance identification, software upload restarts after you open the exit gate.
- Perform a manual update (see *Manually Uploading Milk Meter Software* below).

Manually Uploading Milk Meter Software

1. Open *AfiMen*.

   The AfiMen Real Time window (Figure 33) appears.

2. Select the Milk tab.
3. Click Test to enter "`Test`" mode.
4. Select the Track tab.
5. Click Loader.

   The Password dialog box appears.

6. In the Password dialog box, type **afi** and click **OK.**
7. Navigate to C:\AfiGoat\Data\Hex or C:\AfiSheep\Data\Hex.
8. Open the desired software file (you can only select one at a time).
   - The name of the software file for the *AfiFree155* bodies begins FM1 (Figure 36).
   - The name of the software file for the *Terminal 155i* begins MT1 (Figure 36).

   The update starts.

   The blue bar in the AfiMen Real Time window indicates the progress of the update. The update takes about 5 minutes.

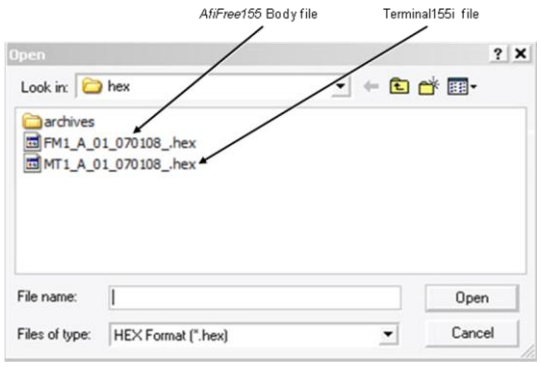


Figure 36: *AfiFree* 155i Software Files

Configuring Milk Meters in a Stand-alone System

Configuring milk meters in stand-alone system has the following parts:

- Assigning Identification Numbers (below)
- Configuring the Animal Type (page 69)

Assigning Identification Numbers

You must assign each milk meter an identification number between one and sixty-four. Do not give the same identification number to different milk meters.

To assign an identification number:

1. Turn on the power supply to the *AfiFree 155i* milk meter.

   The display shows CL--.

2. On the Terminal 155i, simultaneously press  and  until Id-- appears on the display.

   The Terminal 155i is now in Settings mode. Id is short for Stall Identification Number. It is the first item in the Settings menu.

NOTE	When the Terminal 155i is in Settings mode, if you press  for four seconds, the Terminal 155i saves the current settings and exits Settings mode..

3. Press  .

   The display flashes.

4. Display the desired number as follows:

   - To increase the displayed number by one, press  for less than four seconds.

     The highest possible stall identification number is 64. When the display reads Id64, pressing  displays Id01.

   - To decrease the displayed number by one, press  .

5. When the display shows the desired number, press  for four seconds.

   The Terminal 155i sets the identification number and exits Settings mode.

Configuring the Animal Type

Each *AfiFree* milk meter can be configured for milking one of the following animal types:

- Buffalo
- Cow
- Goat
- Sheep

Make sure that each milk meter is configured for the type of animal to be milked in the parlor, by doing the following:

1. On the Terminal 155i, simultaneously press and hold down  and  until Id appears on the display.

   The Terminal 155i is now in Settings mode. Id is the first item in the Settings menu.

NOTE	When the Terminal 155i is in Settings mode, if you press  for four seconds, the Terminal 155i saves the current settings and exits Settings mode.

2. Use  to scroll through the Settings menu until An appears on the display.
3. Press  to enter the Animal Type menu.

   The display flashes.
4. Use  to scroll through the Animal Type menu until the abbreviation for the desired animal type appears.

   Table 16 shows the abbreviations for each animal type.
5. Press  for four seconds.

   The Terminal 155i sets the Animal Type and exits Settings mode.

Table 16: Abbreviations for Animal Types

Animal Type	Display	Abbreviation
Buffalo		Anbu
Cow		AnCo
Goat		AnGt
Sheep		AnSh

Setting Up the Wash Controller

NOTE	For parlors where the washing process is controlled by *AfiWash*, see *AfiWash* Installation manual P/N 9040646.

This section contains the following parts:

- Wash Controller Principles of Operation (below)
- Wash Controller Configuration (page 70)

Wash Controller Principles of Operation

In milking mode, the *AfiFree Body* allows milk to flow through it freely. In cleaning mode, cleaning fluids must completely fill the *AfiFree Body* to enable thorough cleaning.

In cleaning mode, during system wash, cleaning liquid is supplied by the parlor wash system. The *AfiFree* Wash Controller alternately turns the Wash Control Valve(s) on and off.

The Wash Control Valve opens and closes the washing diaphragm of each *AfiFree Body* connected to it, allowing the *AfiFree Body* to repeatedly fill up with washing liquid and then to empty.

One Wash Controller controls one or two Wash Control Valves, opening and closing both Wash Control Valves simultaneously.

One Wash Control Valve controls up to 20 *AfiFree155i* bodies (see Figure 37).

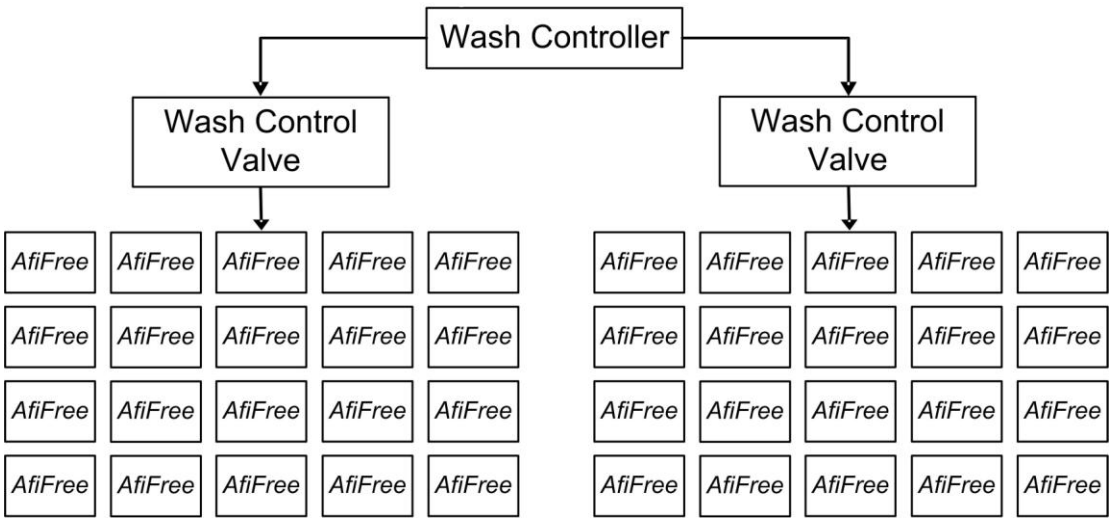


Figure 37: *AfiFree* Cleaning System

During the system wash, the Wash Controller opens and closes the Wash Control Valve(s) according to a preset cycle, until the system wash is complete. The cycle is set, after parlor installation, according to the *Wash Controller Configuration* procedure, below.

The Wash Controller has two modes of operation:

- **Automatic mode -** the main parlor wash system activates and shuts down the Wash Controller.
- **Manual mode** - the Wash Controller is activated by a manual control button, and is turned off after a predefined time interval.

Wash Controller Configuration

NOTE	Refer to the label on the inside of the Wash Controller lid for wiring and DIP switch settings.

Configuration of the Wash Controller involves setting three time parameters, explained in Table 17.

Table 17: Wash Controller Time Parameters Functionality

Parameter	DIP Switch	Action			To Set Parameter, See:
		Controller	Valve	*AfiFree Body*	
Time On	DSW1	Supplies +24 V to valve	Supplies air to *AfiFree Body*	Body fills with cleaning fluid	Page 71
Time Off	DSW2	Removes +24 V from valve	Supplies vacuum to *AfiFree Body*	Cleaning fluid drains from the body (*AfiFree155i* milk meter returns to normal state - Milking Mode)	Page 71
Wash Duration (manual mode only)	DSW3	Stops wash cycle (at the selected time)	Supplies vacuum to *AfiFree Body* (at the selected time)	Milking Mode (normal state)	Page 72

Setting Time On and Time Off Parameters

These parameters must be set according to the characteristics of the parlor.

1. Measure the time intervals described in Table 18.

Table 18: Wash Time Intervals

Measurement	Parameter	DIP Switch
From the beginning of Cleaning Mode until the farthest* *AfiFree Body* is filled with liquid	*Time On*	DSW1
From the end of Cleaning Mode until the nearest* *AfiFree Body* is empty	*Time Off*	DSW2

***NOTE**	"Farthest" and "Nearest" refer to distance from the Parlor Wash System.

2. Set DIP switches DSW1 and DSW2 according to the time intervals measured in step 1. Figure 38 shows DIP switch positions for different time intervals.

NOTE	To double parameter values for DSW1 and DSW2, move the DSW4 switch 3 to OFF. For example, if switch 3 on DSW4 is set to OFF then 1 second becomes 2 seconds, 2 seconds becomes 4 seconds, etc.

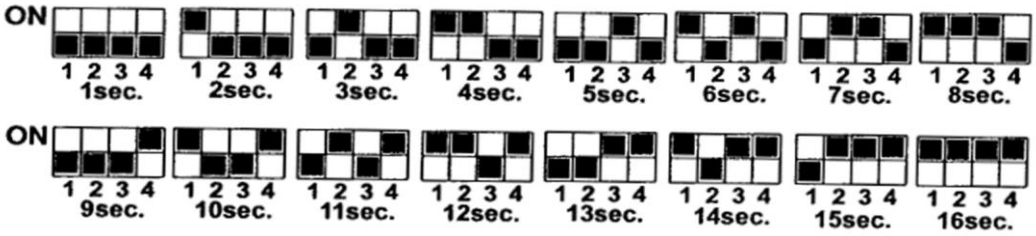


Figure 38: DSW1 and DSW2—DIP Switch Options for

NOTE	The above figure is also displayed on the label on the inside of the Wash Controller lid.

Setting the Wash Duration Parameter

The *Wash Duration* parameter is required only for Manual Mode.

Set the *Wash Duration* parameter in accordance with the local parlor operation doctrine. General guidelines are given in Appendix B. In most cases, a 20–30 minute wash cycle is suitable.

Set the *Wash Duration* parameter using DIP switch DSW3. Figure 39 shows DIP switch positions for different wash durations.

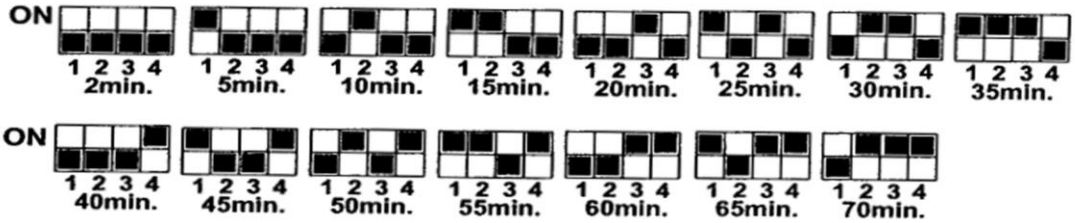


Figure 39: DSW3—DIP Switch Options

Check the current wash cycle duration by chemical testing and milk sampling. If the results are below standard, extend the wash cycle by increasing the *Wash Duration* parameter value.

Testing *AfiFree155i* Performance

AfiFree155i milk meters must be tested before beginning normal operation. If *AfiFree155i* milk meters have been installed as part of a system including antennas, parlor controls etc., the following tests are performed as part of the system tests.

1. Check the power supply.

   AfiFree155i milk meters will not operate at less than 21.6 VAC. Voltage in excess of 26.4 VAC will cause damage to the *AfiFree155i* milk meters.

2. Check the vacuum supply.

   The vacuum pressure must be between 36-38 kPa.

3. Check that the Wash Controller has been set up to local requirements.

4. To verify that there is vacuum at all the washing diaphragms, remove the vacuum line connection to the *AfiFree155* body and check vacuum.

5. Perform a washing cycle:

   a. Verify that there are no leaks in the system.

   b. Verify that the washing diaphragm opens and closes according to the timing set.

   c. Verify that the shut-off valves on the long milk tube operate.

   d. Check that all *AfiFree155* bodies are filled with water up to the tip of the electrodes and that the inside of the cover is cleaned by the turbulence. If the *AfiFree155* bodies are not filled with water, reset the washing parameters (see *Wash Controller Configuration*, page 71).

   e. Verify that all *AfiFree155* bodies are clean and are fully drained after the washing cycle.

      ◊ If the *AfiFree155* bodies are not clean reset the washing parameters as in step d above.

      ◊ If the *AfiFree155* bodies are not completely drained adjust the *Time Off* parameter.

6. Make any necessary repairs and adjustments, and then repeat the washing cycle.
7. Check that the antennas are in communication with the *AfiFree155i* milk meters by bringing a spare tag into antenna rang of **each** antenna, and verifying that the display responds.

NOTE	If the tag is not assigned to an animal identification number in *AfiSheep/AfiGoat*, the display shows 999_

8. Before performing a milking session, check that the *AfiFree155i* milk meters respond to the buttons by doing the following:
   a. Press the Start/Stop button twice as if to start milking; verify that the shut-off valve on the long milk line opens.
   b. Press the Start/Stop button for less than four seconds to stop milking; verify that the ACR (if installed) operates.
9. Perform a milking session
   a. Verify that cluster removal in all *AfiFree155i* milk meters is functioning.
   b. Verify that each *AfiFree155i* milk meter responds to all the button presses.
   c. Verify that all *AfiFree155i* milk meters send data to the computer.
   d. Verify that the data sent from the *AfiFree155i* milk meter is reasonable, with no unusually high or low volumes.
   e. Verify that the correct parameters have been loaded.
10. Make all the required corrections and repeat the procedure.

Configuring *AfiFree 155i* Parameters

The value of the *G* parameter must be calculated and set to suit the characteristics of the parlor—see Calculating and Setting the *G* Parameter, page 81.

The *AfiFree 155i* parameters are detailed in *Introduction to the AfiFree 155i* Parameters (below).

Introduction to the *AfiFree 155i* Parameters

Table 19 shows the parameters for *AfiFree 155i* and their default values.

Table 19: Terminal 155i parameters

Parameter	Parameter	Parameter description	Key combination	Display view example	Min. Value	Max. Value	Step	Units	Default value
F1	Minimum Milking Time	Minimum Milking Time	"F"+"1"	F1 180	20	250	10	sec	90
MFR	Minimum Flow	Flow for end of milking	"F"+"2"	MF 150	20	1000	10	g/min	70

Parameter	Parameter	Parameter description	Key combination	Display view example	Min. Value	Max. Value	Step	Units	Default value
F3	Removal Delay	Delay between Vacuum closing and Removal	"F"+"3"		1	9	1	sec	1
G	Measurement coefficient	Measurement coefficient	"F"+"4"		85	115	1	%	100
ODD	Milk Remainder	Oddments milk constant addition	"F"+"5"		0	300	10	gram	50
RAL	Removal Alarm	Duration of green lights blinking before Removal	"F"+"6"		0	30	1	sec	0 (OFF)
SH	Sweep Delay	Delay between Removal and Sweep start	"F"+"7"		0	9	1	sec	1
SL	Sweep Pulse Duration	Sweep Pulse Duration	"F"+"8"		500	5000	500	mSec	500
NBS	Sweep Pulses Number	Number of Sweep Pulses	"F"+"9"		0	5	1		3
IOC	IO Configuration	Pulsation control or Back Flush control	Stall # +"1"		0	3	1		0
Cu	Flow Control Pulsation	Curves of milk flow controlled pulsation	Stall # +"2"		0	8	1		0 (OFF)
PF	Pulsation Frequency	Constant Pulsation Frequency set	Stall # +"3"		30	180	1	p/min	120
PR	Pulsation Ratio	Constant Pulsation Ratio set	Stall # +"4"		50	80	1		50
PTP	Reverse pulsation	Reverse Pulsation Ratio	Stall # +"5"		0	1	1		0 (OFF)
STR	Strip	Flow for Strip activating	Stall # +"6"		0	2000	10	g/min	0 (OFF)
BFD	Back Flush Delay	Delay between Sweep end and Back Flush start	Stall # +"7"		1	9	1	Sec	2
U1	Water Back Flush	Water Back Flush Duration	Stall # +"8"		0	9	1	Sec	0 (OFF)
A1	Air Back Flush	Residue Air Back Flush Duration	Stall # +"9"		0	9	1	Sec	0 (OFF)
Kg/Lb	Weight Units	Weight Units	Animal ID +"1"						Kg
C/F	Temperature Units	Temperature Units	Animal ID +"2"						C
STD	Stimulation Duration	Stimulation Duration	Animal ID +"3"		0	55	5	Sec	0 (OFF)
STF	Stimulation Frequency	Stimulation Frequency	Animal ID +"4"		90	300	10	p/min	300
SR	Stimulation Ratio	Stimulation Ratio	Animal ID +"5"		50	80	1		50
CT	Maximum AMT	Maximum Milking Time	Animal ID +"6"		0	1200	10	Sec	0 (OFF)
CC	Low Cluster in Removal	Delay to Cluster lowering in Removal	Animal ID +"7"		0	25	1	Sec	0 (OFF)

Parameter	Parameter	Parameter description	Key combination	Display view example	Min. Value	Max. Value	Step	Units	Default value
SF1	Second Attachment	Second Attachment Premilk time	Animal ID +"8"	SF1 60	20	250	10	Sec	20
DPM	Dump Milk	Dump Milk	Animal ID +"9"	DP0400	0	9900	100	gram	0 (OFF)
CCR	Cancel ACR	Allow cancel ACR from AfiSheep/ AfiGoat by code	"Group" +"4"	CC- 0	0	1	1		0 (OFF)
SPM	Spoiled Milk	Allow Spoiled Milk	"Group" +"5"	SP 0	0	1	1		0 (OFF)
AS	Automatic Stimulation	Allow Automatic Stimulation	"Group" +"6"	AS 0	0	1	1		0 (OFF)
ADA	Reset	When cluster is reattached, this parameter determines whether milk measurement begins again from zero or continues from previous count	ADA		0 (reset)	1 (continue			1 (con't)

Notes to Parameter Table

This section contains instructions relating to several fields in Table 19.

IO Configuration parameter

IOC = 0; set outputs to work with pulsation control and strip.

IOC = 1; set outputs to work with back flush and strip.

IOC = 2; set outputs to work with pulsation control and diversion milk line.

IOC = 3; set outputs to work with back flush and diversion milk line

Flow Control Pulsation

There are seven separate curves (programs) available for flow control pulsation (FCP). To enable FCP, specify a value for Cu, according to Table 20.

Pulse/min (Rate)	Ratio	Cu1 Curve 1	Cu2 Curve 2	Cu3 Curve 3	Cu4 Curve 4	Cu5 Curve 5	Cu6 Curve 6	Cu7 Curve 7
60	60/40	0 – 2.0	0 – 2.5	0 – 3.0	0 – 3.5	0-2	0-2.5	0-3.0
58	63/37	2.0 – 2.5	2.5 – 3.0	3.0 – 3.5	3.5 – 4.0	2-2.5	2.5-3.0	3.0-3.5
56	65/35	2.5 – 3.0	3.0 – 3.5	3.5 – 4.0	4.0 – 4.5	2.5-3.0	3.0-3.5	3.5-4.0
54	68/32	3.0 – 3.5	3.5 – 4.0	4.0 – 4.5	4.5 – 5.0	3.0-3.5	3.5-4.0	4.0-4.5
53	70/30	3.5 – 4.0	4.0 – 4.5	4.5 – 5.0	5.0 – 5.5	3.5-4.0	4.0-4.5	4.5-5.0
52	73/27	4.0 – 4.5	4.5 – 5.0	5.0 – 5.5	5.5 – 6.0	4.0-4.5	4.5-5.0	5.0-5.5
51	74/28	4.5 – 5.0	5.0 – 5.5	5.5 – 6.0	6.0 – 6.5	4.5-5.0	5.0-5.5	5.5-6.0
50	75/25	5.0 +	5.5 +	6.0 +	6.5 +	5.0+	5.5+	6.0+

Table 20: Flow control pulsation curves

Setting Parameters from Terminal 155i

The procedures in this section make use of the information in Table 19 (page 74). Some of these parameters can also be set from AfiSheep/ AfiGoat.

Reading and Setting Parameters

1. On the Terminal 155i, press the appropriate key combination specified in Table 19 (page 74).

   The Animal ID field displays the parameter (on the left side) and current value (on the right side). For example:

2. To change the value, press the Edit/ Message mode button  .
3. To increase the value, do one of the following:
   - To increase the value by the amount indicated in the Step column, press and release  .
   - To increase the value by 10x the amount indicated in the Step column, press  for several seconds.
4. To decrease the value, do one of the following:
   - To decrease the value by the amount indicated in the Step column, press and release  .
   - To decrease the value by 10x the amount indicated in the Step column, press  for several seconds.
5. Perform the appropriate action of the following:

   - To confirm a changed value, press the Enter button  .
   - To keep the current value, press the Cancel button  .

Central Activation of Milking/Cleaning Mode

NOTE	Before you perform this procedure, see Group Retrieval (below). This option is available only under AfiSheep/ AfiGoat.

At the start of a milking, when all of the milk meters are in cleaning mode, press simultaneously "Group Nº " +"2"on one of the milk meters. All Milk Meters on the same side will change mode from Cleaning to Stand By.

At the end of a milking, press simultaneously "Group Nº "+"8" on one of the milk meters. All Milk Meters on the same side will change mode from Removal to Cleaning.

Cluster Clearance

(either under AfiSheep/ AfiGoat or in a standalone configuration)

Set parameter **Cc** to allow cluster clearance.

CC parameter is the delay time desired (in seconds), between cluster removal and the lowering of the cluster.

After setting this parameter, the milk meter is timed to lower the cluster (at the designated delay time) after cluster removal. After an animal has been milked and the cluster removed, the cluster remains in the lower position to allow easy preparation of the animals.

Raising or Lowering Clusters

(either under AfiSheep/ AfiGoat or in a standalone configuration)

In removal mode, to raise or lower a cluster without initiating milking, hold down the group number button  and then press **1**.

Stimulation

(either under AfiSheep/ AfiGoat or in a standalone configuration)

A rapid pulsation at the beginning of milking helps to stimulate milk let-down.

Three parameters control the stimulation function:

- Stimulation Duration (STD)
- Stimulation Pulsation Frequency (STF)
- Stimulation Pulsation Ratio (SR)

To allow automatic stimulation by code from AfiSheep/ AfiGoat, set Parameter AS to 1(ON).

For Manual Activation Stimulation, press "Code"+"9" combination (only in removal for next milking only).

For Manual Stop/Canceling Stimulation, press "Code"+"6" combination.

Milk Diversion

An extra milk line must be installed to carry the diverted milk. As well, a diversion valve must be installed near the milk outlet of the milk meter. The circuit is normally open. Use the Strip output to control a diversion valve. This function diverts milk from the main milk line into a secondary milk line. Milk can be diverted automatically, or manually, as needed.

To allow this feature with pulsation control set parameter IOC to 2.

To allow this feature with Back Flush set parameter IOC to 3.

If this feature is used, the Strip feature cannot be used.

Diverting Milk Manually

Pressing "Code"+"0" diverts milk from the milk meter into the secondary line.

Pressing "Code"+"8" returns the milk flow to the main milk line.

This feature is useful if a milker notices that here is some blood in the milk.

Automatic Milk Diversion

This feature automatically diverts milk from an animal that has been identified with a health code. The duration of the milk diversion depends on the code assigned to the animal:

- If the animal has assigned a Dump Milk Operation code, milk is diverted throughout the milking.
- If the animal has assigned a Dump First Milk Operation code (DPM parameter), only first milk is diverted.

Milk Remainder

(either under AfiSheep/ AfiGoat or in a standalone configuration)

A certain amount of milk remains in the bend of the tube after the animal is milked. When milking resumes, this milk passes through the *AfiFree155* body too quickly to be registered. The *Milk Remainder* parameter compensates by automatically adding a set amount to the quantity of milk recorded for each animal.

Sweep

(either under AfiSheep/ AfiGoat or in a standalone configuration)

AfiFree 155i milk meters can be set to remove milk remaining in the milking tube after each milking by performing a sweep. The sweep pulse duration, number of sweep pulses, and sweep delay can be set individually in three parameters with those names (see Table 19).

Viewing software version

(either under AfiSheep/ AfiGoat or in a standalone configuration)

These options enable you to view the software versions, as follows;

- Terminal 155i: Press buttons "F"+"0" simultaneously.
- Milk Meter: Press buttons "Stall number"+"0" simultaneously.

Setting Parameters in AfiSheep/ AfiGoat

Group Retrieval

If you want to raise or lower clusters in groups, you need to set two parameters in the *AfiSheep/ AfiGoat* real-time window:

Set **Lowering Clusters in Batches – Number of Milk Meters per Batch** to a value of at least **1**.

Allow Remote Parlor Operations (1-enable, 0-disable) to **1**.

Auto Program

Auto Program is a parameter set in AfiSheep/ AfiGoat that determines whether AfiMen automatically loads parameter values (except for the G parameter) to milk flow indicators. When Auto Program is enabled *AfiMen* functions as follows:

1. When communication is established with the milk meters, *AfiMen* compares the parameter values in each milk meter with those set in *AfiSheep/AfiGoat* (except for the G parameter).
2. If any milk meter has a parameter with a value different from the value in *AfiSheep/AfiGoat*, then *AfiMen* overwrites the value in the milk meters with the value in *AfiSheep/AfiGoat* (except for the G parameter).

This option is useful when replacing a Terminal 155i or installing a new one.

To enable Auto Program:

1. Open AfiSheep or AfiGoat.

   The *AfiSheep* or *AfiGoat* main window appears.

2. In the *AfiSheep* or *AfiGoat* main window, select **Parameters** from the Tools menu.

   The parameters window appears.

3. Click the Milking Station icon in the Station pane.

   The *AfiFree 155i* parameters appear in the right hand pane (Figure 40).

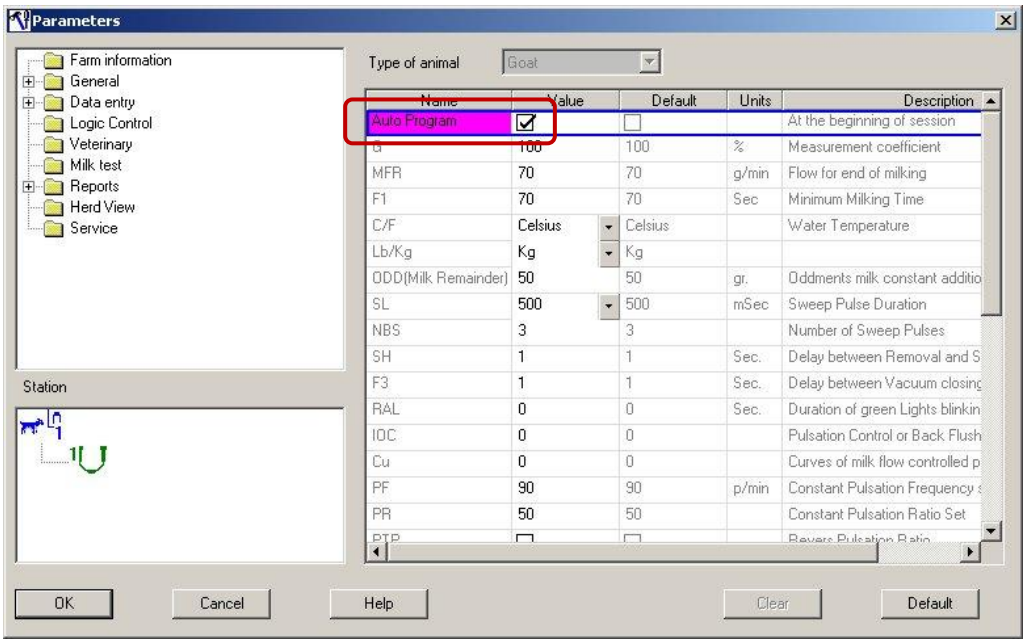


Figure 40: The Auto Program Check Box

4. Select the Auto Program check box (Figure 40).
5. Click **OK** to accept the changes.

   The Password dialog box appears.

6. In the Password dialog box, type **afi** and click **OK** to confirm the changes.

Calculating and Setting the *G* Parameter

An *AfiFree 155i* milk meter provides an indication of volume of milk produced from the associated stall. However, variations in placement of the milking and vacuum lines and other factors in the parlor may cause a difference between the volume recorded by the *AfiFree 155i* milk meter and the actual volume produced. To compensate for this difference *AfiFree 155i* uses the *G* parameter.

There are two ways of calculating and setting the *G* parameter:

- For each milk meter individually—see *Calculating and Setting G for an Individual Milk Meter* (below)
- For all milk meters together—see *Calculating and Setting G for All Milk Meters* (below)

Calculating and Setting *G* for an Individual Milk Meter

1. Weight the milk from the milk meter (= the Actual Amount).
2. Calculate G for the milk meter as follows:

$$\frac{\text{Actual Amount}}{\text{Amount recorded by } \textit{AfiFree155i}} \times 100 = \textbf{“G”} \text{ value}$$

3. Set the *G* parameter for the milk meter.

Calculating and Setting *G* for All Milk Meters

1. Weigh all the milk from all the milk meters in one milking session (= the Actual Amount).
2. Calculate G for the milk meter as follows:

$$\frac{\text{Actual Amount}}{\text{Amount recorded by } \textit{AfiFree155i}} \times 100 = \textbf{“G”} \text{ value}$$

3. Set the *G* parameter for all milk meters as explained in Setting Parameter Values for all *AfiFree 155i* Milk Meters, page 81.

Setting Parameter Values for all *AfiFree 155i* Milk Meters

There are two steps to setting the parameter values for all *AfiFree 155i* milk meters:

- Entering a Parameter Value in AfiSheep/AfiGoat (below)
- Uploading Parameter Values from AfiSheep/AfiGoat to All the Milk Meters (page 82)

Entering a Parameter Value in AfiSheep/AfiGoat

1. If *AfiSheep/AfiGoat* is not running, start it.
2. In the *AfiSheep/AfiGoat* main window, select **Tools**>**Parameters**.

The Parameters window appears.

3. Click under Station.

   The *AfiFree 155i* parameters appear in the right hand pane (see Figure 41).

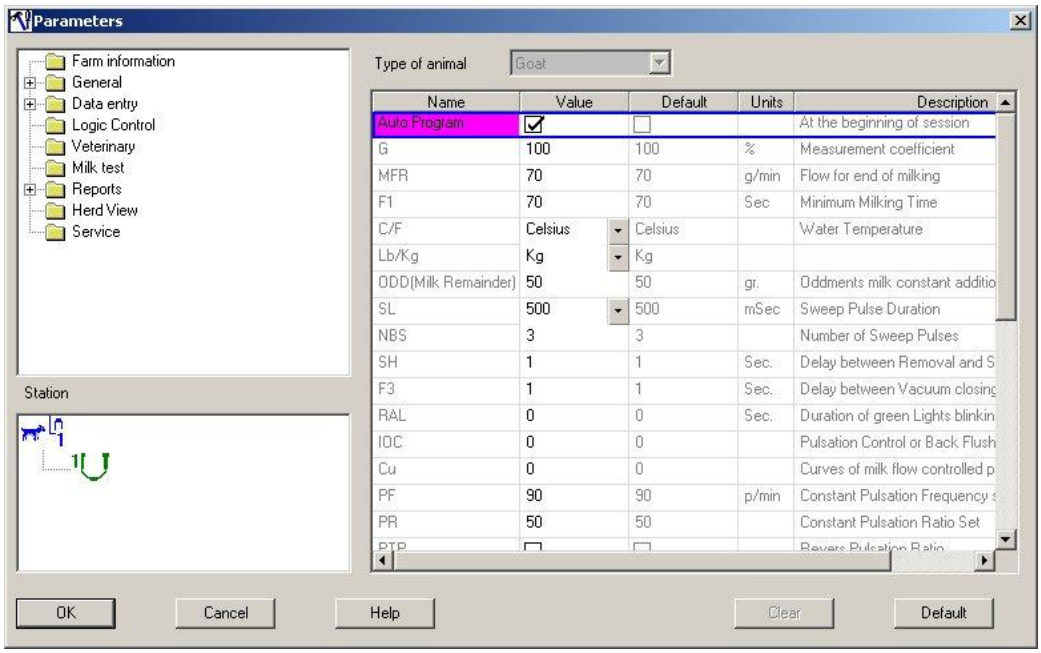


Figure 41: *AfiSheep/AfiGoat* Parameters Screen

The initial values assigned to each parameter are the default values.

4. Modify parameter values as follows:
   - Integers (e.g. 8)—click the field and type the new value.
   - Unit type (e.g. Kg)—click in the Parameter Value box to open the Unit Type menu, and select a new value.
5. Click **OK** to accept the changes.

   The Password dialog box appears.
6. In the Password dialog box, type **afi** and click **OK** to confirm the changes.

Uploading Parameter Values from AfiSheep/AfiGoat to All the Milk Meters

There are two types of parameter value upload from *AfiSheep/AfiGoat* to the milk meters:

- Updating all parameter values **except** the *G* parameter value (below)
- Updating all parameter values **including** the *G* parameter value (below)

To update all parameter values <u>except</u> the *G* parameter value on all *AfiFree 155i* milk meters:

In the Parameters window, make sure the Auto Program check box is selected (Figure 40)

When communication is established with the milk meters, *AfiMen* compares the parameter values in each milk meter with those set in *AfiSheep/AfiGoat* (except for the G parameter). If any milk meter has a parameter with a value different from the value in *AfiSheep/AfiGoat*, *AfiMen* overwrites the value in the milk meter with the value in *AfiSheep/AfiGoat* (except for parameter G).

To update all parameter values <u>including</u> the G parameter value on all *AfiFree 155i* milk meters:

1. Open *AfiMen*.

   The AfiMen Real Time window appears (Figure 33)

2. In the AfiMen Real Time window, select Test.

3. Click Milk Meter.

   The Password dialog box appears.

4. In the Password dialog box Type **afi,** and click **OK**.

   The communication icons flash red for a few moments and return to blue when the parameter values have been updated.

   The *AfiFree 155i* milk meter enters Test mode, and the Terminal 155i displays the following indications several times (for about 10–60 seconds):

   - Terminal 155i software version (for example, 2.05)
   - Parlor configuration (for example, CF01)
   - Table version (for example, tbCo)
   - PuPd (Parameter Update)

5. To return to normal operation mode, click Auto.

Chapter 5 Troubleshooting

This chapter contains the following:

- Guidance on searching for the source of an electrical problem (below)
- Troubleshooting Guide(below)

For the meaning of lit or flashing LEDs on a Terminal 155i, see Table 25: Operating Modes and their Indicators (page 97) and Table 28: Alarm and Malfunction Indicators (page 117).

Searching for an Electrical Problem

To search for electrical problems, proceed as follows until the problem is resolved:

1. Check all connections in the connection box:
   a. Verify that wire colors match the wiring diagram in the lid of the Connection Box.
   b. Check for poor contacts.
2. Replace the Terminal 155i.
3. Replace the *AfiFree Body*.

Table 21: Troubleshooting Guide

Indication	Probable cause	Possible solutions
Display panel is not illuminated	Faulty connection of power supply (24 V) cable to the control unit	Check the power connection
	Insufficient power supply	Verify that the last *AfiFree155i* milk meter on each side is being supplied with 24V± 3.6V
Terminal 155i does not display identification of animals	Identification or antenna problem	Consult manual for identification system: • *AfiPass64 Installation Manual* (P/N 9040610) • *IDeal Installation Manual* (P/N 4022900)
Milk flowing but no weight shown or only partial weight shown	Electrodes dirty or coated in milk lime	Perform acid wash with 1.5-2% concentration
	Defective *AfiFree155* body or Terminal 155i	Replace defective unit
Milk flow stopped but *AfiFree155i* **continues to measure and does not remove the cluster**	There are foreign particles inside the body	Make sure there are no foreign particles inside the body

Table 21: Troubleshooting Guide

Indication	Probable cause	Possible solutions
***AfiFree155i* measures very large milk quantity**	Diaphragm Stuck	Vacuum leak—check other units: • If other units are OK, then check local vacuum line connections to *AfiFree155* body • If other units have similar problems then check for problems in main vacuum line
	Defective diaphragm	Check diaphragm and replace if necessary
Milk Overflowing *AfiFree Body*	Diaphragm Stuck	Vacuum leak—check other units: • If other units are OK, then check local vacuum line connection to *AfiFree Body* • If other units have similar problems then check for problems in main vacuum line
	Defective diaphragm	Check diaphragm and replace if necessary
Over-weighing The amount displayed is **more** than the actual amount of milk.	*AfiFree Body* is not level	Level the *AfiFree Body* as described in *Mounting and Wiring the AfiFree Body*, page 34
	Condition of basic milking equipment	Check the air bleed nozzle in the cluster Check the liners
	Blocked air bleeder of the *AfiFree Body*	Unblock the air bleeder
	Electrodes dirty or coated in milk lime	Perform acid wash using 1.5-2% acid solution
	The G parameter is inaccurate.	Change the G parameter to the correct value.

Table 21: Troubleshooting Guide

Indication	Probable cause	Possible solutions
Under-weighing The amount displayed is **less** than the actual amount of milk.	*AfiFree Body* is not level	Level the *AfiFree Body* as described in *Mounting and Wiring the AfiFree Body*, page 34
	Leak in the *AfiFree Body* resulting in penetration of air into the system	• Check that the cover is on securely • Check for leak in lid gasket • Check for leak in wash diaphragm • Check for penetration of air into the cluster • Check for malfunction of vacuum shut off valve • Check for cracks and wear on the lining • Check that cluster gaskets are securely in place
	Blocked air bleeder of the *AfiFree Body*	Unblock the air bleeder
	The G parameter is inaccurate	Change the G parameter to the correct value.
Alternating large weighing deviations (Alternating over-weighing and under-weighing)	The elbow joint between the body outlet and the milk line has a negative slope.	Correct the slope as necessary
	Diaphragm sometimes does not open properly	• Check that during milking, diaphragm is open • Check that diaphragm is not amortized • Check that *AfiFree Body* cleaning valve is OK • Check that there is no vacuum leakage in diaphragm's pipe
	Fluctuating vacuum supply.	Check vacuum pump
	Electrodes dirty or coated in milk lime	Perform acid wash using 1.5-2% acid solution
***AfiFree155i* milk meter not responding to external start button**	Defective connection	Check that the external start button cable is correctly connected to the connection box

Chapter 6 Corrective Maintenance

This chapter contains the following sections:

Maintenance Policy

Upgrades and changes to the software should be carried out by SAE Afikim trained technicians only.

Silicone and Rubber Component Replacement

Replace the following components once a year:

- Rubber gasket for lid of *AfiFree body*—for part number, see *AfiFree Body—Replacement Parts List*, page 95
- Washing valve rubber diaphragm (on *AfiFree body*)— for part number, see *AfiFree* Body—Replacement Parts List, page 95
- Milk Pipe Section between shut-off valve and *AfiFree body* (P/N 5235590)

Replacing *AfiFree155i* Bodies

There are two steps to replacing an *AfiFree body*:

1. Removing a Malfunctioning *AfiFree* body (below)
2. Installing a Replacement AfiFree body (page 90)

Removing a Malfunctioning *AfiFree body*

1. Disconnect the *AfiFree body* pig-tail from the *AfiFree body* connection cable.
2. Separate the hose from the milk outlet.
3. Separate the hose from the washing valve cover.
4. Separate the hose from the milk inlet on the lid.
5. Rotate the *AfiFree body* bracket locks to the open position (Figure 16, page 37) and remove the *AfiFree body* from the bracket.

Installing a Replacement *AfiFree body*

1. Mount the new *AfiFree body* as in *Mounting the AfiFree Body* (page 37).
2. Connect the hoses to the new *AfiFree body*.
3. Connect the pig-tail of the new AfiFree body to the AfiFree body connection cable.

Replacing a Terminal 155i

CAUTION	When replacing several Terminal 155i's, always start with the malfunctioning unit that has the lowest identification number. Make sure that its replacement is fully functioning before you replace the malfunctioning Terminal 155i that has the next lowest identification number.

There are three steps to replacing a Terminal 155i:

1. Preparing the Computer (below). This step prepares the computer to:
   - Assign the original identification number to the new *AfiFree155i* unit
   - Download the software (including parameter values)
2. Removing a Malfunctioning Terminal 155i (page 91)
3. Installing a Replacement Terminal 155i (page 91)

Preparing the Computer

1. In *AfiSheep* or *AfiGoat*, make sure that Auto Program is enabled.
2. Choose from:

Is *AfiMen* running?	Do this:
Yes	On the taskbar double-click 
No	Open *AfiMen*

3. Verify that the parlor is active (*AfiMen* program is in a time track) and the milking icon 

is displayed.

   The *AfiMen* program is active during the designated milking times. If it is not active, select the Track tab and click **Start** or **Continue** and then **OK**.

4. Click 

.

   The Milk Parameters dialog box appears.

5. Verify that *AfiMen* is in **Auto** mode.
6. Make sure the following parameters are enabled:

- *Automatic address definition*
- *Automatic Load Software*
- *Automatic Load Tables*

A parameter is enabled when its value is 1.

7. To accept the settings, press **OK**.

Removing a Malfunctioning Terminal 155i

1. Unplug the Terminal 155i cable from the Terminal 155i.
2. Push the Terminal 155i up, until the top clip is above the bracket.
3. Using two hands, pull the Terminal 155i towards you, freeing it from the bracket.

Installing a Replacement Terminal 155i

1. Mount the replacement Terminal 155i on the Terminal 155i bracket, as described in Mounting the Terminal 155i (page 41).
2. Plug the Terminal 155i cable into the replacement Terminal 155i.

Checking and Preventive Maintenance

The checks listed below should be made from time to time, and especially before the national cattle breeders association performs the annual weighing procedure. The checks are divided into pre-milking checks (below) and post-milking checks (page 92).

Pre-Milking Checks

1. Terminal 155i—check for faults.
2. *AfiFree155i* bodies—do the following:
   - Check for defects
   - Check proper assembly to the parlor frame.
   - Re-tighten all fasteners.
   - Check that *AfiFree155i* bodies are properly leveled.
   - Make sure there is no fat or milkstone residue inside bodies.
   - Make sure there are no foreign particles inside bodies.
3. Air bleeder on the *AfiFree155i* bodies' covers—make sure there is no blockage.
4. Washing valve diaphragm (on *AfiFree155 body*)—do the following:
   - Check for defects and replace as necessary

- Check diaphragm is properly inserted into its seat.

5. Vacuum line to washing valve diaphragm of *AfiFree155 body* (including the line's branches)—check for defects.
6. Main vacuum valve—check for defects.
7. *AfiFree* Wash Controller—check for faults.
8. Clusters, liners, and shut-off valves or diaphragms—check for defects and replace as necessary.
9. Pulsators—check for defects and replace as necessary.
10. Vacuum level—do the following:
    - Check that the vacuum level is correct, using the parlor gauges and a reference gauge (a gauge brought from outside the parlor).
    - Make sure that the vacuum pumps have sufficient reserve for the number of stalls.
11. Electricity supply and transformer—make sure they are functioning correctly.
12. *AfiSheep/AfiGoat*—check for communication malfunctions.

Post-Milking Checks

1. When the wash diaphragm is in the closed position, check that *AfiFree155* bodies are filled with rinse water.
2. Check for correct water temperatures.
3. Check for proper acid (stone-remover) procedure and operation.
4. When the wash cycle finishes, check that the cleaning water is completely drained.

Chapter 7 Parts Lists

This chapter contains the following parts lists:

- Vacuum Shut-Off Valve Installation—Replacement Parts List (below)
- *AfiFree* Body—Replacement Parts List (page 95)
- Terminal 155i—Replacement Parts List (page 96)

Vacuum Shut-Off Valve Installation—Replacement Parts List

The *AfiFree155i* milk meter controls a valve that shuts off vacuum to the cluster. When an animal has finished milking, this valve is closed and vacuum to the teat chamber of the cluster is shut off. Then the cluster is removed.

Figure 42 shows the replacement parts for mounting the vacuum shut-off valve. Table 22 lists the part names and part numbers.

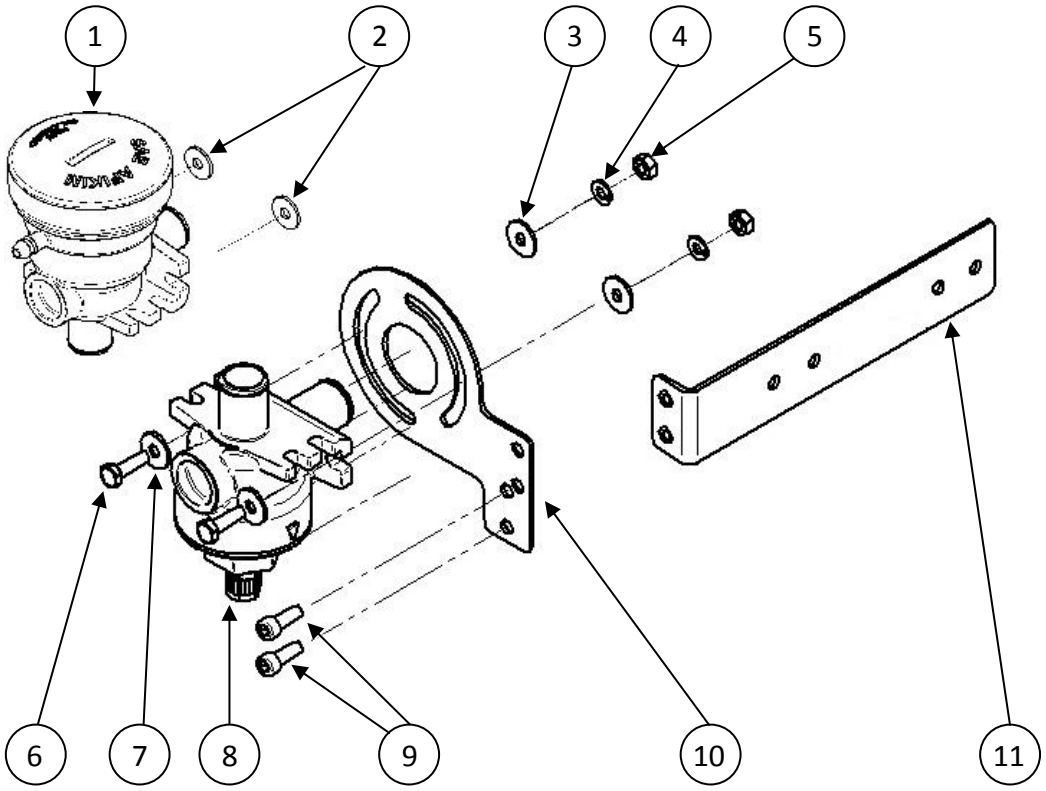


Figure 42: Parts for Attaching Vacuum Shut-Off Valve

Table 22: Shut-Off Valve Installation—Replacement Parts List

No. in Figure 42	Part Name	Details	P/N
1	Typical Vacuum NO Operated Shut-off Valve		
2	Washer M6 DIN 9021 A2		9020769
3	Washer M6 DIN 9021 A2		9020769
4	Spring Lock M6 washer DIN 127-A2 M6		9020684
5	Nut M6 DIN 934 A2		9020683
6	Hexagon Head Bolt M6 x 20 DIN 933 A2		9020641
7	Washer M6 DIN 9021 A2		9020769
8	Typical Air/Vacuum NC Shut-off Valve		
9	Hexagon socket head cap screw DIN 912 A2 M6 x 16		9020700
10	Generic Shut-off Valve Holder		4033532
11	Generic Shut-off Valve Bracket		4033533
Not shown	Milk Pipe Section 17 x 26	Connects between shut-off valve and *AfiFree body*	5235590

AfiFree Body—Replacement Parts List

Figure 43 shows the replacement parts of the *AfiFree body*. Table 23 lists the part names and part numbers.

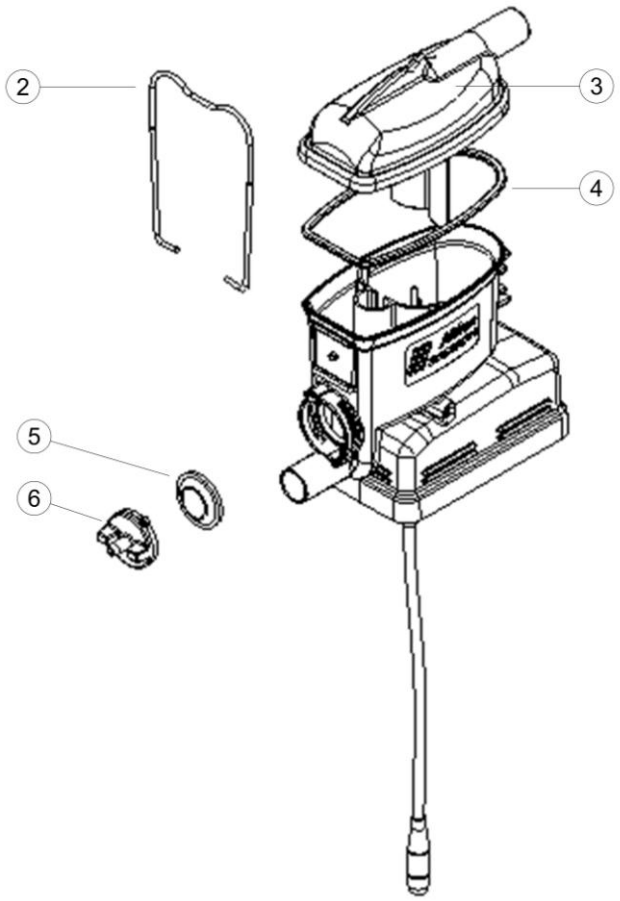


Figure 43: *AfiFree body* Exploded View

Table 23: *AfiFree body* Replacement Parts List

No. in Figure 43	Part Name	P/N	Qty
—	Complete *AfiFree155 body*	4299120	1
2	*AfiFree* body retaining clasp	4099041	1
3	*AfiFree* body lid	4099037	1
4	Rubber gasket for *AfiFree* body lid	4099095	1
5	Washing valve rubber diaphragm	4099071	1
6	Bayonet washing valve cover	4099020	1

Terminal 155i—Replacement Parts List

Table 24 lists the replacement parts for Terminal 155i.

Table 24: Terminal 155i Replacement Parts List

Part	Catalog No.
Terminal 155i	4097335
Terminal 155i bracket	4097343
Terminal 155i cable	4000400

Appendix A User Information and Instructions

This appendix contains the following sections:

Terminal 155i Modes and Settings

This section deals with modes and settings of the Terminal 155i, as follows:

Operating Modes

(See footnotes to tables regarding configurations under AfiSheep/ AfiGoat or standalone.)

Operating Mode Indicators

Table 25 shows *AfiFree155i*'s operating mode definitions on Terminal 155i.

Mode		**Milking**		**Removal**		**Cleaning**
Sub-Mode		Normal	Message*	Normal	Message*	Normal
Start/Stop button		Active	Active	Active	Active	Active
Cancel ACR button		Active	Active	Active	Active	Blocked
Cleaning button		Blocked	Blocked	Active	Active	Active
Service buttons		Blocked	Active	Blocked	Active	Blocked
Outputs	Vacuum	OFF	OFF	ON	ON	OFF
	Remover	OFF	OFF	ON	ON	OFF
	Pulsation1	Rated	Rated	OFF	OFF	OFF
	Pulsation 2	Rated	Rated	OFF	OFF	OFF

Table 25: Operating Modes and their Indicators

* PC button and Message Sub-Mode are available in configuration with AfiSheep/ AfiGoat only.

Changing Operating Mode

Table 26 shows how to change the operating mode of the Terminal 155i.

Table 26: Changing Operating Mode

Present Mode	Action	New Mode
Terminal is OFF	Power ON	Cleaning Mode
Cleaning Mode	Cleaning button pushing	Removal Mode
Cleaning Mode	Start/Stop button pushing	Removal Mode
Removal Mode	Start/Stop button pushing	Milking Mode
Removal Mode	Cleaning button pushing	Cleaning Mode
Removal Mode	PC button pushing*	Message Sub-Mode in Removal Mode*
Milking Mode	Start/Stop button pushing	Removal Mode
Milking Mode	PC button pushing*	Message Sub-Mode in Milking Mode*
Message Sub-Mode in Removal Mode*	PC button pushing*	Removal Mode
Message Sub-Mode in Removal Mode*	Enter button pushing	Removal Mode
Message Sub-Mode in Milking Mode*	PC button pushing*	Milking Mode
Message Sub-Mode in Milking Mode*	Enter button pushing	Milking Mode

* PC button and Message Sub-Mode are available in configuration with AfiSheep/ AfiGoat only.

Terminal 155i Settings

This section deals with various Terminal 155i settings.

Changing a Stall Number

Specifying a stall number is a procedure required when working under AfiSheep/ AfiGoat. It is also available for standalone configuration.

1. On the Terminal 155i, press the Edit/ Message mode button  .

   The message sub-mode is activated.

2. Press the Stall number button  .

   The Stall number field blinks with hyphens  .

3. Type the new stall number.

4. Press the Enter button  .

Viewing and changing the Animal Type

Use this procedure under standalone configuration. (Under AfiSheep/ AfiGoat, the animal type is set from within the flock management system.)

1. While holding down the Animal ID button  , press **0**.

   The Animal ID field displays the current animal type, according to the following key:

   - **CO** — cow
   - **SHEEP** — sheep
   - **GOAt** — goat
   - **BUFF** — buffalo
   - **WTEST** — salt water test mode

2. To change the value, do the following:

   a. Press the Edit/ Message mode button  .

   b. Scroll among the options by pressing  or  .

3. Perform the appropriate action of the following:

   - To confirm a changed value, press the Enter button  .
   - To keep the current value, press the Cancel button  .

Terminal 155i User Procedures

This section contains the following sub-sections:

Cancelling ACR

(either under AfiSheep/ AfiGoat or in a standalone configuration)

Use this procedure to cancel or to restore ACR (automatic cluster removal).

- To cancel ACR (automatic cluster removal) for a stall, press  for less than two seconds.

  When ACR is cancelled, the LED to the right of the button that you pressed is lit.

- To turn ACR on after it has been cancelled for a stall, press  .

  When ACR is on, the LED to the right of the button that you pressed is lit.

Displaying/Hiding Animal Identification Number

- To display the animal identification number of the animal last identified in the stall, press  for more than two seconds.
- To hide the animal identification number after it has been displayed, press  .

Message Sub-Mode Procedures

(All of the procedures in this section are relevant under AfiSheep/ AfiGoat only.)

You activate the message sub-mode by pressing the Terminal 155i Edit/ message mode button  . This button-press is the first step of the procedures in this section. Successful conclusion of these procedures updates AfiSheep/ AfiGoat.

Changing Displayed Animal ID

Use this procedure in the following cases:

- Animal ID not detected
- Animal ID not correctly detected

1. On the Terminal 155i, press the Edit/ Message mode button  .

   The message sub-mode is activated.

2. Press the Animal ID button  .

   The Animal ID field blinks with hyphens .

3. Type the Animal ID Number, using the alphanumeric keys.

4. Press the Enter button  .

   While the data is being processed, the data updating icon flashes. Following successful processing, the changed animal ID is displayed without blinking.

Tips for Entering Alphanumeric Characters

This explains how to enter alphanumeric characters using the Terminal 155i keys.

Key pressed	4	3	6	2
Animal ID field				

To enter an alphabetic letter, press the appropriate key for at least two seconds. At this point, the numeric and alphabetic values scroll at intervals of one second. Release the key when the character that you need is displayed.

2 or A or B or C example

Key pressed	2				
Time pressed	First 2 seconds	Next 1 second	Next 1 second	Next 1 second	Next 1 second
Animal ID field					

The only valid position for an alphabetical character is the first (left-most) position. The best way for typing of number with the letter is to key in a letter first and just after that to type a numerous part of ID.

Six-digit alphanumeric example

This example illustrates entering animal ID B4362. This example is relevant for an animal ID consisting of six digits or less, with the option of an alphabetical character. Note that any such alphabetical character is always displayed as the first character.

Key pressed	2 (scroll until **B**)	4	3	6	2
Animal ID field					

Animal IDs longer than six digits

The Terminal 155i LCD displays no more than six digits of an animal ID. If there are no alphabetical characters, the last six characters are displayed. For example, an animal ID of 79843625 is displayed as:

If a long animal ID includes a letter, the letter is displayed as the first character, followed by the last 5 digits of the ID.

For example, an animal ID of W79843625 is presented as:

Changing an animal's group assignment

Use this procedure for changing an animal's group number.

1. On the Terminal 155i, press the Edit/ Message mode button  .

   The message sub-mode is activated.

2. Press the group button  .

   The group field blinks with hyphens  .

3. Type the group number, using the alphanumeric keys.

4. Press the Enter button  .

   While the data is being processed, the data updating icon flashes. Following successful processing, the changed group number is displayed without blinking.

Managing Health, DIM, Activity, and Days from Insemination Parameters

Use this message for changing, entering or canceling one or more of the following parameters:

- Health code
- Days-in-milk (DIM)
- Activity/ Days from insemination

1. On the Terminal 155i, press the Edit/ Message mode button  .

   The message sub-mode is activated.

2. Do the following for each parameter that you need to modify:

   a. Press the health code button  .

      The health code field blinks with hyphens  .

   b. If you need to display a different parameter, while holding down the Function button  , press the health code button  to toggle among the Health Code, Days in milk, and Activity/ Days from insemination fields.

      A second code is displayed on the Peak flow field, and a third code is displayed on the Momentary flow field.

   c. Do the appropriate of the following:

      ◊ To enter or change a code, use the alphanumeric keys to type the code.

      ◊ To cancel an existing code, do not type anything.

3. Press the Enter button  .

   While the data is being processed, the data updating icon flashes. Following successful processing, the changed health code is displayed without blinking.

Managing the Infected Half Code

Use this procedure for changing, entering, or canceling the the code for an infected half udder.

1. On the Terminal 155i, press the Edit/ Message mode button  .

   The message sub-mode is activated.

2. Do one or more of the following:

   - To mark the left half as infected, press **1**.
   - To mark the right half as infected, press **3**.
   - To clear infected-half marking, press the Cancel button  .

3. Press the Enter button  .

While the data is being processed, the data updating icon flashes. Following successful processing, the message mode is deactivated.

Terminal 155i Display Fields

Display Fields under AfiSheep/ AfiGoat

Display fields under AfiSheep/ AfiGoat connection

1. Milk Yield field

Mode	Milk Yield field displaying		Example
Cleaning	The Temperature inside of Milk Meter Body	Celsius	
		Fahrenheit	
Removal	Hyphen (before first milking or after reset)		
	Final milk yield (at end of previous milking before reset)		
Milking	On-Line Milk Yield updated every 100mSec(?)		

2. Animal ID field

Mode	Description	Example
Cleaning	OFF	
Removal	Animal ID number (after identification)	
	OFF (before first milking or after reset)	
Milking	Animal ID number	

3. Last Highest Conductivity

Mode	Description	Example
Cleaning	OFF if no fluid in a milk meter	
	The Current Conductivity of the cleaning fluid in AfiFree conductivity units (updated every 3 sec end calculated by average conductivity of last 3 sec)	
Removal	OFF (before first milking or after reset)	
	The Maximum Conductivity of the milk at last milking in AfiFree conductivity units	
Milking	The Maximum Conductivity of the milk at current milking in AfiFree conductivity units	

4. Expected conductivity field

Mode	Description	Example
Cleaning	OFF	
Removal	Predicted conductivity (after identification)	
	OFF (when no identification)	
Milking	Predicted conductivity (after identification)	

5. Expected Milk Yield field

Mode	Description	Example
Cleaning	OFF	
Removal	Predicted yield (after identification)	
	OFF (when no identification)	
Milking	Predicted yield (after identification)	

6. Days in Milk field

Mode	Description	Example
Cleaning	OFF	
Removal	Days in milk (after identification)	
	OFF (when no identification)	
Milking	Days in milk (after identification)	

7. Days from insemination field

Mode	Description	Example
Cleaning	OFF	

Mode	Description		Example
Removal	after identification	Days from insemination (after identification)	
	when no identification	OFF (when no identification)	
Milking	after identification	Days from insemination (after identification)	

8. Momentary Flow field

Mode	Description	Example
Cleaning	OFF	
Removal	OFF	
Milking	Current milk flow	

9. Peak Flow field

Mode	Description	Example
Cleaning	OFF	
Removal	OFF (before first milking or after reset)	
	Last milk flow peak (at end of previous milking before reset)	
Milking	Last milk flow peak	

10. Milking Time Clock field

Mode	Description	Example
Cleaning	OFF	
Removal	OFF (before first milking or after reset)	
	Last milking duration (at end of previous milking before reset)	
Milking	Time from start of current milking (**min:sec**)	

*When milking time reaches 20 min the counting restarts from 0:00 and the first character blinks.

11. Pulsation field

Mode	Description		Example
	Pulsation Output 1	**Pulsation Output 2**	
Removal	OFF	OFF	
Cleaning **Milking**	ON	OFF	
	OFF	ON	
	ON	ON	

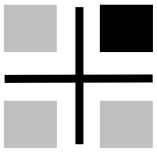
12. Stall number field

Mode	Description	Example
Cleaning **Removal** **Milking**	Stall number	

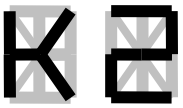
13. Group field

Mode	Description	Example
Cleaning	OFF	
Removal	Group number (after identification)	
	OFF (when no identification)	
Milking	Group number (after identification)	

14. Infected-Half icon field

Mode	Description		Example
Cleaning	OFF		
Removal Milking	After identification	OFF (if no infected half)	
		When left half infected	
		When right half infected	
	When no identification	OFF	

15. Health code field

Mode	Description	Example
Cleaning	OFF	
Removal Milking	Health code (after identification)	
	OFF (when no identification)	

If an animal has two health codes, the second code is displayed on the "Peak flow" field.

If an animal has three health codes, the third code is displayed on the "Momentary flow" field.

In both those cases the icon of flow fields and flow bar are deactivated.

16. Icon PC

Mode	Description	Example
Message sub-mode OFF	OFF	
Message sub-mode ON	ON	

17. Data Updating Icon

Mode	Description	Example
Message Closed	Sending the last message to AfiSheep/ AfiGoat and Updating Data on Display fields	

Display Fields under Standalone Configuration

1. Milk Yield field

Mode	Milk Yield field display		Example
Cleaning	The Temperature inside of Milk Meter Body	Celsius	
		Fahrenheit	
Removal	Hyphen (before first milking or after reset)		
	Final milk yield (at end of previous milking before reset)		
Milking	On-Line Milk Yield updated every 100 mSec		

2. Animal ID field

Mode	Description	Example
Cleaning **Removal** **Milking**	OFF	

3. Last Highest Conductivity

Mode	Description	Example
Cleaning	OFF if no fluid in a milk meter	
	The Current Conductivity of the cleaning fluid in AfiFree conductivity units (updated every 3 sec end calculated by average conductivity of last 3 sec)	
Removal	OFF (before first milking or after reset)	
	The Maximum Conductivity of the milk at last milking in AfiFree conductivity units	

Mode	Description	Example
Milking	The Maximum Conductivity of the milk at current milking in AfiFree conductivity units	

4. Predicted conductivity field

Mode	Description	Example
Cleaning **Removal** **Milking**	OFF	

5. Predicted yield field

Mode	Description	Example
Cleaning **Removal** **Milking**	OFF	

6. Days from insemination field

Mode	Description	Example
Cleaning **Removal** **Milking**	OFF	

7. Activity field

Mode	Description	Example
Cleaning **Removal** **Milking**	OFF	

8. Current milk flow rate field

Mode	Description	Example
Cleaning	OFF	
Removal	OFF	
Milking	Current milk flow	

9. Peak milk flow rate field

Mode	Description	Example
Cleaning	OFF	
Removal	OFF (before first milking or after reset)	
	Last milk flow peak (at end of previous milking before reset)	
Milking	Last milk flow peak	

10. Milking time field

Mode	Description	Example
Cleaning	OFF	
Removal	OFF (before first milking or after reset)	
	Last milking duration (at end of previous milking before reset)	
Milking	Time from start of current milking (**min:sec**)	

11. Pulsation field

Mode	Description		Example
	Pulsation Output 1	Pulsation Output 2	
Cleaning Removal Milking	OFF	OFF	
	ON	OFF	
	OFF	ON	
	ON	ON	

12. Stall number field

Mode	Description	Example
Cleaning, Removal, Milking	Stall number	

13. Group field

Mode	Description	Example
Cleaning, Removal, Milking	OFF	

14. Infected Half field

Mode	Description	Example
Cleaning, Removal, Milking	OFF	

15. Health code field

Mode	Description	Example
Cleaning, Removal, Milking	OFF	

16. Icon PC

Mode	Description	Example
Message sub-mode OFF	OFF	

17. Data Updating Icon

Mode	Description	Example
---	OFF	

Enabling and Disabling Display Fields

(either under AfiSheep/ AfiGoat or in a standalone configuration)

Key Combination	Display Result
Press simultaneously "Cancel" and "F"	To disable/enable LCD backlight
Press simultaneously "Cancel" and "1"	To disable/enable "Milking Time Clock" field
Press simultaneously "Cancel" and "2"	To disable/enable "Stall Number" field
Press simultaneously "Cancel" and "3"	To disable/enable "Animal ID" field
Press simultaneously "Cancel" and "4"	To disable/enable "Group" field
Press simultaneously "Cancel" and "5"	To disable/enable "Peak Flow", "Current Flow" and "Flow bar" fields
Press simultaneously "Cancel" and "6"	To disable/enable " Health code" field
Press simultaneously "Cancel" and "7"	To disable/enable "Expected Milk Yield" field
Press simultaneously "Cancel" and "8"	To disable/enable "Days in Milk" and "Activity" fields
Press simultaneously "Cancel" and "9"	To disable/enable "Last Highest Conductivity" and "Expected conductivity" fields

Table 27: Display field enablement and disablement

Under AfiSheep/ AfiGoat, you can also disable or enable any of the above display fields for all of the attached Terminal 155i's. You do this by choosing the ON or OFF option in the appropriate AfiSheep/ AfiGoat table.

Terminal 155i Alarms

Alarm and Malfunction Indicators

Terminal 155i indicates an alarm or malfunction by flashing or continuously lit LEDs (green and red).

When Terminal 155i's LEDs indicate an alarm, its display shows information about the alarm. Table 28 shows how to identify which alarm Terminal 155i is indicating.

Alarm name	Alarm description	Activation timing	Display	Red Lights blinking	Red lights continuous
High level Health code	The animal has a code defined in AfiSheep/ AfiGoat as a "High level health code ". **Special start required** **External start is blocked**	Before the milking	"Animal ID" field and "Health code" field are blinking	YES	NO
Medium level Health code	The animal has a code defined in AfiSheep/ AfiGoat as a "Medium level health code ". **Special start required**	Before the milking	"Animal ID" field and "Health code" field are blinking	YES	NO
Low level Health code	The animal has a code defined in AfiSheep/ AfiGoat as a "Low level health code".	Before the milking	"Animal ID" field and "Health code" field are blinking	YES	NO
High conductivity	The milk has conductivity high than alarm conductivity level defined by AfiSheep/ AfiGoat	During the milking	"Animal ID" field and "actual conductivity" field are blinking	YES	NO
Low Milk Yield	Removing conditions are fulfilled, but the milk yield is low than minimum level predicted by AfiSheep/ AfiGoat	After removing	"Animal ID" field and "predicted milk yield" field are blinking	YES	NO
Sick animal	High conductivity alarm and Low Milk Yield alarm simultaneously	After removing	"actual conductivity" field and "predicted milk yield" field are blinking	YES	NO
Dirty body	Three sequential animals have milk conductivity less than "6" AfiFree units	During the milking	"Stall number" field & "actual conductivity" field are blinking	NO	YES
Pulsation output fault	Pulsation output failed	Coincidental	"Stall number" field and "Pulsation" field are blinking with 	NO	YES
Vacuum Shutoff output fault	Vacuum Shutoff output failed	Coincidental	"Stall number" field is blinking and "Animal ID" field blinks with 	NO	YES

Alarm name	Alarm description	Activation timing	Display	Red Lights blinking	Red lights continuous
Cluster Remover output fault	Cluster Remover output failed	Coincidental	"Stall number" field is blinking and "Animal ID" field blinks with 	NO	YES
Diaphragm fault	Diaphragm not open	During the milking	"Stall number" field is blinking and "Animal ID" field blinks with 	NO	YES
No Milk Meter	The communication with milk meter is lost	Coincidental	"Stall number" field is blinking and "Animal ID" field blinks with 	NO	YES

Remark: To cancel any *visual or sound alarm, press simultaneously "Cancel" and "0"*.

Table 28: Alarm and Malfunction Indicators

Appendix B Milking System Cleaning Guidelines

This appendix provides guidelines and recommendations for cleaning the milking systems. It contains the following sections:

- Cleaning Recommendations (below)
- Performing an Acid Wash (page 120)

WARNING

- Always comply strictly with the instructions of the chemical manufacturers. Failure to comply with instructions can cause injury and damage to equipment.
- Use gloves and protective goggles when working with chemical detergents.
- Avoid mixing active detergents and acids in the same container.

CAUTION

- Butyl Glycol or Butyl Cellusolve detergent in excess of 10% concentration may damage plastic components of the system. SAE Afikim recommends cleaning fluids with a maximum concentration of 10% Butyl Glycol or Butyl Cellusolve.
- Follow all of the manufacturers' recommendations, including: concentrations, temperatures, and cleaning-cycle times. Excessive use of chemicals may damage the *AfiFree155 body*.
- Leaving detergent inside the *AfiFree155 body* may damage its components.
- Avoid contact of pesticide materials with the exterior of the *AfiFree155 body* and Terminal 155i.
- Clean the *AfiFree155 body* and Terminal 155i's exterior with a moist cloth, without detergent.

Cleaning Recommendations

Cleaning recommendations has the following parts:

- Chemical Dispensing Pumps (page 119)
- Vacuum Pump (page 119)
- Liquid Volume (page 119)
- Temperature and Cycle (page 119)
- Cleaning Exterior Surfaces (page 120)

NOTE To prevent deterioration in accuracy due to limestone residue on the electrodes of the *AfiFree155 body*, perform three acid wash cycles every week.

Chemical Dispensing Pumps

To achieve accurate detergent dispensing, we recommend using chemical dispensing pumps.

Vacuum Pump

- The vacuum pump must operate throughout the cleaning cycle. A temporary stop of the vacuum pump while the sink is being filled can cause milk and cleaning fluid to seep out between the lid and the *AfiFree155 body*.
- The clusters must be connected to the jetters.

Liquid Volume

During every stage of cleaning, there must be sufficient liquid to "flood" the milk chamber of the *AfiFree155i* bodies.

The amount of liquid required per milking point varies between 6–8 liters, according to:

- Parlor configuration
- Length and diameter of milk lines
- Volume of the receiving vessels

Factors requiring additional liquid for cleaning:

- Double size milk line is installed in the parlor
- Milk tank is far from the parlor

Temperature and Cycle

There are various cleaning systems and procedures in use in milking parlors. Nevertheless, the following rules must be followed for all the procedures and detergents in use.

Initial cleaning in an open circuit: All residual milk must be rinsed into a drain using lukewarm water. The temperature of the water should be approximately body temperature.

- Water too cold will cause the milk fats to solidify on the surfaces, and be difficult to remove.
- Water too hot will cause the milk fats to bake onto the surfaces, and be difficult to remove.

Cleaning with hot soapy water: circulate hot water with detergent in the system.

- Use a basic detergent additive (Ph=13)
- Entry water: minimum 70°C (158°F)
- Returning water: minimum 55°C (131°F)

The milking system must be warmed up by passing hot water through the system.

After warming up, the milking system must be brought into a closed circulation setup, detergent added, and the hot water and detergent circulated for 10-12 minutes.

After being circulated in the milking system, the hot water and detergent must be drained away.

Rinsing with cold water: the milking system must be rinsed with cold water in an open circuit to remove all traces of detergent.

Cleaning Exterior Surfaces

CAUTION	Detergents are destructive. Do not use any kind of detergent on the *AfiFree155* body.

Moisten a soft cloth with water and ***gently*** rub the surfaces of the *AfiFree155* bodies.

Performing an Acid Wash

Perform an acid wash three times a week, or more frequently when necessary. The acid wash does not replace the daily cleaning routine.

NOTE	• There are some cleaning solutions available that remove both milk residues and hard water salts. • Follow all of the manufacturers' recommendations, including: concentrations, temperatures, and cleaning-cycle times. Excessive use of chemicals may damage the *AfiFree155i* bodies.

To perform an acid wash (after performing a regular cleaning cycle with hot water and detergent):

1. Rinse the detergent solution out of the system with cold water.
2. Circulate hot water and phosphoric and/or sulfuric acid for 10–12 minutes and drain:
   - Entry liquid: 70°C [158°F], minimum
   - Returning liquid: 55°C [131°F], minimum
3. Rinse the system with cold water.