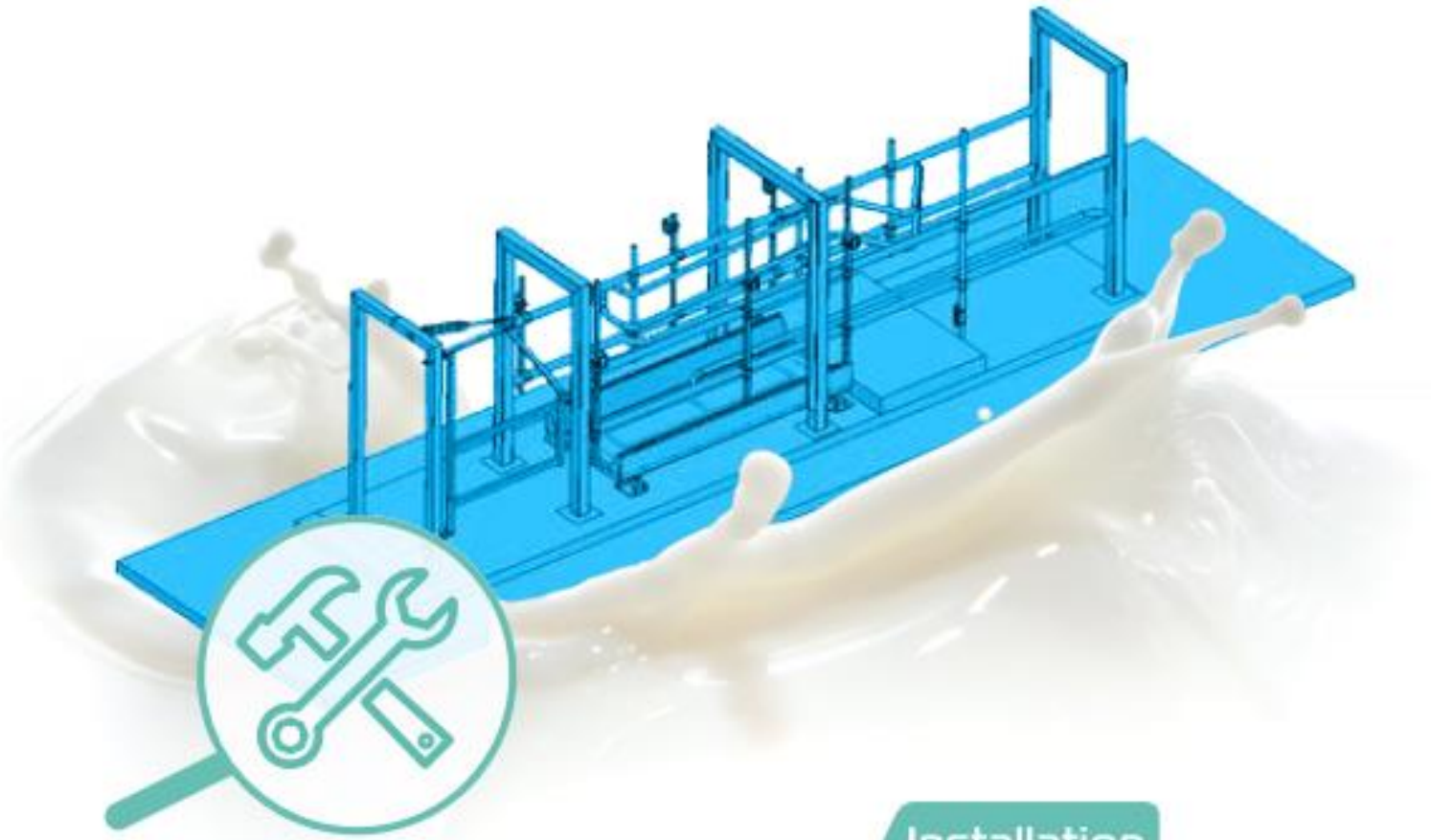

Installation

AfiWeigh™ & AfiSort™

Weighing and Sorting System Installation Manual

afimilk®
Vital know-how in every drop

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For the year 2008

To: S.A.E. - COMPUTERIZED DAIRY SYSTEMS

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Testifying to compliance of their management systems
to the highest standards of quality

Ziva Patir
Director General

This publication describes the state of this product at the time of its release, and may not reflect the product at all times in the future.

Software License Terms

The software and the system design are the property of *Afimilk*.

The software is supplied to the buyer to be used solely for its stated purposes. It is strictly forbidden to make copies of the software or transfer it in any manner, for any purpose, to a third party.

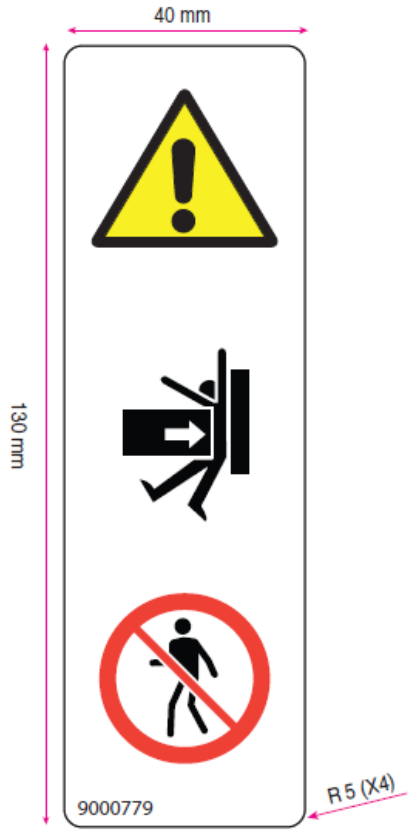
In addition to application software specifically developed by *Afimilk*, the system makes use of certain third party utilities and system software. These are licensed for a single user. They must not be copied in any manner, for any purpose, by the purchasers, their employees, or anyone else.

The license to use the software is granted to the user only for the specific system it is installed on by *Afimilk*, or its authorized distributors and representatives.

The purchaser shall not modify the software in any manner.

If the computer is supplied by *Afimilk*, it is strictly forbidden to install any software that is not supplied by *Afimilk*.

NOTE: Use the supplied hazard sticker (catalog number 9000779) at all entry points to the Weigh / Sort system to indicate possible hazards:



WARNING

- Installation, operation, and maintenance of this system ***must*** be done in accordance with all applicable codes, regulations, and safety measures. It is the responsibility of the customer to see that these activities are carried out accordingly.
- High voltage transients, surges, and other power irregularities can cause extensive damage. It is the user's responsibility to provide a power protection system.
- Use electrical equipment only in a manner specified by the manufacturer. Improper use impairs the protection provided by the equipment.
- Do not use the AfiMilk AfiWeigh & AfiSort System for any purpose other than those detailed in this manual.

DISCLAIMER

The contents of this manual may be revised to incorporate changes and improvements without prior notice and without obligation. Every effort has been made to ensure that the information is complete and accurate at the time of publication. Nevertheless, *Afimilk* cannot be held responsible for errors or omissions. Trademarks, patents, and copyrights apply.

Revision History

Ver	Date	ECO	Description	SME	Writer
6.1	Jun 2009	Release to production	Old manual rewritten for *AfiSort & AfiWeigh System*.	Yaron Kopilevsky	George Oshry
7.0	Oct 2009	ECO90026	Updates in electrical drawings, configuration, calibration, and a flow chart. Approved by Marketing Dept	Yaron Kopilevsky	David Williamson
8.0	Jan 2012	ECO110122	More specific tube descriptions and pressure specifications, gate connections, drawing appendix	Sid Larkin	David Williamson
9.0	Feb 2014	ECO130037	Add cow photocell; rename gate photocell; Electrical adjustments to support AfiFarm5; Remove electric cabinet and pneumatic box from the system fence		Eran S.
10.0	Nov 2014		Correct location between antenna & photocell - Figure 12, Figure 14; Added photocell control & LED indicators; Updated Hazard sticker		Ruth R.
10.1	Dec 2014		Change in open page		Hagai F.

Product P/N: 5001100 and family
Manual P/N: 9040144

Referenced Documents

P/N	Document Title
9040635	IDeal Installation Manual
9040150	AfiCom1 Installation Manual
	AfiFarm User Manual
9040148	AfiFarm Configuration Manual

Table of Contents

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Manual Overview

This document provides comprehensive instructions for installing and operating the Afimilk AfiWeigh and AfiSort systems. The Afimilk AfiWeigh/AfiSort systems are designed for weighing and sorting cows and heifers weighing over 200 kg (440 lbs). There are three Afimilk Sorting and Weighing System configurations:

- Sorting System

  AfiSort Walkover automatically controls exit gates that enables separating the cows leaving the milking parlor into predefined groups, such as those requiring individual or collective medical treatment, those designated for breeding, and so forth. The system supports three different exit schemes: straight and left; straight and right; straight, left, and right.

- Weighing System

  AfiWeigh is an automatic cow body weighing system. It weighs the cows without interfering with herd traffic to and from the milking parlor.

- Combined Weighing and Sorting System

  This system enables automatically sorting the cows directly after weighing them.

The combined system is shown in Figure 1.

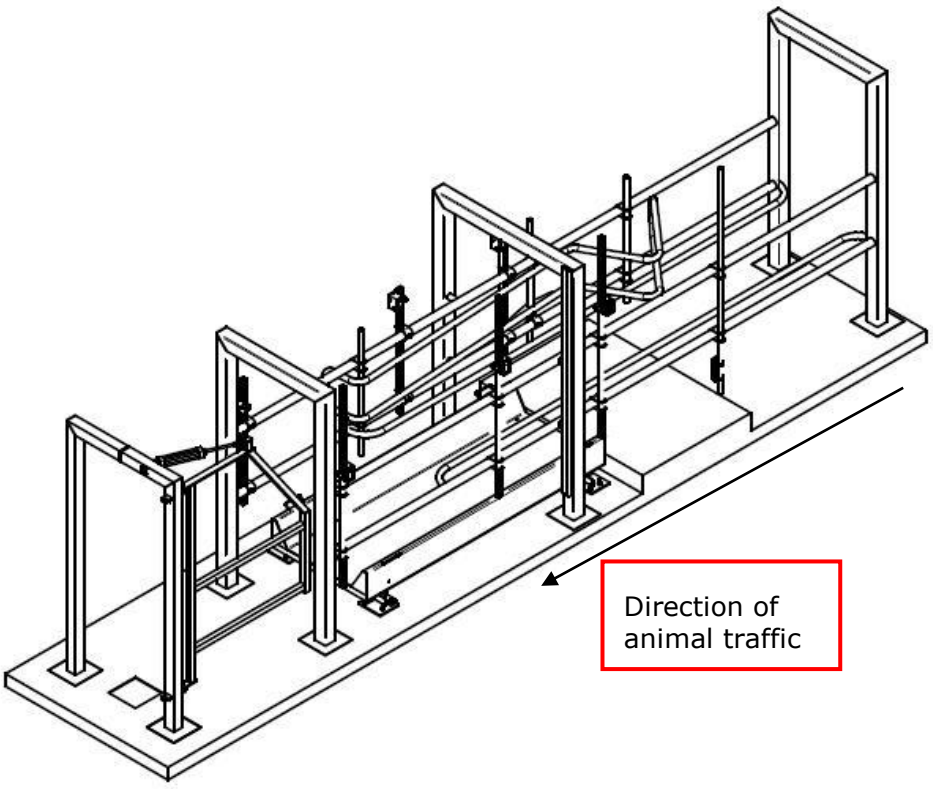


Figure 1: Combined AfiWeigh and AfiSort System

How this Manual Is Organized

The manual is arranged in four parts as follows:

Part	Title	Description and Scope
1	Installation Guide	Contains instructions for installing the Weigh and Sort stations, separately, and the combined Weigh and Sort station. The instructions cover both mechanical and electrical installation.
2	System Configuration	Contains instructions for configuring Weigh and Sort stations through the software.
3	Operation Guide	Contains the start up operation procedures, and daily operation sequence descriptions.
4	Troubleshooting	Contains troubleshooting procedures and separation solutions, and includes upgrade replacement procedures.

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 *AfiWeigh* body.

NOTE

Hints and recommendations for working efficiently.

For example, optimal cleaning techniques.

Safety

When installing the Afimilk system, the following safety rules apply and should be strictly adhered to.

1. The system components are very heavy and could cause injury if they fall. When installing, make sure there are enough people to help lift and secure each component. Ensure that any component left standing is firmly secured.
2. The system and its components are powered from the mains voltage. The power is high enough to cause personal injury or death. Ensure that the electricity is disconnected when assembling the electrical components.
3. Installation must follow the instructions in this document to ensure safe operation.
4. It is your responsibility to install, operate, and maintain the system in accordance with all applicable codes, regulations, and safety measures, and in accordance with the instructions contained in this document.

Part 1
Installation Guide

This part contains instructions for installing the AfiWeigh and AfiSort systems.

General Requirements

The following are the requirements and considerations that must be taken into account for installing the Afimilk Weighing and Sorting systems.

Site Prerequisites and Design for Cow Separation

Separation between cows is critical to the proper functioning of the system. Long, narrow entry paths, together with side rails, path-narrowing rails and cow separator slow cow traffic and help separate cows.

The following factors may prevent cow separation:

- ❑ Cow behavior
- ❑ Path length and positioning
- ❑ Milking method

For solutions, refer to Part 4 - Troubleshooting.

Therefore the following guidelines should be followed:

1. Before the Entrance Gate, there must be ample room to prevent cow congestion. The size of the area should be approximately 1.8 m^2 per cow times the max number of cows that will be released from the milking stations simultaneously.
2. The Entrance Gate must allow the passage of only one cow at a time. Entrance to the system should be direct, without any sharp bends. It is recommend that a path roughly 0.9 m wide be built up to the entrance to funnel the cows one-by-one into it.
3. It is also recommended building a similar narrow path from the Exit gate to prevent the cows from bunching up upon exiting the system.

A typical scheme for entering and exiting the system is shown in Figure 2.

NOTE

- ❑ The parts making up the foundation and chute may be purchased from Afimilk, or be manufactured in accordance with the drawings supplied by Afimilk.
- ❑ The system ***must*** be installed either by a local Afimilk dealer or an Afimilk Service technician.
- ❑ The gate controls and pneumatic system must be those supplied by Afimilk.
- ❑ **The referenced construction drawings are supplied separately by Afimilk.**
- ❑ **Apply hazard sticker (catalog number 9000779) at all entry points to the Weigh / Sort system, to indicate possible hazards. The Sort gate and the Separator can be hazardous to people.**

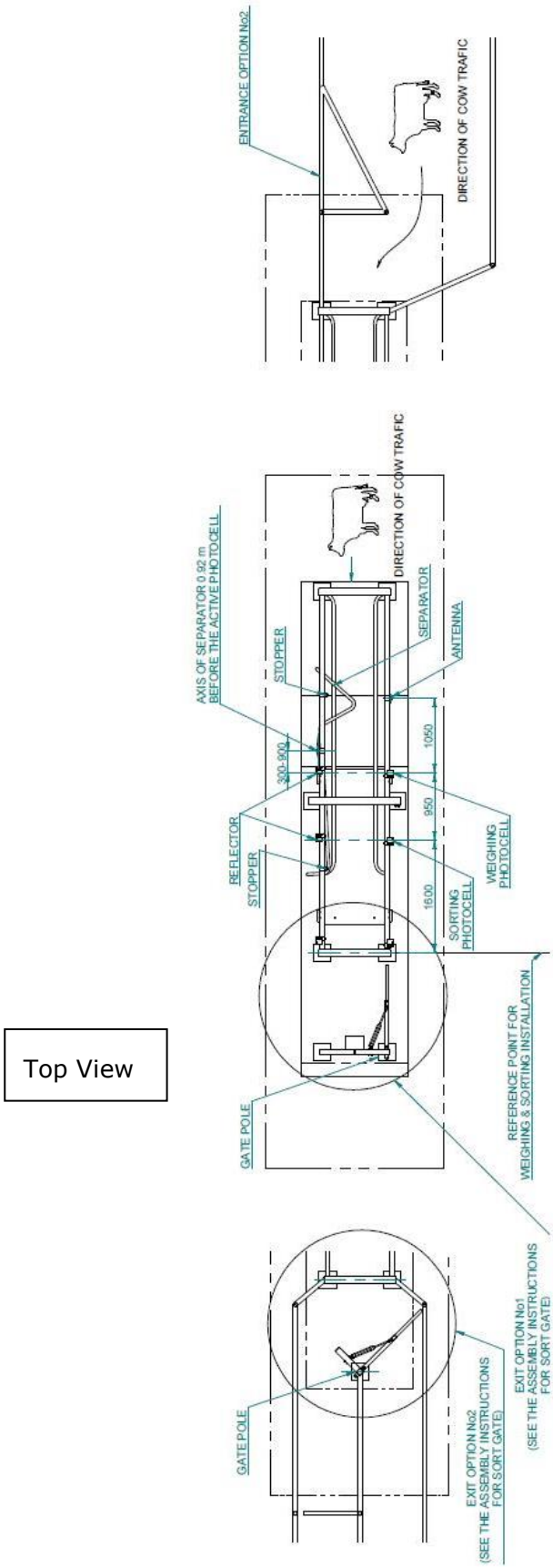
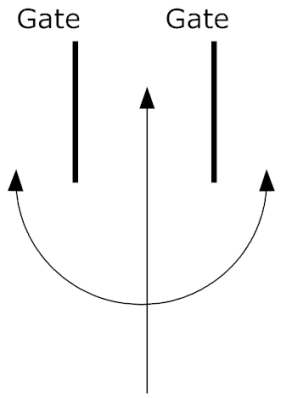


Figure 2: Weighing and Sorting System Entrance and Exit

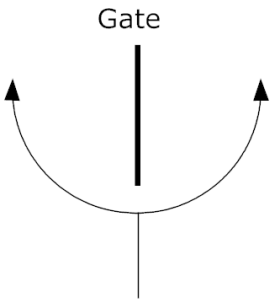
System Exit Paths

There are three possible exit paths:

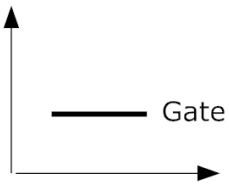
- System with three exit paths:



- System with two exit paths, right or left:



- System with two exit paths, straight or 90° to the right (or left):



Minimum Requirements for Weigh Configuration

Before installing the AfiWeigh System, ensure the following requirements are met:

1. The AfiWeigh station must be completely level sitting on a concrete platform elevated, at a minimum, 100 mm (4 in) to facilitate cleaning.
2. It should be situated at least 300 mm (12 in) from any walls that are not part of the station.
3. Allowing the weighing platform to stand in cow manure or water will result in system failure and possible damage to the weighing platform. The floor and the area around the floor must ensure that water flows freely away from the weighing platform.
4. It is highly recommended that a water tap and hose be installed as well as a drain in order to facilitate cleaning.

Minimum Requirements for Sort Configuration

Before installing the *AfiSort* System, ensure the following requirements are met:

1. 6 BAR air pressure supply
2. Air supply pipe. ½" Galvanized pipe or similar. (OD [Outside Diameter] 21.3mm, ID [inside diameter] 16mm)
3. Gentle slope along the paths is recommended (away from the Weighing Platform, if installed) to facilitate drainage
4. Water outlet for cleaning
5. Drainage system to enable free flow of water
6. Fencing or similar means to prevent other cows from approaching the antenna

Number of Stations Required

The number of stations required depends on the number of cows released at one time from a parlor. A station can process 10–12 cows per minute. Therefore, if the parlor is very large, a second station may be required.

Computer Requirements for All Configurations

Computer requirements are stated in the AfiFarm manual.

Communication Ports

Ensure the following are available:

- ❑ Two free AfiCom ports for a single station (one RS-485 port for Weigh Station and one Current Loop Port for communicating to the IDeal (Identification System), or
- ❑ Two free AfiCom ports for a single station (two RS-485 ports)

NOTE	The above also applies to Afihub Communication card

Power Requirements for All Configurations

Before installation, ensure the following power requirements are fulfilled:

- ❑ 24 VAC power supply of 75 VA for a single electric box; 150 VA for two electric boxes

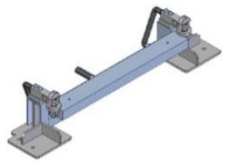
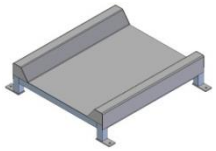
NOTE	It is recommended using separate power supplies for each electric box (system) at 75 VA 230/24 VAC to avoid downtime and for optimal troubleshooting.

- ❑ Isolating transformer used only for powering the Walkover Weigh and/or Sort Station

System Components

This section details the major components of the AfiWeigh and AfiSort systems. The following tables display the main mechanical and pneumatic components of the AfiWeigh/AfiSort system. For hardware accessories that are associated with the component, refer to the parts list.

Mechanical and Pneumatic Components

Component	Description	Part Number	Function	Product	
				Weigh	Sort
	Weigh Load Bar—Single	5000909	Performs weighing	Afi-Weigh	
	Weighing Platform	5001020	Rests on Weigh Load Bars, supports cows	Afi-Weigh	
	Weigh Elevation Platform	5001020	Serves as buffer before Weighing Platform	Afi-Weigh	
	Sorting Gate	5001031	Directs cows to specific areas		Afi-Sort
	Gate Post	5001030	Supports Sorting Gate		Afi-Sort
	Separator	5000834	Mechanically separates cows before the Weighing Platform	Afi-Weigh	Afi-Sort
	Bracket	5000834	Used to attach Antennas and Photocells to posts	Afi-Weigh	Afi-Sort

Component	Description	Part Number	Function	Product	
				Weigh	**Sort**
	Rubber Mat Assembly for Raising Platform	5000921	Prevent cows from slipping	Afi-Weigh	Afi-Sort
	Rubber Mat Assembly for Weighing Platform	5000840	Prevent cows from slipping	Afi-Weigh	

Electrical and Pneumatic Components

Component	Description	Part Number	Function	Product	
 Electric Box	Sort only Sort & Weigh Addition Sort (without IDeal)	5101080 5101081 5101082	For the contents of the Electric Box, see below.	Afi-Weigh	Afi-Sort Afi-Sort Afi-Sort
	AfiWeigh Terminal Display	4100320	Weigh display and control of I/O system	Afi-Weigh	Afi-Sort
	AfiScale Card	4100200	Weight measurement	Afi-Weigh	
	IDeal	4022900	Animal identification	Afi-Weigh	Afi-Sort

Component	Description	Part Number	Function	Product	
				Weigh	**Sort**
	Control Box for Double Gate Sort System	4085854	Controls opening and closing of two gates		Afi-Sort
	Communication Connection Box	4085825	Used to connect the IDeal communication cables with the AfiCom card inside the computer	Afi-Weigh	Afi-Sort
	Gate/Cow/Weigh Photocell Assy	5000530	Detects the presence of the cow and initiates the Weigh/Cow Station process	Afi-Weigh	Afi-Sort
	Manual Operation Box	5001040	Used for manually controlling the Sorting Gates		Afi-Sort

Electric Box Contents

The contents of the electric box are illustrated in Figure 3.

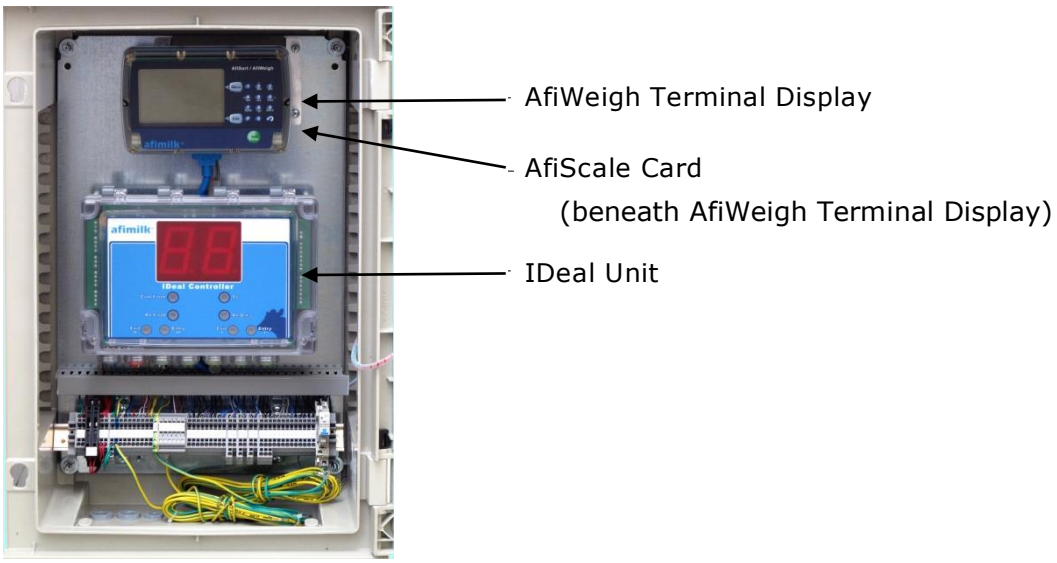


Figure 3: Electric Box Contents

The contents are:

- AfiWeigh Terminal Display

  The AfiWeigh Terminal Display displays the weight of the cow most recently weighed.

- AfiScale Card

  The AfiScale Card (located behind the AfiWeigh Terminal Display) performs the weight process.

- IDeal Unit

  The IDeal Unit tracks the active antenna and displays the current antenna process.

On the face of the Electric Box is a manual on/off switch for turning all of the units inside on and off.

Installation Overview

This section provides the stages of the installation of the system.

The section is broken down into the three configurations:

- AfiSort Walkover sort system
- AfiWeigh system
- Combined AfiSort and AfiWeigh system

Follow relevant instructions below, according to the product you are installing.

Installation AfiSort

1	Install system foundation and chute. Reference drawing: 5001130-AD Page 13.
2	Install Sort gate. Reference drawing: 5001031-AD Page 16.
3	Install Electric Box and pneumatic system. Reference drawing: 5001111-SD Page 30.
4	Install photocells and antenna. Reference drawing: 5001111-SD Page 30.
5	Install electrical wiring. Page 34.
6	Install mechanical separator. Reference drawing: 5001111-SD Page 28.
7	Configure system. Page 54.
8	Initial operation: Page 58.

AfiWeigh Installation

1	Install system foundation and fences. Reference drawing: 5001130-AD Page 13.
2	Install Weigh Station. Reference drawing: 5001020-AD Page 19.
3	Install Electric Box and pneumatic system. Reference drawing: 5001111-SD Page 30.
4	Install photocells and antenna. Reference drawing: 5001111-SD Page 24.
5	Install electrical wiring. Page 34.
6	Install mechanical separator. Reference drawing: 5001111-SD Page 28.
7	Configure system. Page 50.
8	Initial operation: Page 58.

Combined AfiSort and AfiWeigh Installation

1	Install system foundation and fences. Reference drawing: 5001130-AD Page 13.
2	Install Sort gate. Reference drawing: 5001031-AD Page 16.
3	Install Weigh Station. Reference drawing: 5001020-AD Page 19.
4	Install Electric Box and pneumatic system. Reference drawing: 5001111-SD Page 30.
5	Install photocells and antenna. Reference drawing: 5001111-SD Page 24.
6	Install electrical wiring. Page 34.
7	Install mechanical separator. Reference drawing: 5001111-SD Page 28.
8	Configure system. Page 54 and Page 50
9	Initial operation: Page 58.

Mechanical Installation

Foundation

The construction of the foundation depends on the choice of exit schemes (see Page 4).

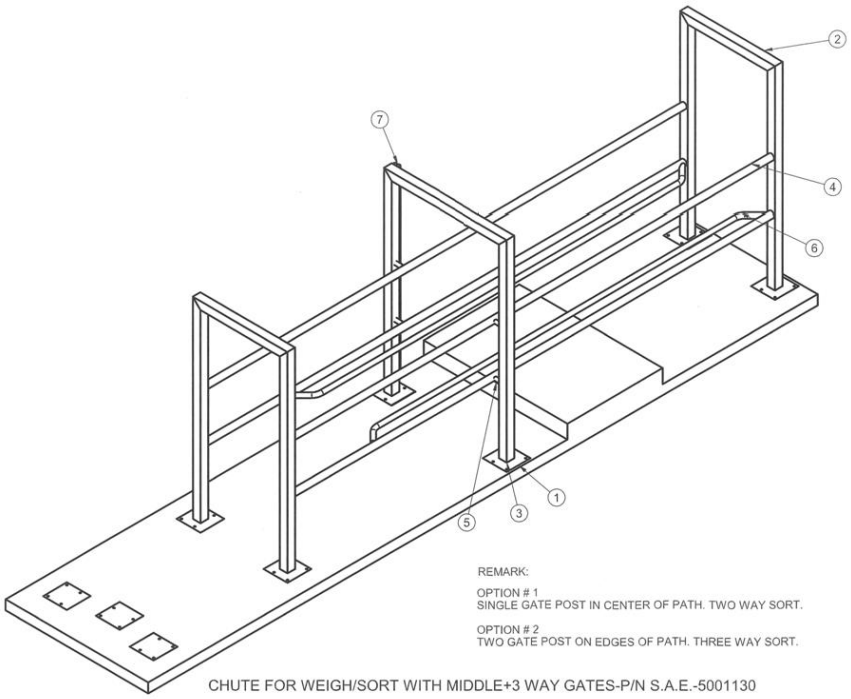


Figure 4: Chute with 3 Way Exit

Reference drawing no: 5001130-AD

The hardware accessories for installing the 3-Way Chute are listed in Table 1.

Table 1: 3-Way Chute Hardware Accessories

No.	Part Number	Description	Qnty	Drawing No.
1		Plate for Weigh/Sort system	9	5001102-DD
2		Arch for entry to exit	2	5001130-WD1
3		Middle arch	1	5001130-WD2
4		2” pipe support	4	
5		1” pipe support – galvanized	4	
6		1.25” narrowing pipe	2	5001130-DD1
7		1” pipe for cable – galvanized	2	

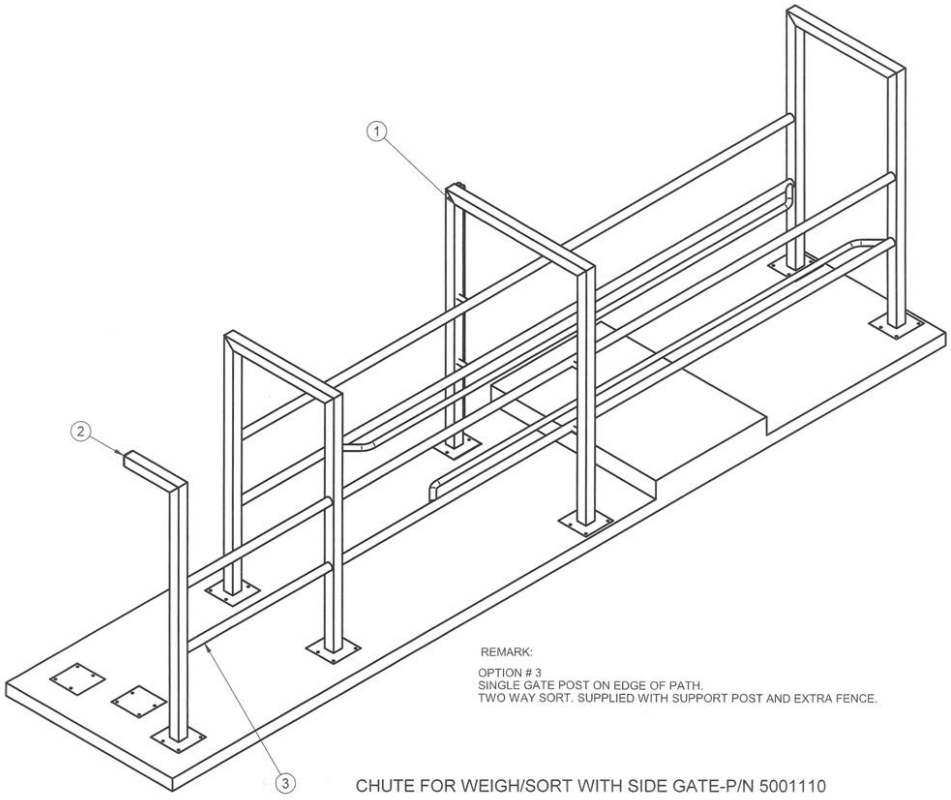


Figure 5: Chute with Two-Way Exit

Reference drawing no: 5001130-AD

The hardware accessories for installing the 2-Way Chute are listed in Table 2.

Table 2: 2-Way Chute Hardware Accessories

No.	Part Number	Description	Qnty	Drawing No.
1	5001130	Chute for Weigh/Sort with middle gate	1	5001103-AD
2	5001103	Support post for Sort gate post	1	5001103-WD
3	5001104	2” Pipe for closing gate post	2	

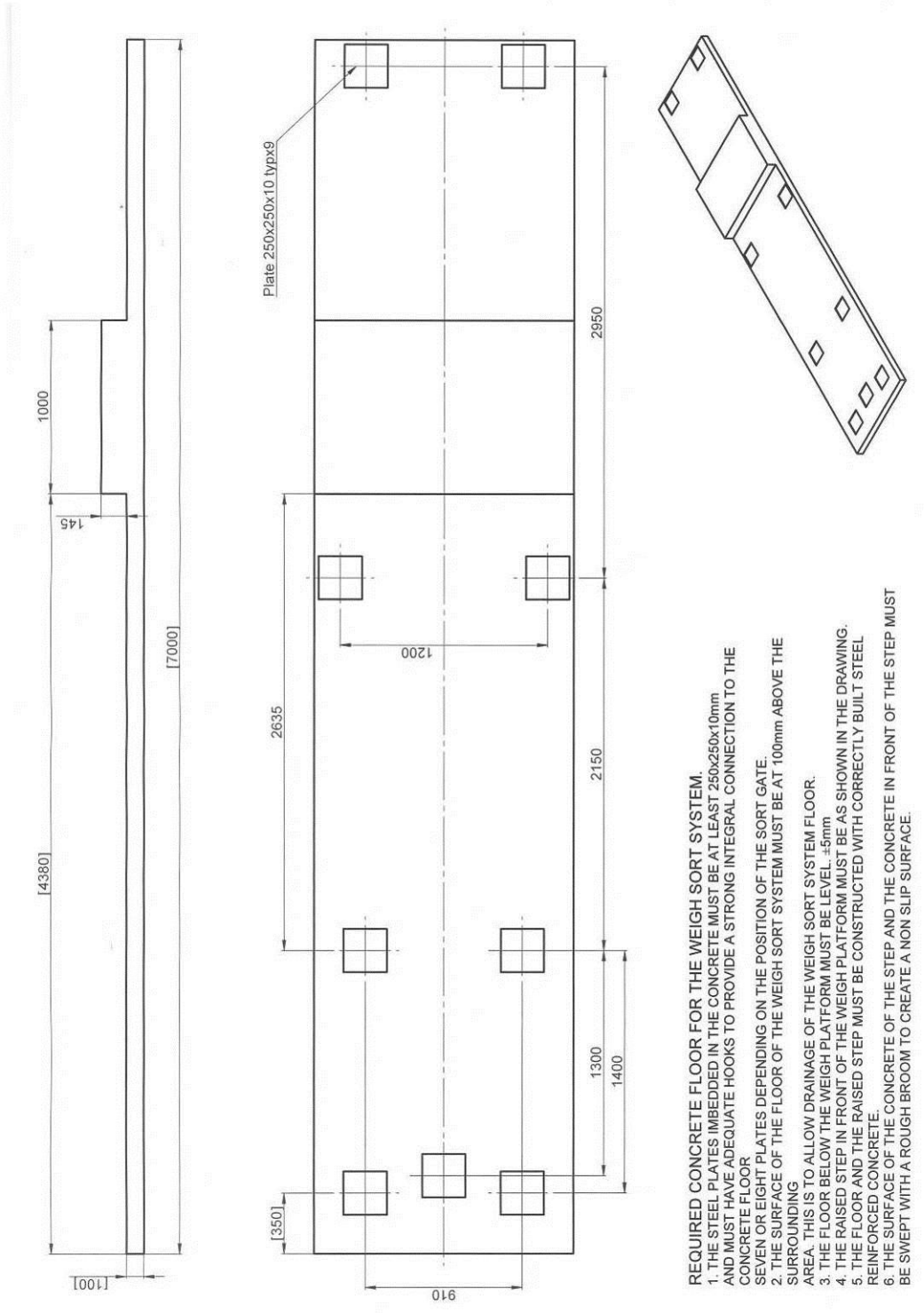


Figure 6: System Concrete & Steel Foundation

Reference drawing no: 5001031-AD

The correct placement of the AfiWeigh station is illustrated in Figure 7 (dimensions are in mm).

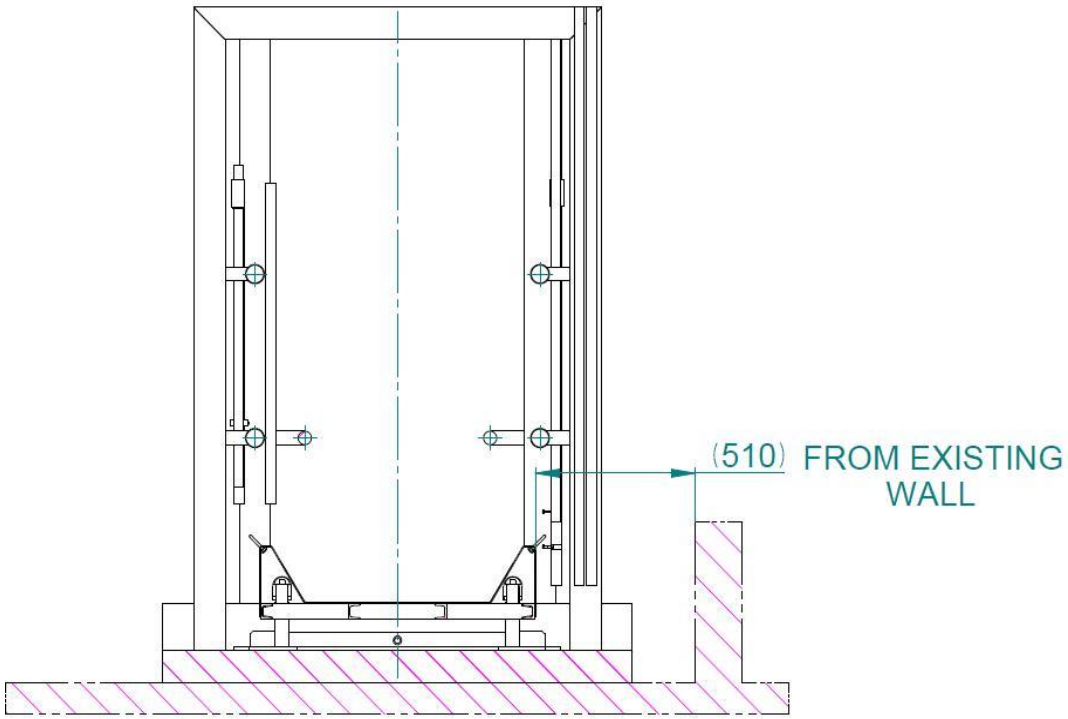


Figure 7: Minimum Distance from Wall

Sort Gate

The gate is symmetrical and can be assembled on either side and in either direction, as per the needs at the customer site.

Another gate can be added to create a 3-way system.

You can erect the gate post in the center of the cow path. This will contribute to more consistent cow traffic as the cows pass through the Sorting Gate.

CAUTION	**Before welding**, ensure that all adjustments are correct. After welding, the fully open and fully closed gate positions cannot be adjusted.

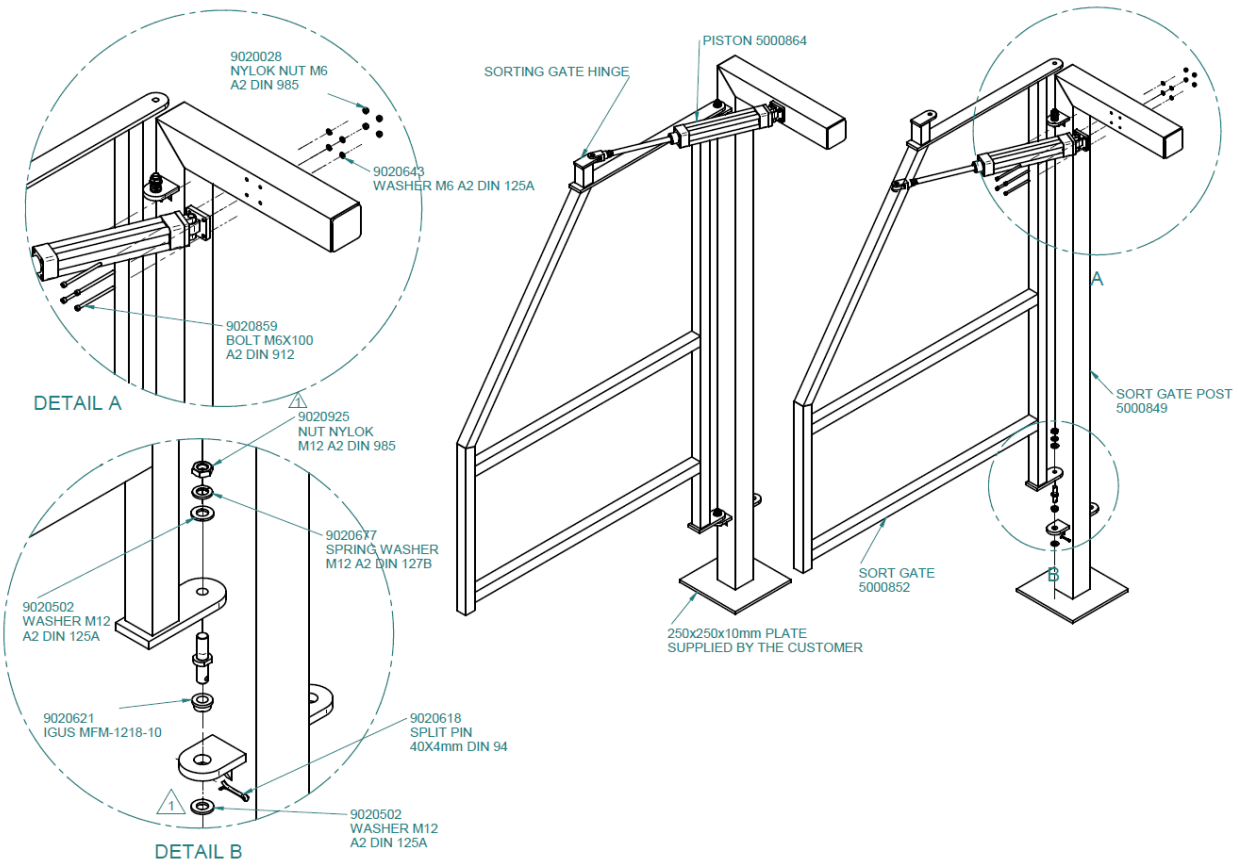


Figure 8: Gate Installation

Reference drawing no: 5001031-AD

To install the sorting gate post:

1. Assemble the gate pins.
2. Assemble the gate post bearings.
3. Mount the gate on the post.
4. Mount the piston.
5. Erect and support the gate and gate post.
6. Align the gate post for required function.
7. Align the gate post vertically.
8. Weld the gate post in place.

To mount the gate to the gate post:

1. Insert the polymer bearings into the gate post hinge.
2. Insert the gate hinge pins into the polymer bearings and place the gate on the hinge pins.
3. Tighten the nuts.
4. Place a washer on the hinge pin and secure it with a cotter (split) pin, as shown in figure 8, above.

To mount the piston:

1. Check the connection area of the cylinder connection to the horizontal part of the gate post and clean any excess galvanizing material if necessary.
2. Connect the cylinder connection to the horizontal part of the gate post with 4 socket head cap screws (M6x100 DIN 912).

To align the gate assembly:

1. Position the gate post in place on the metal plate prepared in the concrete.
2. Rotate the post to align the open and closed gate positions (refer to the drawing relevant to the client's chosen configuration).
3. Adjust the position of the post as follows:

   When the piston is open, the gate will be in line with one fence post.

   When the piston is closed, the gate will be about 20–30 mm (¾-1¼^) from the other fence post.
4. Ensure that the gate post is vertical and weld the gate post to the metal plate.
5. Secure the gate post to the continuation of the rails and to the opposite post.
6. Paint all welded joints with galvanic coating paint.
7. Lubricate the rod end and cylinder connections and instruct the client to lubricate once per month.

To position and mount the pneumatic control panel and connections:

1. Mount the pneumatic control panel on the center posts or on the rails, next to the electric box.
2. Connect the piston to the valve with 8 mm tubing.
3. Attach a flow control valve to the piston.
4. Attach the air supply to the pneumatic control panel.
5. Check gate functioning and adjust the throttle check valve. If needed, adjust the speed of the gate movement: close the flow control valve completely, then slowly open until a gate opening or closing cycle of approximately one second is achieved.

Weigh Station

This section provides the procedure for assembling a Walkover Weigh Station **without** a Sorting Gate.

Assembly

1. Attach the Weigh Elevation Platform to the floor.
2. Assemble the weighing platform and attach it to the floor.
3. Install the sensors.
4. Install the Separator.

The following figures show the installation of a Weigh Station. Adhere strictly to these measurements.

The Weigh Station plan is shown below.

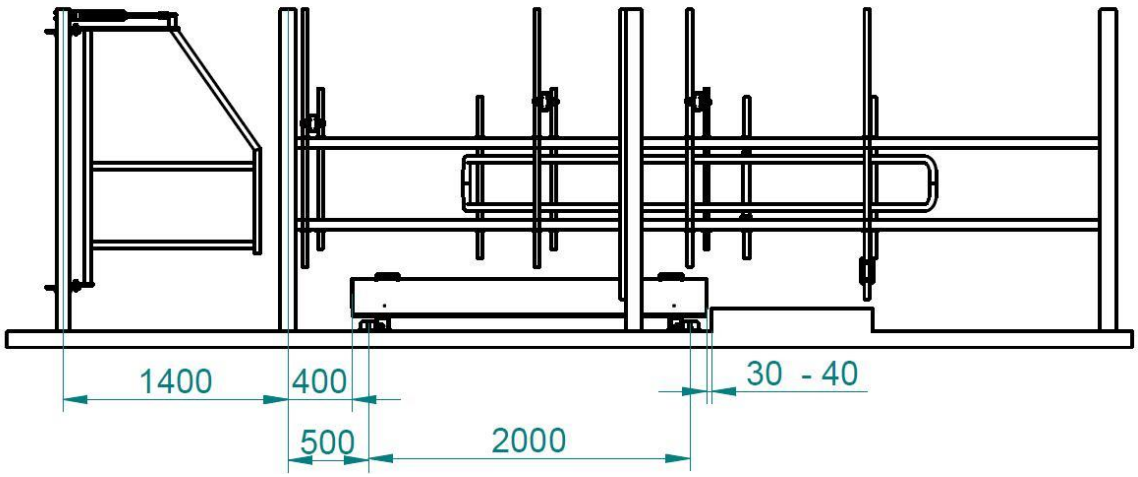
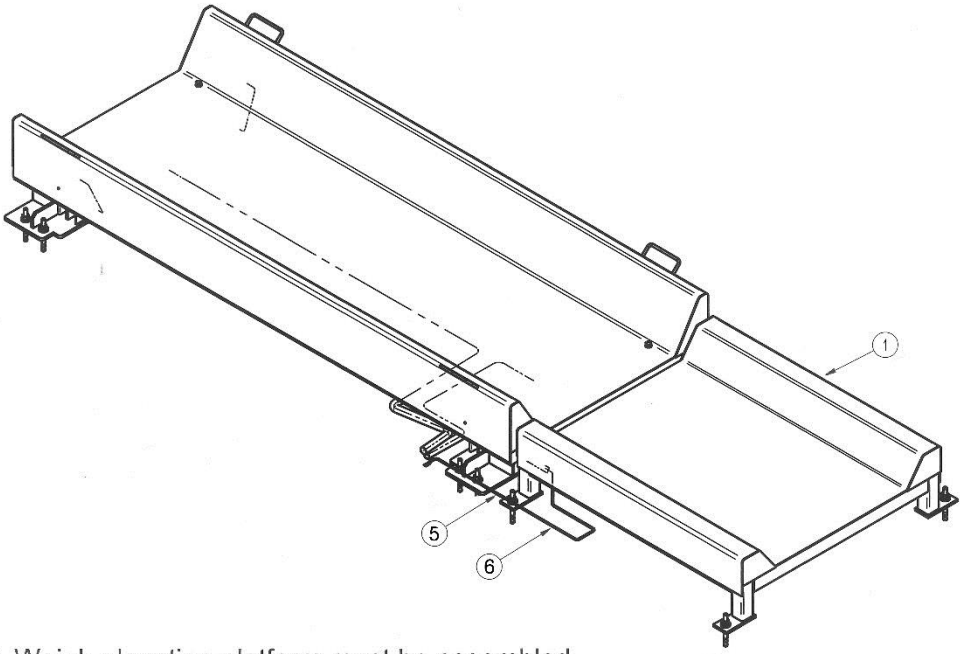


Figure 9: Weigh Station—Plan Side View

Reference drawing no: 5001020-AD

CAUTION	Ensure that there is a distance of at least 510 mm (20 in) between the Weighing Platform and any obstruction, for example, a wall, on either side. Otherwise, accumulated cow manure and water will damage the weighing platform.



* Weigh elevation platform must be assembled only if the raised step on concrete floor (drawing No 5001130-AD) was not executed.
** If the Weigh elevation platform is non existant Grounding wire L=300 , is not necessary.

NOTE:
1. LONG GRAUND WIRE (PART No 6) FOR STANDART GROUNDING TO CONSTRUCTION GROUND ON SITE
2. ASSEMBLY THE GROUND WIRE BEFOR INSTOLATION THE WEIGHING PLATFORM ON CONCREATE

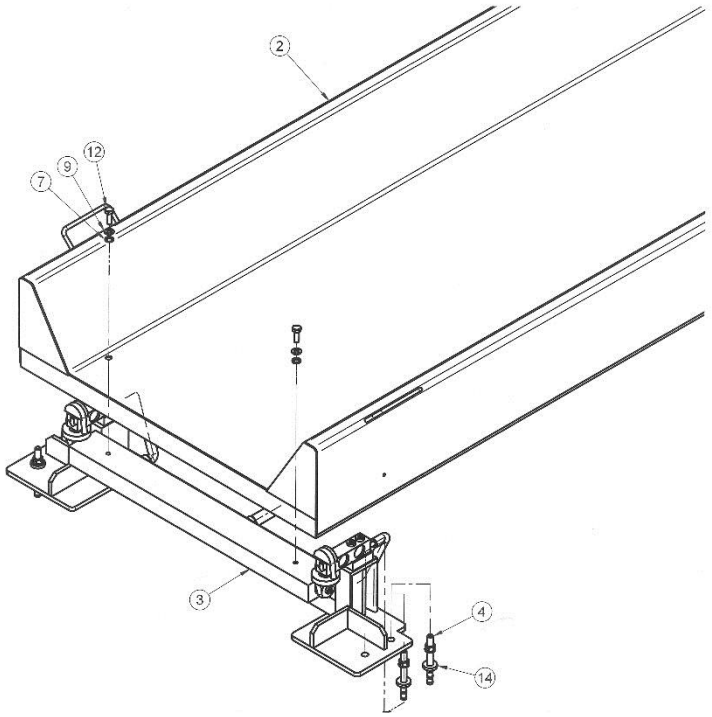


Figure 10: Weigh Station – Assembly

Reference drawing no: 5001020-AD

The hardware accessories for installing the Walkover Weigh Station are listed in Table 3.

Table 3: Weigh Station Hardware Accessories

No.	Part Number	Description	Qnty	Drawing No.	Dim
1	5000845	Weigh Elevation Platform (trapeze) + galvanization	1	5000845-WD	
2	5000843	Weighing Platform (trapeze) + galvanization	1	5000843-WD	
3	5000917	Weigh Load Bar Assy (1 unit) new	2	5000917-SD	
4	9020192	Wedge Anchor (A4) double ring	12		M12x120
5	4000271	Ground Wire Assy L=300	1	4000271-AD	
6	4000270	Ground Wire Assy L=2000	1	4000270-AD	
7	9020039	Spring Lock Washer M10 DIN127B-A2	4		
8	9020501	Screw Hexagon M6x30, DIN933 A2	2		M6x30
9	9020703	Washer Flat M10 A2 DIN-125	4		
12	9020695	Metric Hex Agon DIN933-A2	4		M10x30
14	9020027	Washer (thick) M12 DIN7349-A2	12		

NOTE

The Weigh Elevation Platform, available from Afimilk, is optional and is used to ensure that cows pass one at a time to the Weigh Station.

The Weigh Elevation Platform must be installed if the raised step-on concrete platform (Drawing No. 5001130-AD) is not implemented.

Positioning and Assembling the Weighing Platform

NOTE	Before placing the Weighing Platform on the concrete foundation, construct the grounding wire assemble in accordance with "Grounding the Weighing Platform" on Page 46.

- ❑ Fence posts should be welded to metal plates set in the concrete. It is highly recommended to encase the post joints with concrete 200 x 200 x 100 mm (8 x 8 x 4 in) to protect them from rust**.**
- ❑ There must be a space of 510 mm (20 in) or more between the Weighing Platform and any side-wall. If the path includes side-walls, the parts next to the Weighing Platform must be removed.
- ❑ There must be no possibility for water to accumulate under the weighing platform.
- ❑ The concrete surface must be level with no protrusions or depressions.
- ❑ The concrete path must be:
  - **Textured to prevent the cow from slipping.**
  - **Wider than 1100 mm (43 in).**

CAUTION	Welding on any part or structure connected to the Weigh Load Bars is likely to cause them serious damage. Make sure that all welding is completed before installing the Weigh Load Bars.

Installing the Load bar Assembly

Place the load bar assemblies in position so that the cables face each other on the inside of the load bar assemblies, beneath the weighing platform. Do not secure the load bar assembly to the anchoring bolts until it is leveled.

Leveling the Load bar Assembly

The load bar is leveled using a set of leveling spacers supplied with each load bar assembly, as shown in Figure 11.

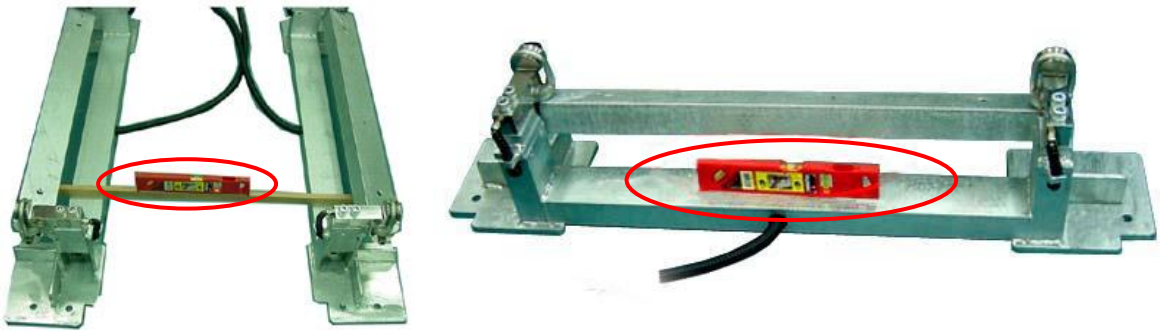


Figure 11: Leveling Spacers

To position the weighing platform:

1. Lower the Weighing Platform onto the load bar assemblies.
2. Connect the Weighing Platform to each load bar assembly with four M10x30A2 bolts (P/N 9020702).

NOTE	After fastening the screws attaching the platform to the Weigh Load Bar assemblies, extreme care must be taken not to drag, tilt, or bend the platform, or lean it on the bars.

3. Place the Weighing Platform (with bases fixed) in its final position, centered in the path.
4. Make sure to remove the cable from the side on which it will be connected to the control box.
5. Ensure that the platform is level using a spirit level. If necessary, level the platform with metal spacers. Make sure to leave the holes free for drilling and securing.

NOTE	Do not raise either end of the platform to 180 mm (7 in) or more from the ground to level it. Level the concrete instead.

6. Drill a 13 mm (½'') hole through each of the bases into the concrete.
7. Insert and tighten the anchor bolts (P/N 9020193).

To position the weigh elevation platform:

1. Position the Weigh Elevation Platform (P/N 5000804) in place.
2. Ensure that the platform is aligned with the Weighing Platform.
3. Ensure that the four legs of the platform are touching the concrete. Adjust any leg that is not touching the concrete.
4. Ensure a gap of 20–30 mm (¾-1¼'') between the Elevation Platform and Weighing Platform.
5. Drill a 13 mm (½'') hole through each of the legs into the concrete.
6. Insert and tighten the anchor bolts (P/N 9000420).
7. Connect the short ground wire from the Weighing Platform to the Weigh Elevation Platform, using the screws located on the sides of the platforms.
8. Connect the long ground wire to the metal work grounding. Ensure proper grounding of the fences around the weighing station.

NOTE	If a concrete platform exists, grounding is done directly to the metal construction. Grounding of the walls must be performed by a certified electrician in compliance to national specifications.

Photocell and Antenna

The photocells and antenna are to be installed as shown in The photocells and antenna are to be installed as shown below

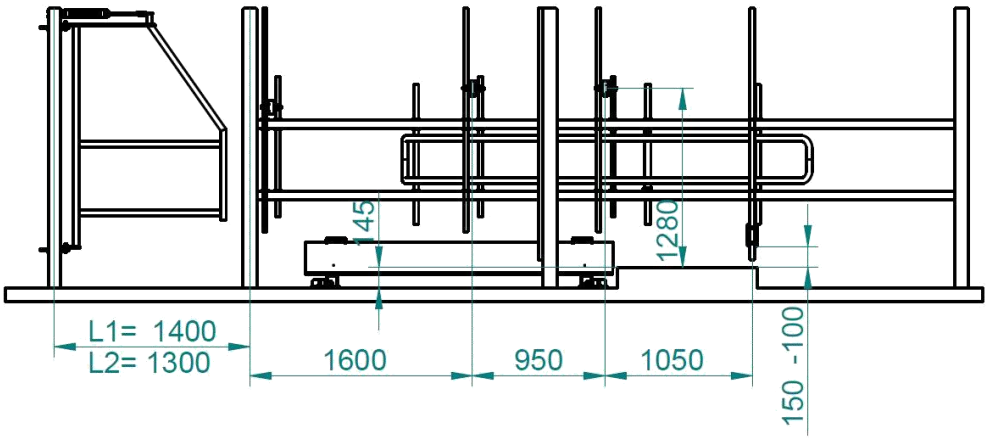


Figure 12.

The photocells and antenna are to be installed as shown below

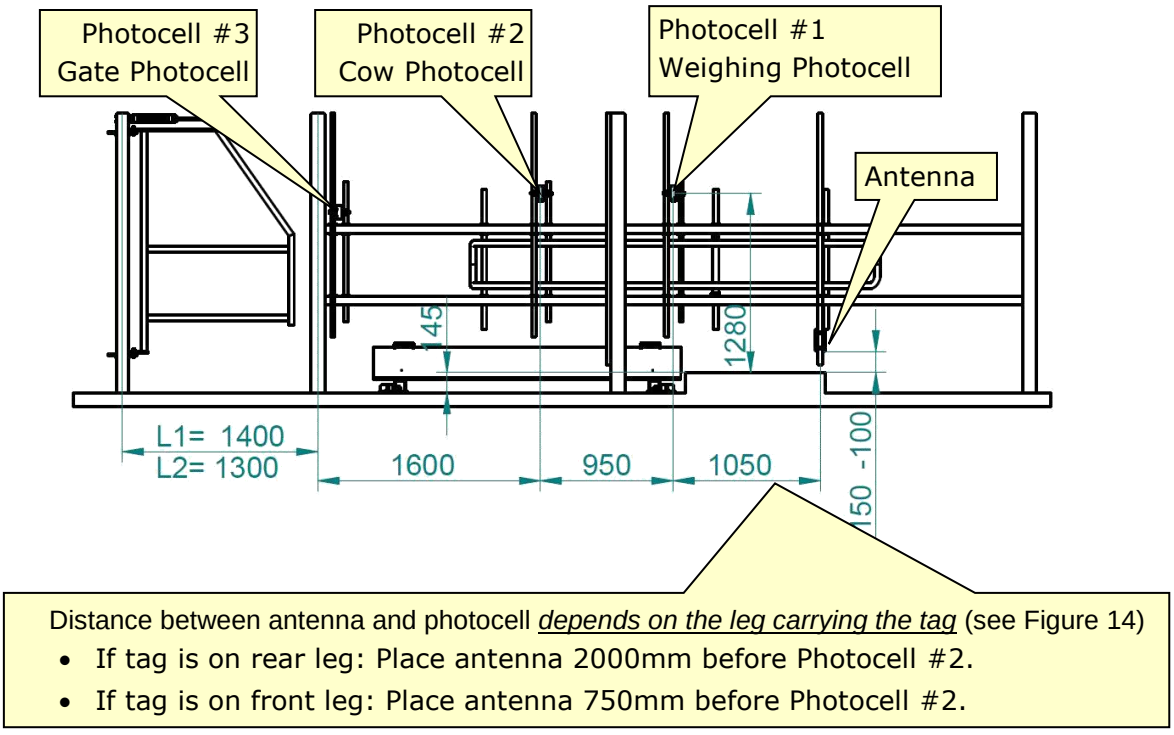


Figure 12: System Photocells and Antenna

Reference drawing no: 5001111-SD

Legend:

1	Weighing Photocell	This photocell acts as a trigger activating the AfiWeigh and cow identification process.
2	Cow Photocell	This photocell triggers the cow identification process and the opening of the AfiSort gates.
3	Gate Photocell	This photocell saves the sorting command continuously, until it is un-covered (exposed), regardless of the gate's default parameter nor the occasion of identifying another cow in the sorting station.
4	Antenna	Reads the leg Identification Tag.

AfiWeigh includes only the Cow photocell and the Weighing photocell.

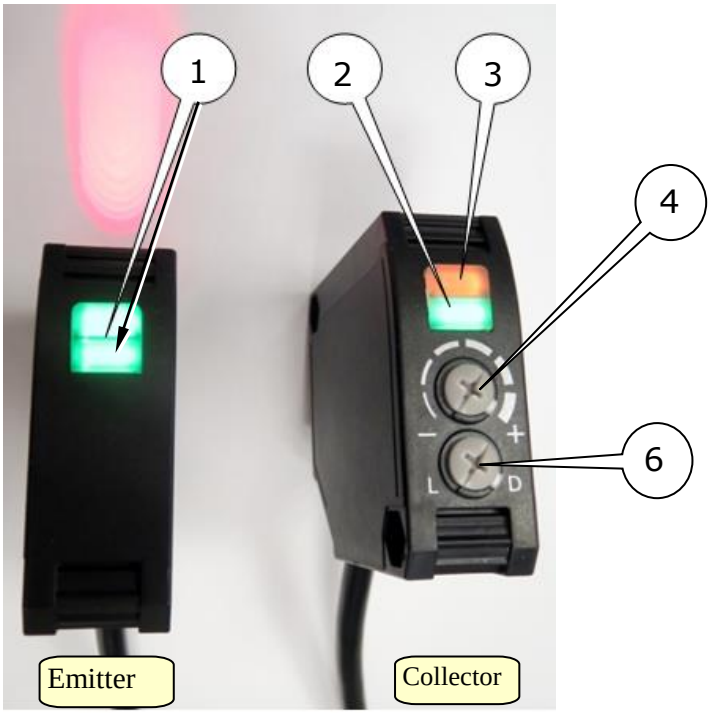
AfiSort includes only the Cow photocell and Gate photocell.

AfiWeigh + AfiSort include all the three photocells: Cow photocell, Gate photocell and Weighing photocell.

Photocell Controls and LED Indicators

The photocell includes two elements:

- **Emitter** - emitting a light beam towards the collector (see below)
- **Collector** - receiving the emitted beam.



1. **Emitter power LEDs** (green: power is ON)

2. **Collector power LED** (green: power is ON)
3. **Collector signal-reception indicator LED**:
   - *Orange LED is lit* – indicates *no signal*, i.e. the collector has no light reception (e.g. when a cow is blocking it, or when it is not properly adjusted)
   - *Orange LED is OFF* – indicates *good signal*, i.e. the collector has good light reception of the emitter beam.

   NOTE: when only the orange LED is lit (i.e. green power LED is OFF), it indicates that the collector's light reception from the emitter is very poor! Possible reasons:
   * *The photocell lenses are not clean*
   * *The photocells are not properly adjusted towards one another*
   * *One of the photocell elements is faulty, and should be replaced*
4. **Collector sensitivity adjuster knob**
5. **Collector mode selector**: L – Light on, D – dark on

Photocell Installation

Photocell pre-installation notes:

The photocell is of a through-beam type. Therefore the collector photocell can be pointed to the emitter via line of sight, but the emitter must be adjusted more accurately as follows:

- ❑ Use a reflector in front of the collector
- ❑ Adjust the emitter to light on the reflector.

If no reflector is available, a white paper may be used instead.

NOTE	The active lens is always the lower one, both in the Emitter and in the Collector.

To install the photocell:

1. Verify that the photocell is set to the **MAXIMUM** range; Verify that the work mode is set to **D** (Dark) (NOT to L-Light!)

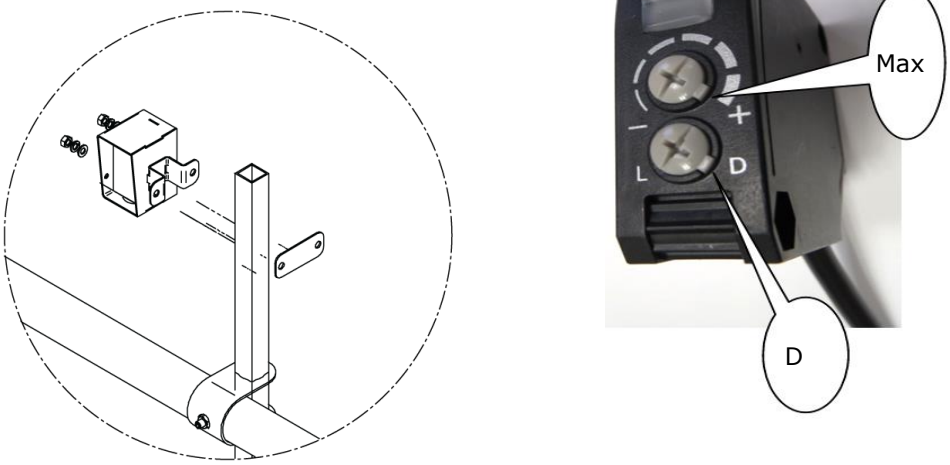


Figure 13: Photocell Installation

2. Connect the 25 mm (1 in) x 1.6 m (63 in) post with the emitter photocell to the exterior of the rails.
3. Connect the 25 mm (1 in) x 1 m (39 in) post with the collector photocell to the other side of the rails, opposite the emitter photocell.
4. Attach the housing unit to the post. Ensure that the centers of the housing units face each other. Insert the rubber pad and lightly tighten the screws.

NOTE	Slight changes in the location of the photocell may be made in keeping with site conditions, type of cow, etc.

5. Final alignment of the photocell location is made following complete installation. After determining that the photocell is functioning correctly, tighten it very firmly to prevent the housing unit from moving.

   A few days after installation, retighten the screws.
6. To protect the photocell cable from damage, thread it through the post towards the Electric Box.

NOTE	As both parts of the Photocell require power supply via cables, make sure that the cables are protected from animals and other hazards.

To mount the antenna:

The placement of the antenna *depends on where the leg ID tag is on* the cow:

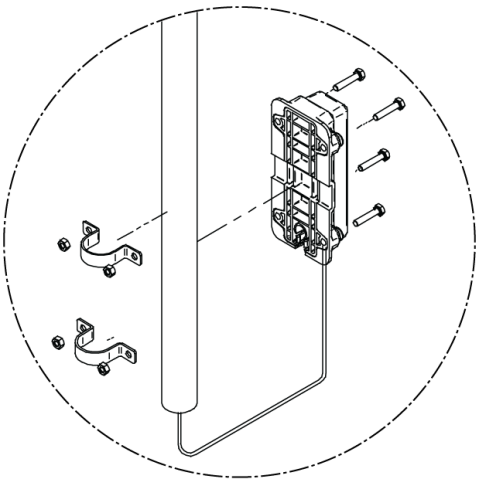
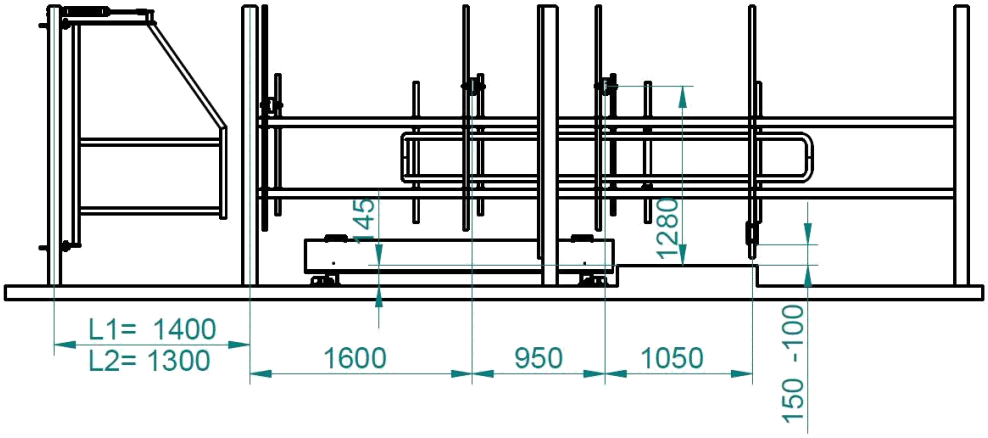
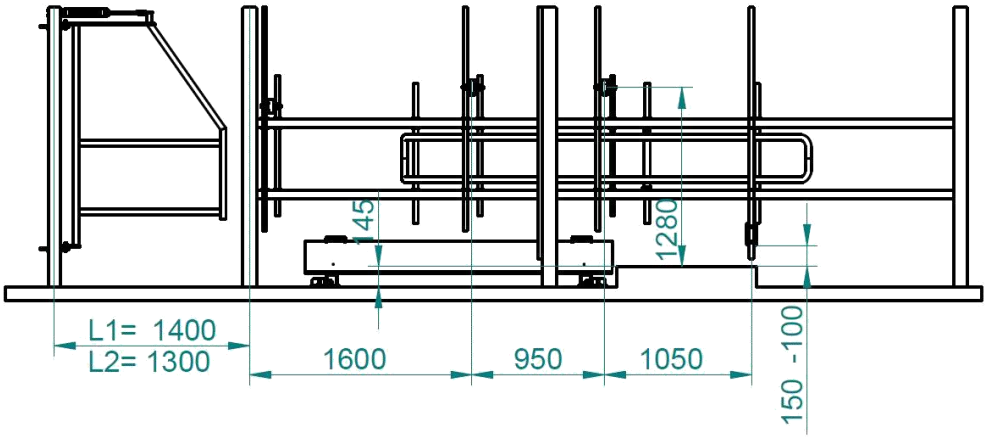


Figure 14: Antenna Mount

- ***If the ID tag is on the rear leg***, the antenna has to be placed 2000 mm (79 in) before photocell #2 (Cow Photocell), see The photocells and antenna are to be installed as shown below



- Figure 12.
- ***If the ID tag is on the front leg***, the antenna has to be placed 750 mm (30 in) before photocell #2 (Cow Photocell), see The photocells and antenna are to be installed as shown below



- Figure 12.

Separator

The purpose of the separator is to create a separation between cows opposite the active photocell. A short separation period suffices to ensure clear distinction between cows.

The separator is symmetrical and may be installed on either side of the station and with entry from either side.

NOTE	It recommended not installing the separator immediately after the installation of the photocells and antenna. The cows should be given a period of time, some 10 days, of passing freely through the station in order to get used to it.

To install the separator:

1. Inspect the existing rails and determine if they match specifications for the separator.
2. Insert the axis into the separator. Ensure that the stop-ring is at the bottom.
   - **In a sort only system: position the axis 1000 mm before the Cow Photocell.**
   - **In a weigh only system, position the axis 1000 mm before the weigh photocell.**

NOTE	For small to medium sized cows position the axis on the inside of the rail. For large cows position the axis on the outside of the rail. This provides an extra approx. 100 mm of clearance and prevents them from being trapped by the separator.

3. Swing the separator in both directions in order to check that there are no obstructions. If there are no obstructions, balance the separator (matching the railing).
4. Mount the stoppers so that they prevent the separator from rotating beyond the rails.
5. Use brackets to connect the 25 mm (1 in) posts, separator axis and rail stoppers.
   You can add rubber stoppers (not supplied) to prevent banging.

The separator plan is shown below.

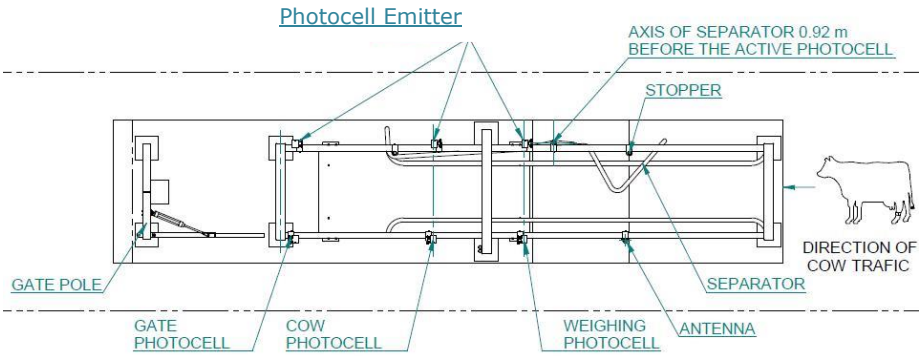


Figure 15: Separator Sort & Weigh Station

Reference drawing no: 5001111-SD

NOTE	The distance between Photocell to Axis measurement is dependent on cow size and the Separator need to allow passage of one cow at a time.

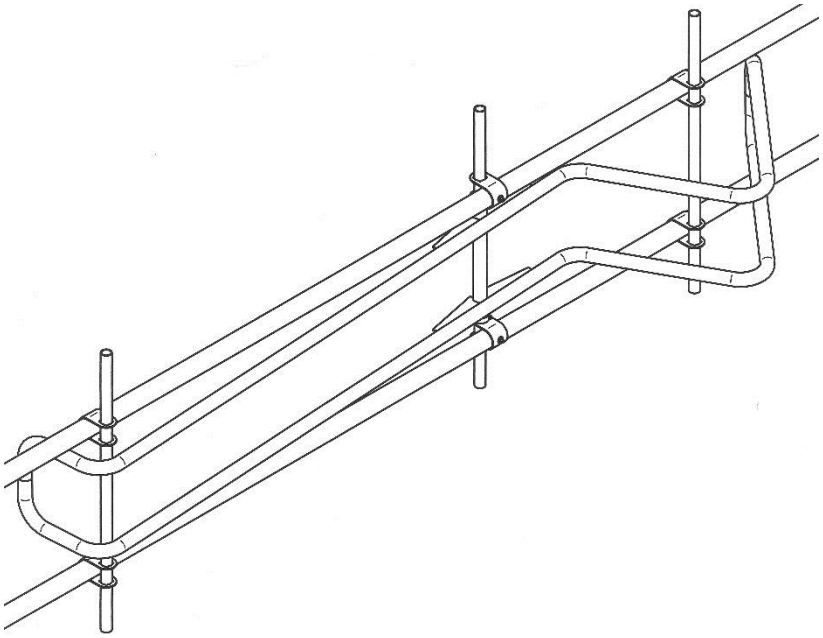


Figure 16: Separator

Electric Box Installation

Install the Electric Box as close to the station as possible.

The preferred option for mounting the Electric Box is on the wall close to the station. The only limitations are:

- ❑ The maximum length for the Weigh Load Bar cables is 10 m.
- ❑ The box must be protected from cows and water, and be easily accessible for servicing.

Pneumatic System Installation

The pneumatic system includes the following components:

- ❑ Air compressor (provided by the customer)
- ❑ Pneumatic control panel
- ❑ ISO 6341 PNEUMATIC CYLINDER Ø40 mm Stroke 200 mm (P/N 5000864) + rod yoke(P/N 5000729) + hinged cylinder connection (P/N 5061246)
- ❑ Air lines:
  - **From the air compressor, to the manual valve in the pneumatic control box, ½" galvanized pipe, or similar (OD 21.3 mm, ID 16 mm)**
  - **From the manual valve in the pneumatic control box, to the cylinders, at least 8 mm diameter**

A flow control valve is shown below.

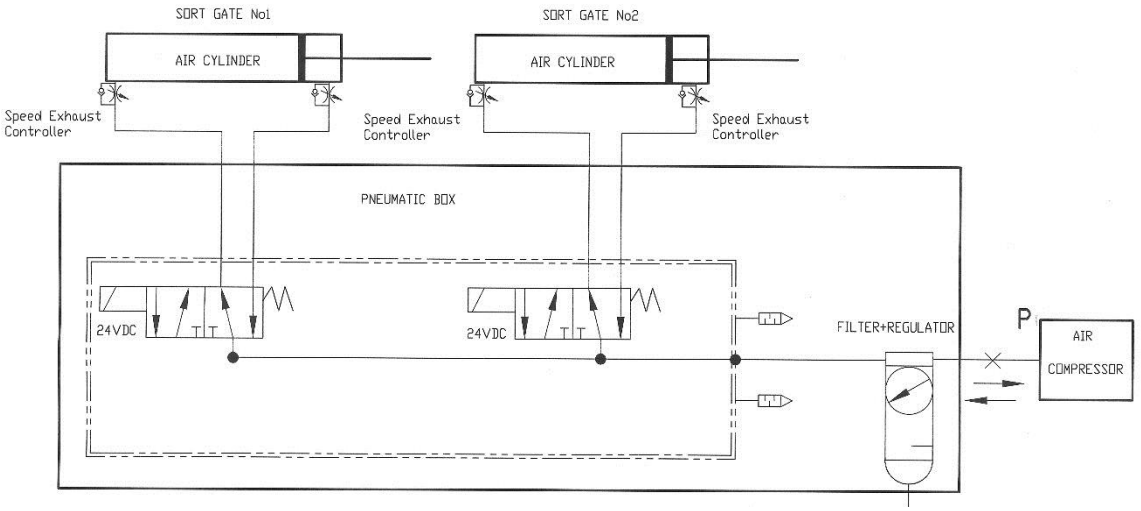


Figure 17: A Flow Control Valve

- The air tubes must be able to withstand local environmental conditions, and working pressure of 9 Bar.
- Protected from mice.

The pneumatic control panel is provided by *Afimilk*. air tubes between the components on the panel are installed in the factory. The following components are attached to the pneumatic control panel:

- ❑ 3 direction, 2 position, 6.35 mm (¼ in) manual on/off valve
- ❑ Air filter, Regulator, (FR) combination unit
- ❑ One 5 direction, 2 position, 6.35 mm (¼ in) solenoid valve for each gate; each valve is controlled by a 24 VDC solenoid, 2.5 W
- ❑ Watertight junction box for electrical connections

NOTES

- ❑ The distance from the control valve to the piston must not exceed 10 meters.
- ❑ Cows chew air tubes. Make sure that the tubes are attached to the metal frames so that the cows cannot reach them.
- ❑ The air tubes should be protected from UV radiation. Use UV protected tubes or insert the air tubes into a protective post.

To install the pneumatic system:

1. Mount the control panel close to the electric box in a protected, dry and accessible location.
2. Run a single ½" galvanized pipe, or similar (OD 21.3 mm, ID 16 mm), from the compressor to the manual on/off valve. Connect the pipe as close as possible to the pneumatic control panel.
3. Run an 8 mm air tube from the solenoid valve to the adjustable check valves mounted on the gate piston.
4. Connect the 24 VDC to the solenoid in the electric box.
5. Following installation of the pneumatic system, adjust the piston adjustable check valves to ensure proper opening and closing of the gate:
   - **Air pressure should be 5 Bar**
   - **Gate should close quickly but not with enough force to strike the cows**
   - **To adjust the speed of the gate movement, close the flow control valve completely. Then slowly open until a gate opening or closing cycle of approximately one second is achieved.**

Repositioning the Separator (AfiSort Only)

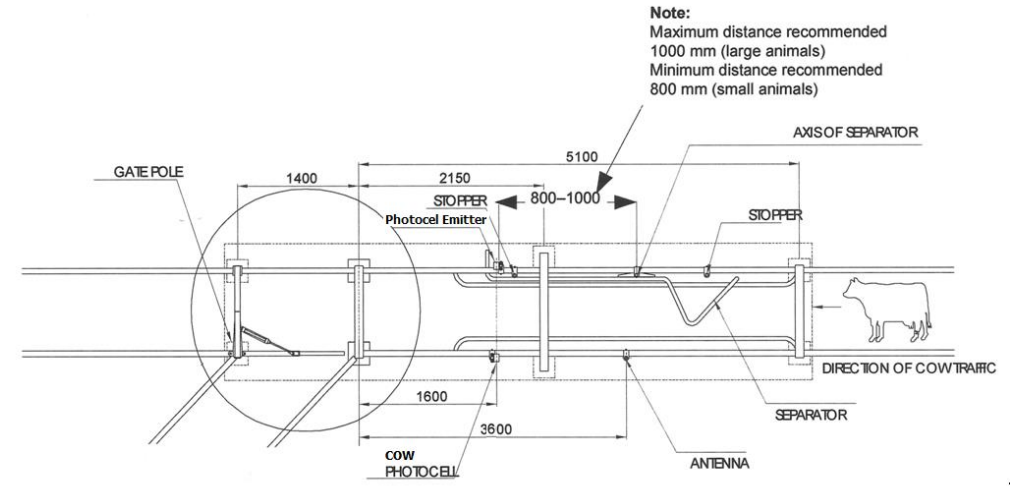


Figure 18 shows the components of AfiSort including the position of the Separator.

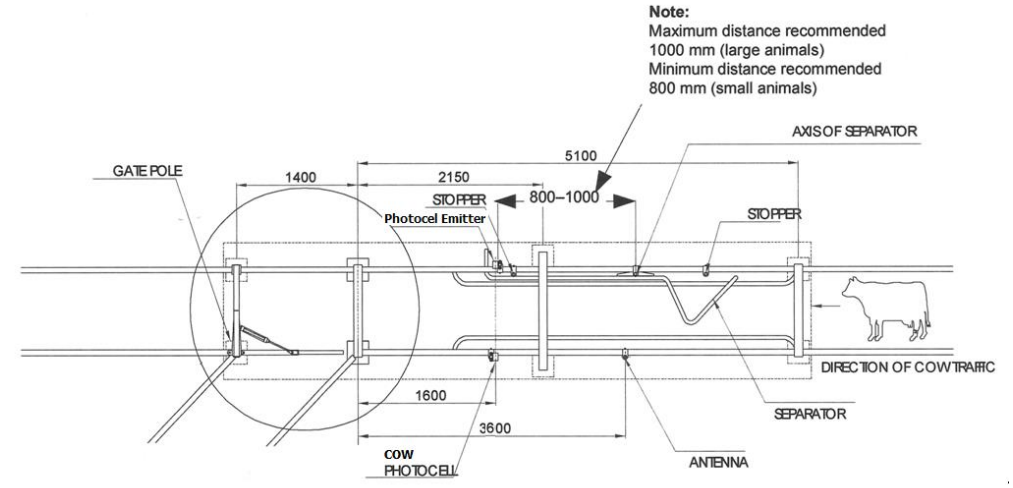


Figure 18: Components of AfiSort

Reference drawing no: 5001111-SD

The axis of the Separator should be positioned between 800—1000 mm from the Sorting Photocell. The distance depends on the size of the cows in the herd. 75B

Repositioning the Separator (Combined AfiSort/AfiWeigh)

Figure 19 shows the components of a combined AfiSort/Afiweigh station including the positions of the additional photocell and Separator.

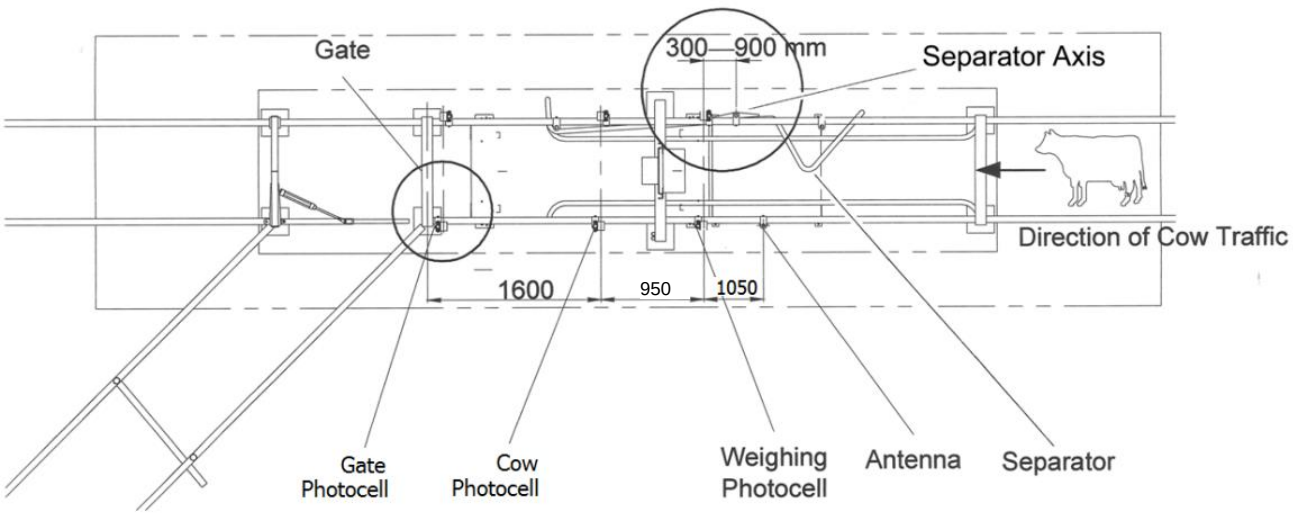


Figure 19: Components of Combined AfiSort/AfiWeigh

Reference drawing no: 5001111-SD

The axis of the Separator should be positioned between 300—900 mm from the Weighing photocell.

Gate Photocell

Sometimes cows' progression through the gates may cause an erroneous sorting, if not handled correctly. This may happen in the following cases:

- When cows delay in exiting the sorting station, and during this delay the Sorting Gate returns to its default state thereby causing an erroneous sorting.
- Another cow blocks the Cow Photocell during her identification process, before the first cow finished the sorting process.

To prevent incorrect sorting, a 3rd Photocell is used, as shown in Figure 23, This Photocell stores the sorting function until the cow that started the sorting has fully completed it.

Position the Gate photocell as close to the Sorting gate as possible, at mid-body height of the cow (see Figure 19).

Wiring instructions for a gate photocell are on page 38.

Electrical Installation

This section contains:

- ❑ Wiring diagrams of the connection and the Electric Component.
- ❑ Wiring instructions for each component
- ❑ Instructions for wiring the junction boxes

The following sections describe AfiWeigh and AfiSort Walkover Weigh/Sort System cabling and electric components, as used in the Afimilk system configurations.

Electrical Cables

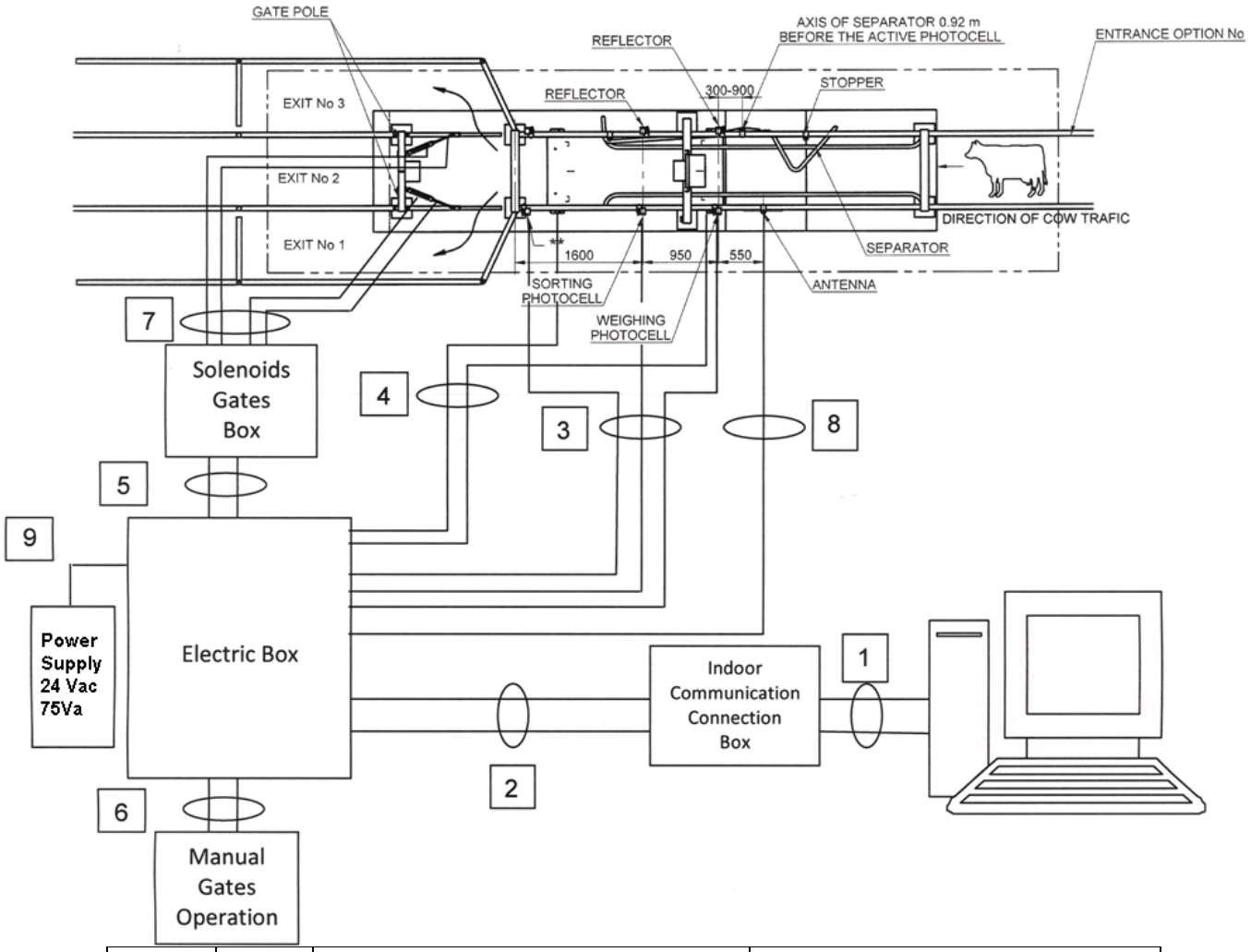
Lay out the cables in the paths selected for connecting the units of the Weighing and Sorting systems. Leave sufficient slack. Use the appropriate cable for each component. If longer cables are necessary, increase their diameter according to standard specifications.

Table 3: Afimilk System Cables

Cable Type	Description
Double-Strand Ø 2 x 0.75 mm^2	This cable connects the pneumatic service panel junction box to the 24 VAC power supply in the electric box.
Shielded 4 Strand 18–20 AWG	This cable connects the IDeal with Current Loop.
Shielded 2 Strand 18-20 AWG	This cable connects RS-485 communication to IDeal (if RS-485 is used) and AfiWeigh Terminal.
Shielded 6 Strand 18–20 AWG	This cable connects the following: ❑ Photocells ❑ Load Cells ❑ Antenna to IDeal ❑ Extension cable types for Load Cell and Photocell
Shielded 6 Strand Communication	This cable is recommended for outdoor communication configurations. This cable connects the following: ❑ 4 strands to the IDeal Current Loop ❑ 2 strands to RS-485 connection

Cabling Diagram

Figure 20 shows a cabling diagram overview.



Cable Number on Drawing	Amount of cables needed	Type of cable needed	Purpose of cable
1.	2	Shielded, 4 strand, 18-20 AWG	communication
2.	2 *or* 1	Shielded, 4 strand, 18-20 AWG Shielded, 6 strand, 18-20 AWG	Outdoor communication Outdoor communication
3.	2 Or 3	Shielded, 6 strand, 18-20 AWG	to all photocells
4.	2	Shielded, 6 strand, 18-20 AWG	to load cells
5.	2	Double strand, 2x0.75 mm^2	to pneumatic solenoids
6.	2	Double strand, 2x0.75 mm^2	to manual operation of gates
7.	1	Air line	to gate cylinder
8.	1	Shielded, 6 strand, 18-20 AWG	to antenna
9.	1	3 strand Ø 3x0.75 mm^2	24v AC power supply

Figure 20: System Cables – General

Connecting the Electric Box

Electric Box Internal Connections

Figure 21 provides a schematic of the Electric Box for Weighing and Sorting wiring.

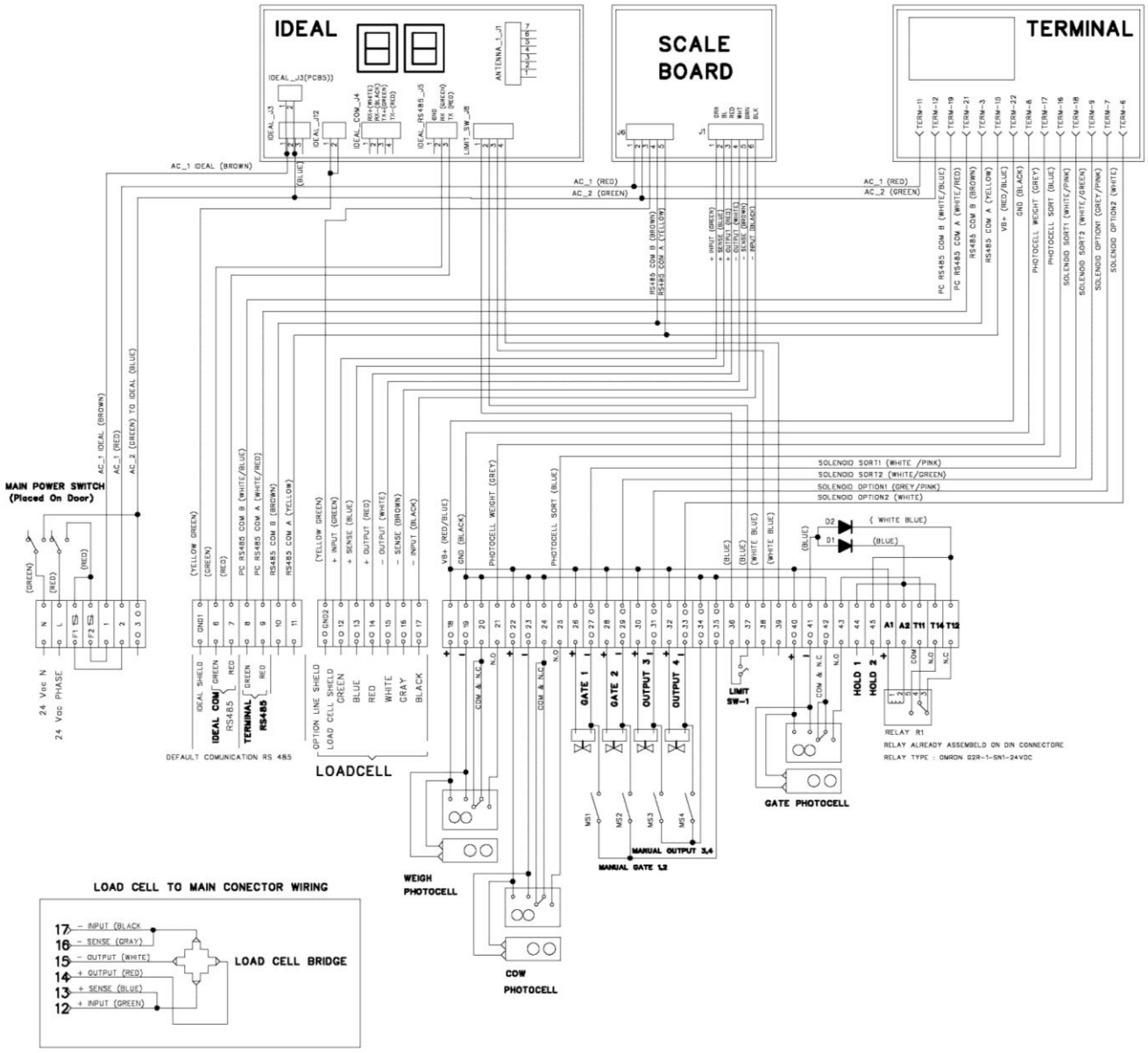
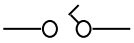
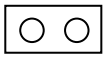


Figure 21: Internal Electrical Connections Weighing & Sorting.

Reference drawing no: 5101081-wl1

The following key defines diagram symbols on the previous page.

Key	
F	Abbreviation for *Fuse*.
L	Abbreviation for *Line*.
N	Abbreviation for *Minus*.
	Represents one of the solenoid valves. They are located on the pneumatic system control panel.
SV-#	Represents one of the solenoid valves Sorting Gate No.1 To.4. They are located on the pneumatic system control panel.
MS-#	Represents the manual switch for Sorting Gate No.1 To.4.
	Represents the Limit Switch.
	Represents the Photocell.
	Represents the Diode.

Gate Photocell and Relay for AfiSort and Combined AfiWeigh/AfiSort Station

The wiring of the gate photocell for a combined AfiWeigh/AfiSort station is according to the diagram given in Figure 22 and the wiring diagram in Figure 21.

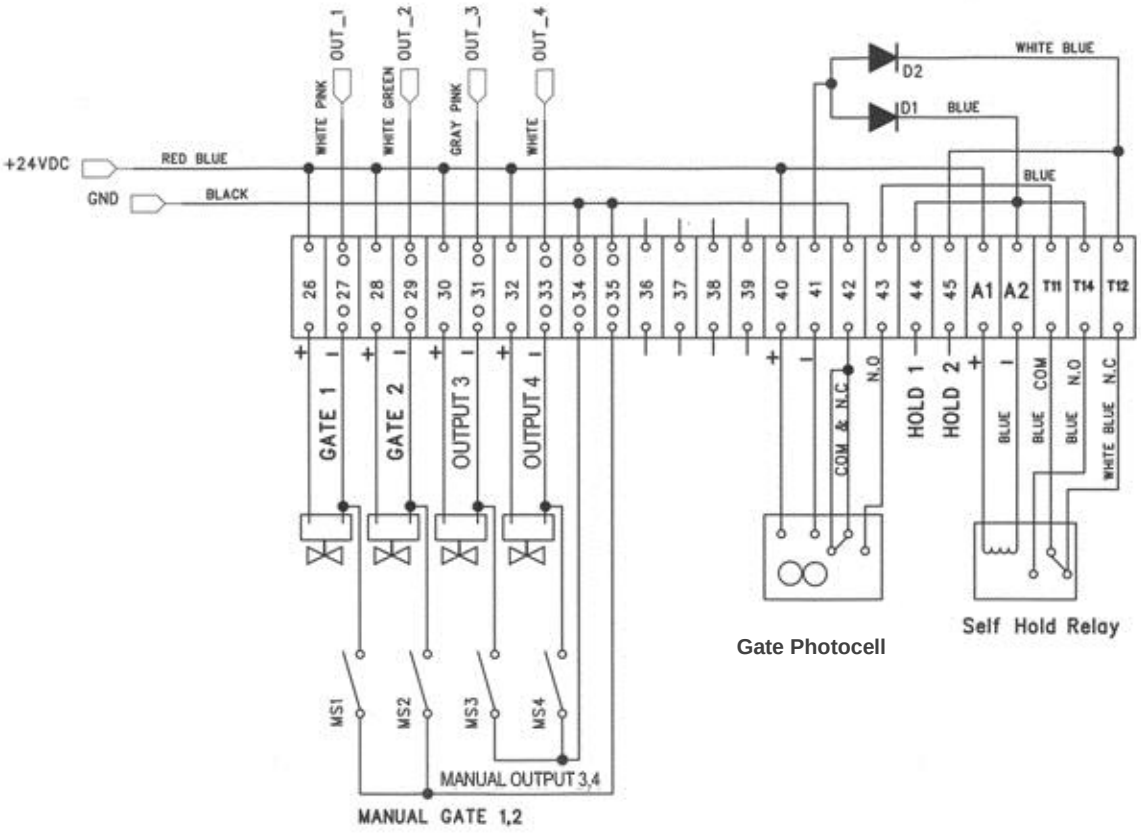


Figure 22: Wiring Diagram of Gate Photocell for AfiSort and Combined AfiWeigh/AfiSort Station

The configuration on Din Connector is as follows:

- ❑ For two exit paths where only one gate has to be held:
  - **To hold SV-1, connect 27 through 44**
  - **To hold SV-2, connect 29 through 44**
  - **To hold SV-3, connect 31 through 44**
  - **To hold SV-4, connect 33 through 44**
- ❑ For three exit paths where two gates have to be held:
  - **To hold SV-1 and SV-2, connect 27 through 44 and 29 through 45**
  - **To hold SV-3 and SV-4, connect 31 through 44 and 33 through 45**
- ❑ For three exit paths any combination of the above can be applied to two of the three gates – only be sure that one is connected to 44 and the other to 45.

Table 4: Wiring IN/OUT Devices for Weighing & Sorting

SELF HOLD OPTIONS For these self-hold options,	OUTPUT No : at these outputs,	CONFIGURE JUMPER configure these jumpers.
Two-way Sorting (1 gate)	Gate 1 or Gate 2	27-44 29-45
Three-way Sorting (2 gates)	Gate 1 and Gate 2	27-44 29-45
Two-Way Sorting (1 gate)	Gate 3 or Gate 4	31-44 33-45
Three-way Sorting (2 gates)	Gate 3 and Gate 4	31-44 33-45

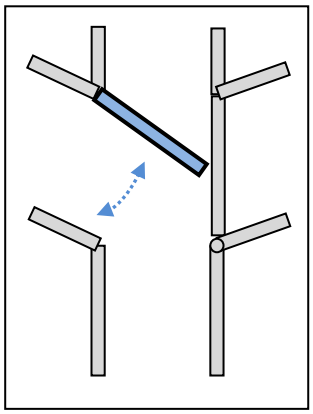
PHOTOCELL MODEL		WIRE COLOR	TASK	CONNECTOR NUMBER
OMRON +Emitter	SAE P/N: 5001026 E3JK-TR11 5M	BROWN	+DC	18,22,40
		BLUE	-DC	19,23,41
		GRAY	N.C	20,24,42
		WHITE	Common	20,24,42
		BLACK	N.O	21,25,43

Wiring the Sorting Gate and Manual Operation Box

Manual operation of the sort gate is required in the following cases:

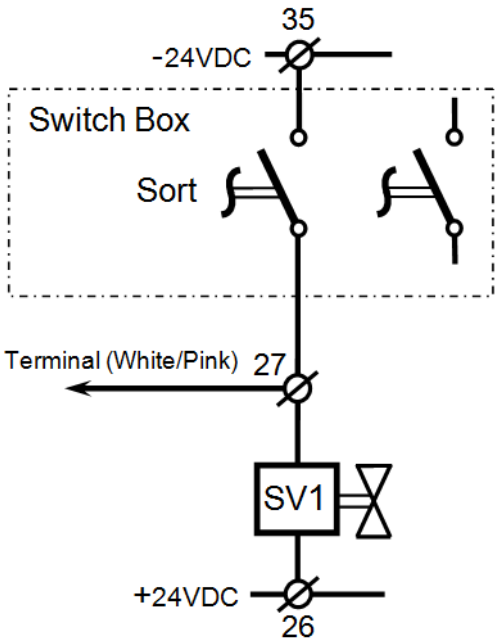
- ❑ When a cow that does not carry a tag needs to be transferred to the treatments yard
- ❑ While the system is not active.
- ❑ During technician examination.

2 Ways Sorting



For manual operation, use the selector switch to provide 24V DC directly to the solenoid.

Afimilk provides a selector box with two selectors; the box will be connected as demonstrated in the following diagram.



NOTE	RS485 communication will be connected to the IDeal via the electrical cabinet; Current Loop will be connected directly to the IDeal.

3 Ways Sorting

In a 3 ways sorting you can choose one of three options as the default pathway. While the system is in its default state, none of the solenoids is active. The default pathway is also the direction-state to which the system directs cows while it is inactive.

Setting the gates towards the right direction would be achieved by plugging the air pressure tube in the desired direction and after the proper configuration.

If you wish to choose as a default pathway the Right gate OR the Left gate, a diode is needed. Connect the diode as illustrated in the diagram below.

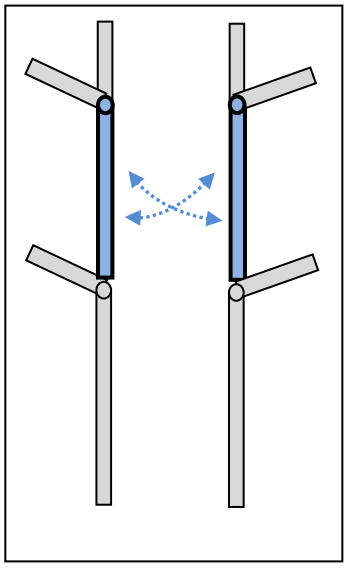
The management system in the computer activates the gates as requested.

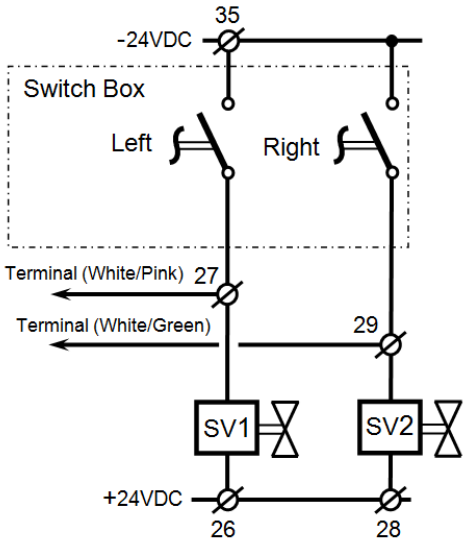
Connecting the selector switches manually using the following diagram:

SV1 – activates the left gate

SV2 – activates the right gate

-
- **i. Default Pathway – Straight**





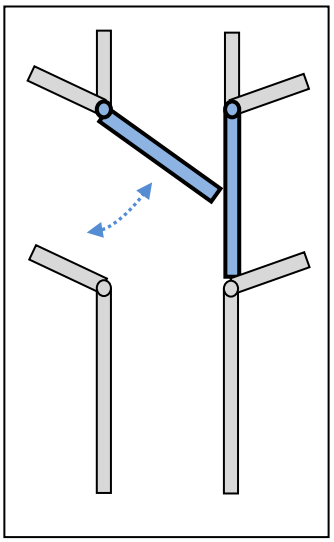
0 – 0 -> Straight (defult)

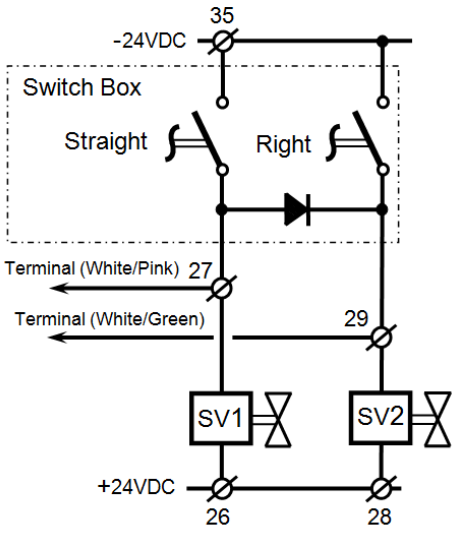
0 – 1 -> Left

1 – 0 -> Right

1 – 1 -> **Illegal !!**

- **ii. Default Pathway – Left**





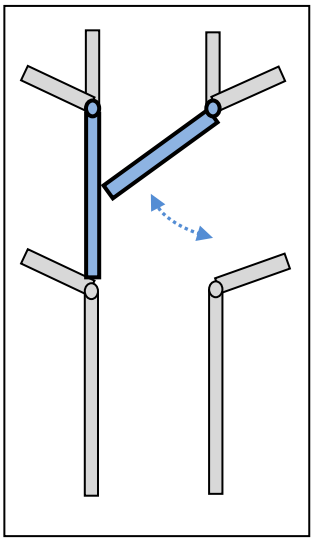
0 – 0 -> Left (defult)

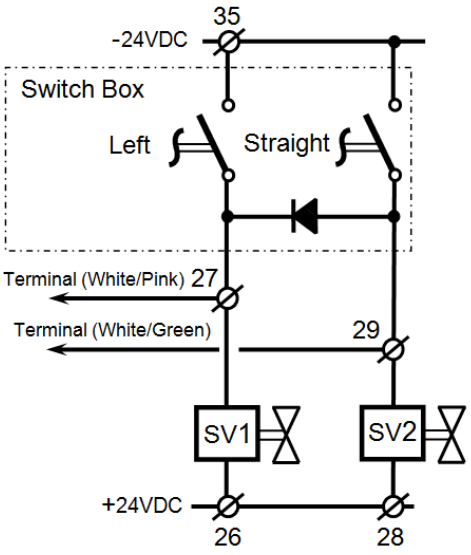
0 – 1 -> Straight

1 – 0 -> **Illegal !!**

- **1 – 1 -> Right**

iii. Default Pathway – Right





0 – 0 -> Right (defult)

0 – 1 -> **Illegal !!**

1 – 0 -> straight

1 – 1 -> Left

Note: The Diode's role is to make sure that each selector will activate the right solenoid when needed.

Diode P/N 4050320 (N4004RL/1N40021) Rear Tension 200V OR 400V

NOTE	Once the manual sorting ended, return the switch back to OFF

Wiring the Antenna

The antenna is wired **directly** to the IDeal.

Wiring the Photocells

The photocells are wired to sort &weigh connection board j8,j9,j10. Afimilk has tested the following photocells and recommends usage depending upon site conditions:

- ❑ OMRON, Through beam, Model No. E3JK-TR11 5M

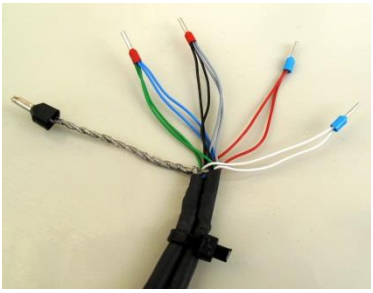
NOTE	The use of photocells, other than those listed above, may cause a system to malfunction. Afimilk will **not** be responsible for malfunctions caused by photocells other than those tested by SAE and specified above.

For the wiring instructions for the photocells approved by Afimilk, refer to Figure 21 on Page 36 and .

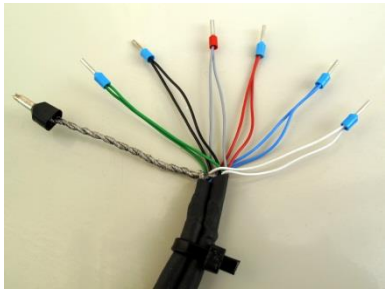
Table 4 on Page 39.

Wiring the Weigh Load Bars

Each Weigh Load Bar has a 6-strand shielded signal cable. As shown in Figure 21 on Page 36, the cables are connected **by wire color** j7 & j16 at sort &weigh connection board. If the Weigh Load Bar cables are not long enough to reach the Electric Box, use the junction box. If the cables are too long, cut and strip the ends. Then, either solder the ends or attach wire caps. Afimilk recommends that the distance to the Electric Box **not exceed** 15 meters (48 ft).



PLC Controller System



AfiScale System

Figure 23: Weigh Load Bar Signal Cables

NOTE	If replacing the PLC controller System with the AfiScale System, the Load Cell end wires need to be separated as shown in Figure 23.

CAUTIONS	❑ After either shortening or lengthening, both Weigh Load Bar cables must be the same length. Differing cable lengths may result in inaccurate measurements. ❑ It is the installer's responsibility to provide proper protection for the Weigh Load Bar cables. Bury the cables or put them into protective tubing. ❑ The entire length of the cables extending from the Weigh Load Bars, **must** be shielded. Interference will disrupt the signals if the cables are not properly shielded.

Communication Wiring

As shown in the figure below, the communication box contains two wires and D type connectors which connect the **AfiWeigh Terminal** and the **IDeal** communication cables to the AfiCom ports.

The AfiWeigh Terminal is usually connected to AfiCom port 8 or port 6 as via an RS-485 cable (with a P8 D type connector).

If using Afihub, the AfiWeigh Terminal is usually connected to the RS-485 Port (with a P8 D type connector).

The IDeal is usually connected to AfiCom port 3 or port 4 as current loop (with a P3 D type connector) and may be connected to port8 or port6 as RS 485 for Pedometer + ID Tag (with a P8 D type connector).

If using Afihub, the IDeal is usually connected to Current Loop port (with a P3 D type connector) or RS-485 Port for Pedometer + ID Tag (with a P8 D type connector).

The AfiCom/Afihub setup and the AfiPort setup should both be set to reflect the change. For more information on AfiCom/Afihub and AfiPort setup, see the *AfiCom Installation Manual* and *Afihub Manual*.

For details, see configuration options in Installation Overview on Page 10.

Wire❑ the communication as shown in Figure 24.

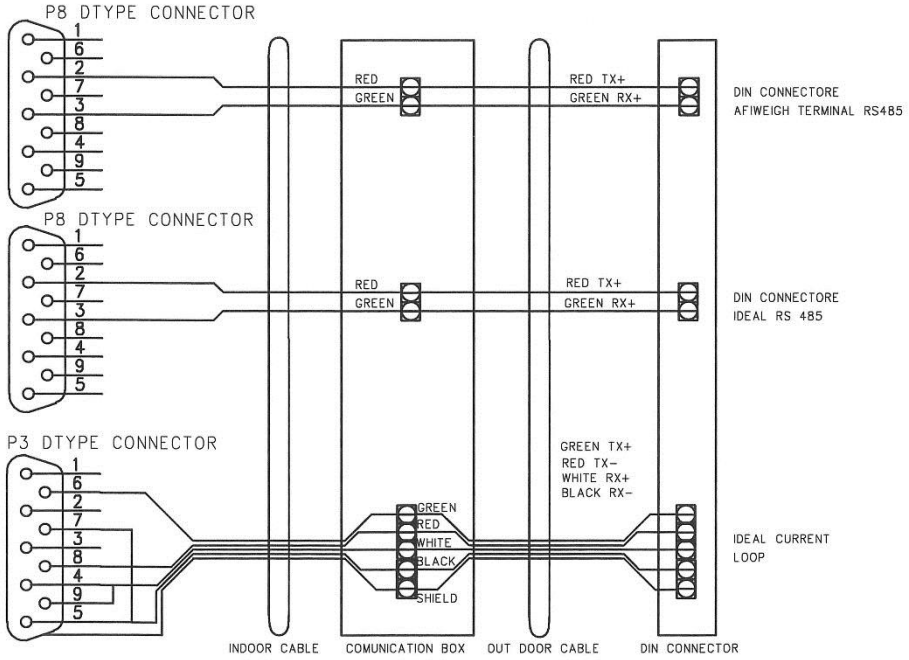


Figure 24: Communication Wiring

NOTE	RS485 communication will be connected to the IDeal via the electrical cabinet; Current Loop will be connected directly to the IDeal.

IDeal can be connected to either Current Loop or RS-485 if using Pedometer+ ID Tags.

CAUTION	Attach the communication cable shield **only** at the computer communication port. Do **NOT** wire the shield at **both** ends (computer and electrical unit). Occasionally, if there is interference that is caused by the shield connection at the computer. If this occurs, it is possible to disconnect the shield at the computer, and connect the shield at the electrical unit.

Grounding and Surge Protection

It is critically important that the system be properly grounded and protected from surges. This section describes protection for, and grounding of the Ideal and electric box.

Grounding the IDeal

The IDeal ground is connected to ideal connection board j9 shield. In addition, the installer must run a wire from segment No.1 GND to the grounded metal of the station, close to the antenna.

Grounding the Weighing Platform

The Weighing Platform must be grounded as shown in Figure 25.

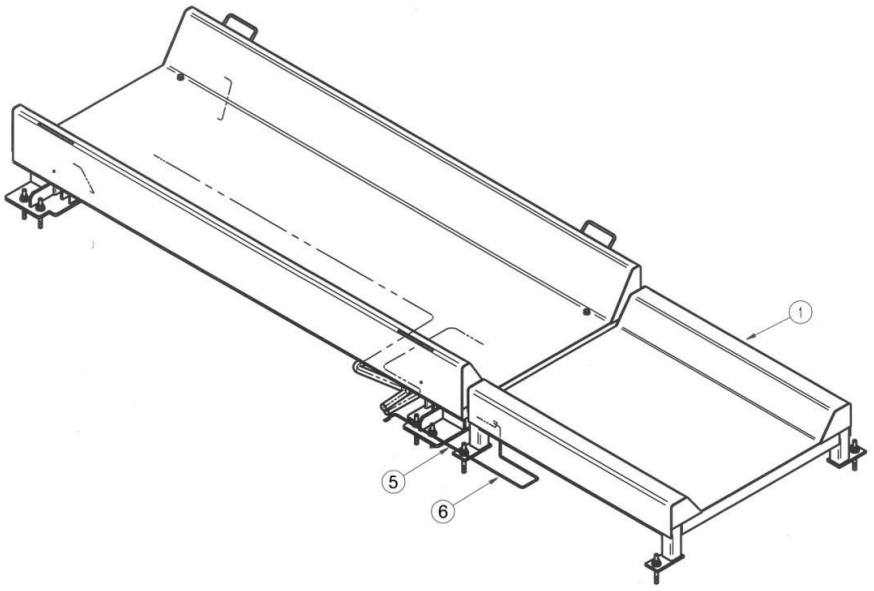


Figure 25: Weighing Platform Grounding

Reference drawing no: 5001020-AD

The hardware accessories for installing the Weighing Platform grounding are listed in Table 5.

Table 5: Weighing Platform Grounding Accessories

No.	Part Number	Description	Qnty	Drawing No.
1	5000845	Weigh Elevation Platform (trapeze) + galvanization	1	5000845-WD
5	4000271	Ground Wire Assy L=300	1	4000271-AD
6	4000270	Ground Wire Assy L=2000	1	4000270-AD

1. Assemble the ground wire before installing the Weighing Platform on the concrete floor.
2. The Long Ground Wire (6) is the standard grounding of the platform to the construction.
3. If the Weigh Elevation Platform is included, attach the Short Ground Wire (5) as shown in Figure 25.

4. Once the Weighing Platform is installed on the concrete foundation, attach the ground.

Placing Electrical and Electronic Components

The Walkover Weigh/Sort System is supported by the electronic components shown in the figure above. Cables between the components are connected in junction boxes as described below.

Communication Connection Box and Cables

The Communication Connection box is mounted beside the computer such that the two cables with the D-type connectors reach the computer with slack remaining.

When laying the communication cables, leave some slack and protect them from the sun either by using UV resistant cable or by threading the cable into a PVC hose.

Table 6 lists the communication connection box connections.

Table 6: Communication Connection Box Cable Connections

Cable	To	Protocol
P3	IDeal	Current Loop
P8 or P6	IDeal	RS-485
P8 or P6	AfiWeigh Terminal	RS-485

Photocell

The photocells are mounted on posts attached to the side rails of the station.

- Weigh station requires two photocells: cow photocell and weight photocell
- Sort station requires two photocells: cow photocell and gate photocell
- The combined Weigh and Sort station requires all three photocells: weight photocell, cow photocell and gate photocell.

Manual Gate Operation Box

The Manual Gate Operation box can be mounted in a variety of locations. It is recommended to mount the box close to the Sort Station.

Weigh Load Bars

The Weigh Load Bars are delivered with 6 meters of cable attached. If required, the cable may be extended to a maximum of 12 meters. To extend the cable use 6 strand 18–20 AWG shielded cable and the cable connection box.

Transformers

Use isolating transformers only to support **only** the system devices.

Because power drops occur when using long cables, the transformer must be as close as possible to the electric box.

Part 2
System Configuration

Introduction

Walkover AfiWeigh/AfiSort Systems communicate with the AfiFarm herd management program via the Aficom1 communication card. If installing a new AfiCom1 card with the AfiWeigh/AfiSort System, refer to the *AfiCom1 Installation Manual*.

This part explains how, using AfiFarm, to configure a Walkover Weigh/Sort System. First configure the AfiWeigh Station and then the AfiSort Station, as described below.

AfiWeigh Configuration

NOTE	For station configuration details, see the *AfiFarm Configuration Manual*.

To configure the AfiWeigh station:

1. Click **Start > Programs > AfiFarm > Config**.

   The Password dialog box is displayed.

2. In the Password dialog box, type the password AFI and click  . The Config screen is displayed.

3. In the Config window, click **Station > Add > Weigh**.

   - **If your system has more than one computer, the Select PC screen is displayed. If this screen is displayed, select the PC to which the sort station is connected (normally PC2 or PC3).**
   - **The Weigh Type screen is displayed.**
   - **If your system has one computer, the Weigh Type screen is displayed.**

4. In the Weigh Type window, select the type of weigh system you have installed: Select  for a walkover system. Click . The Weight Configuration screen is displayed.

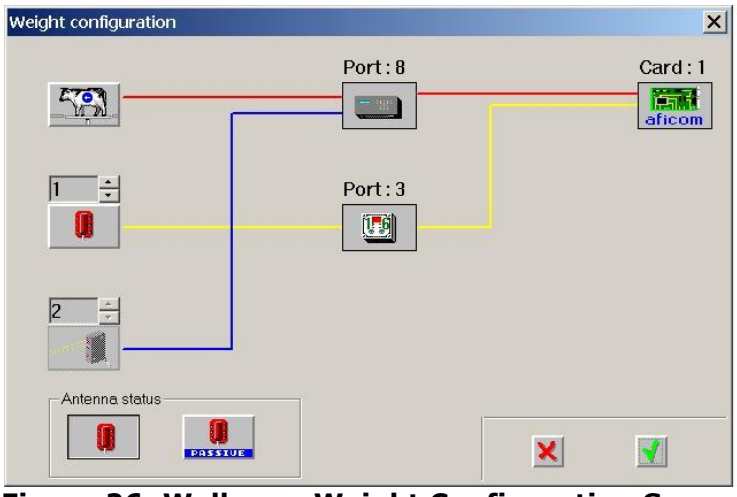


Figure 26: Walkover Weight Configuration Screen

5. In the Weigh Configuration window:

a. The default port for weigh/sort systems is port 8. To change the port, select the weighing platform icon > , and select the AfiCom1 port to which the weigh/sort system is connected.

b. Define connections for weigh station devices:

—antenna

—photocell

For the antenna, at 1, assign an antenna number to the weigh station antenna.

If a number appears with a blue background (1), the antenna number is shared with another antenna.

Continue to iii) below.

For the remaining devices:

i. At 1, select the AfiWeigh Terminal input number. If a number appears with a blue background (1), the input is shared with another device.

NOTES	The default weigh input is input number 2.

ii. Click the device icon and select connections to the computer: aficom—AfiCom1 card, (com Com port—future option).

ii. Select the AfiCom1 port to which the device is indirectly connected (via IDeal or RS-485); for example, .

NOTE	When using RS-485, you must define the indirect connection as Switch Box or 2 Antennas model.

Figure 27 illustrates the Switch Box definition.

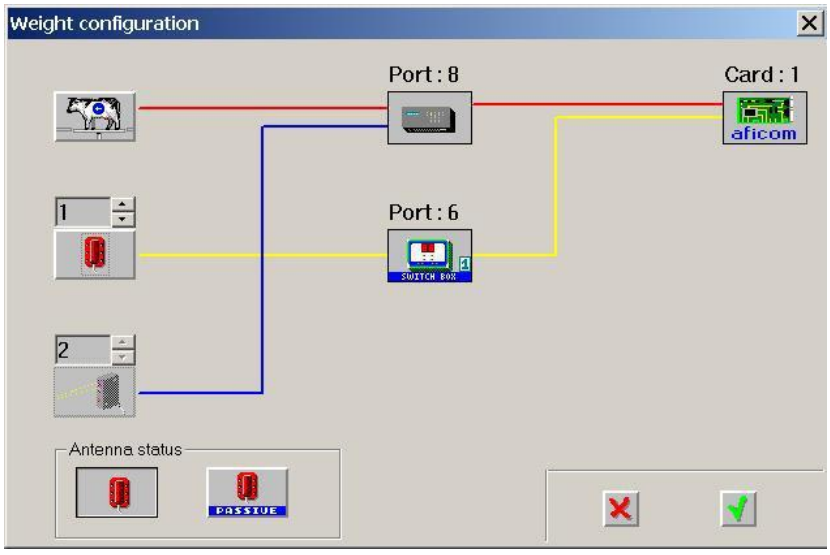


Figure 27: Walkover Weight Configuration Screen - Switch Box Definition

Figure 28 illustrates the definition for two Antennas.

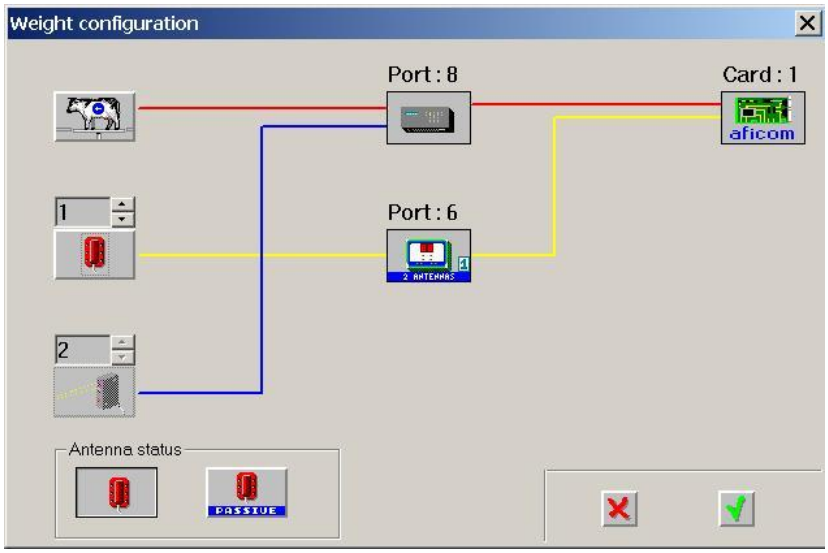


Figure 28: Walkover Weight Configuration Screen - 2 Antennas Definition

A typical designation procedure (in this example based on two Antennas definition) includes the following steps:

1. Click  . The Port screen is displayed.
2. In the Port screen, select the relevant option (in this example, 6). The Instrument screen is displayed.
3. In the Instrument screen, select the relevant designations.

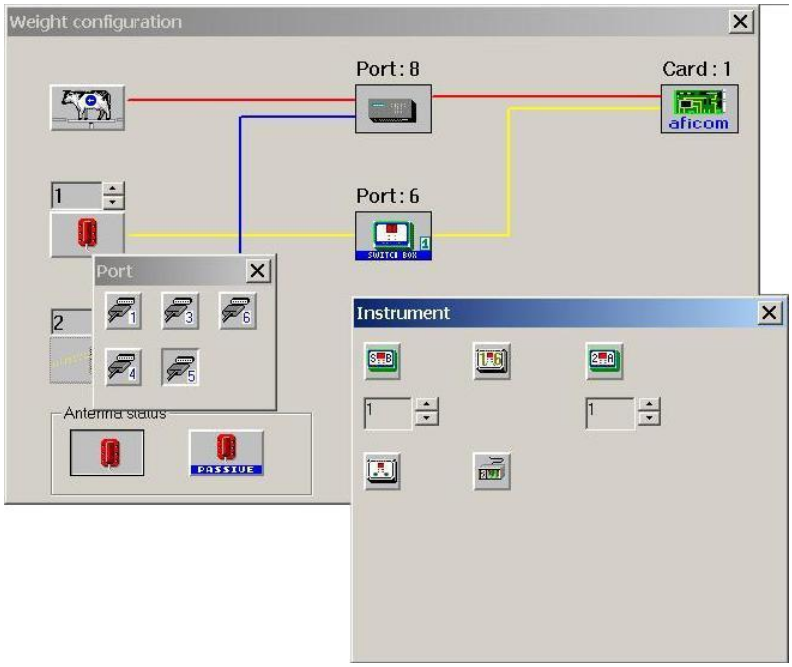


Figure 29: Instruments Screen

4. If necessary, select the controller to which the device is connected:

   —Afiweigh Terminal

   — Standard 12 bit IDeal

   — Model 16 bit IDeal

   — Model RS-485 with 2 antennas

   — Model RS-485 with antennas switch box

5. Click .

The weigh station is configured.

AfiSort Configuration

To configure the AfiSort station:

1. In the Config window, click **Station > Add > Sort**.

   - **If your system has more than one computer, the Select PC screen is displayed. If this screen is displayed, select the PC to which the sort station is connected (normally PC2 or PC3). The Sort Configuration screen is displayed.**
   - **If your system has one computer, the Sort Configuration screen is displayed.**

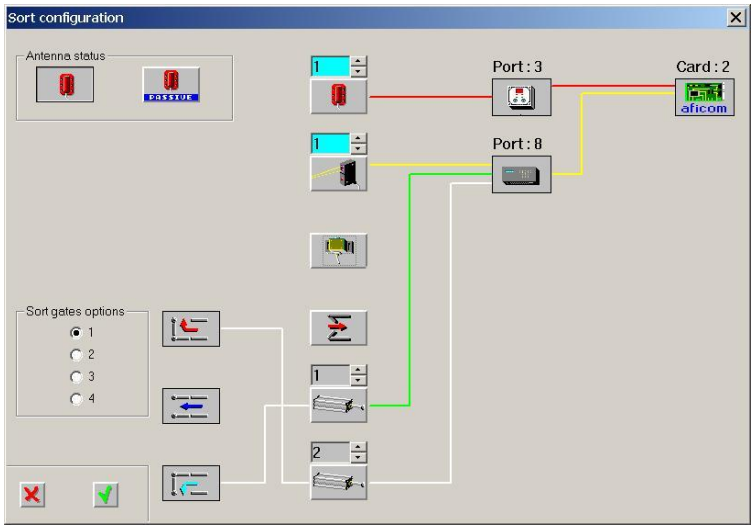
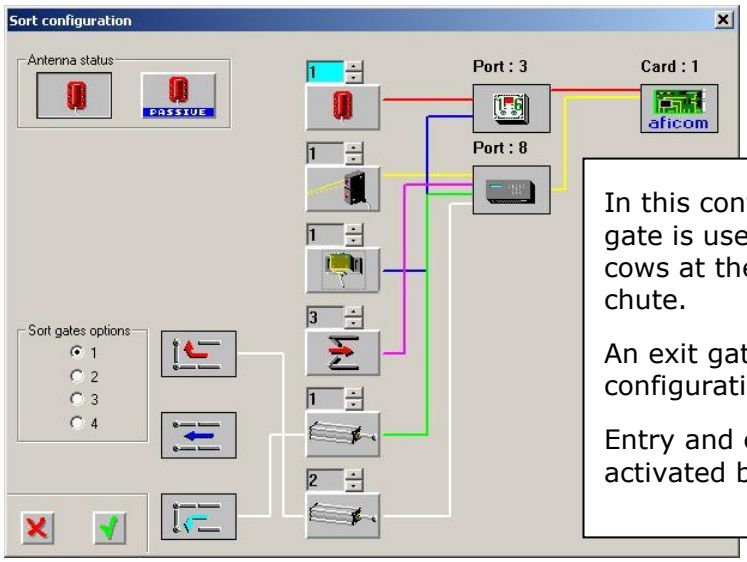


Figure 30: Walkover Sort Configuration



In this configuration, an entry gate is used to help separate cows at the entrance to the chute.

An exit gate is optional in this configuration.

Entry and exit gates can be activated by the same output.

Figure 31: Sort Configuration with an Entry Gate (with a gate limit switch to indicate gate closure)

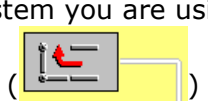
2. In the Sort Configuration screen:

   a. If passive antennas are used in the system, select 

   .

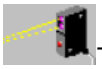
   At 

   , select the type of sort system you are using.

   Observe white lines connecting gate icons () as you select the sort type (1 = right or left; 2 = straight or right; 3 = straight or left; 4 = straight, left, or right).

   b. Define connections for sort station devices:

    —antenna

    —photocell

    —limit switch

    —device that opens entry gate

    —Sorting Gate opening device

   For the antenna, at 

   , assign an antenna number to the weigh station antenna.

   If a number appears with a blue background (

   ), the antenna number is shared with another antenna.

   For the remaining devices:

   i. At 

   , select the AfiWeigh terminal input (or output) number. If a number appears with a blue background (

   ), the input is shared with another device.

   ii. Click the device icon and select connections to the computer:

   — AfiCom1 card

    — Use this option to remove a device.

   — Com port–future option

   iii. Select the AfiCom1 port to which the device is indirectly connected (via an IDeal or RS-485). (For example, 

   .)

iv. If necessary, select the controller to which the device is connected:

 —Afiweigh Terminal

 — Standard 12 bit IDeal

 — New model 16 bit IDeal

 — Model RS-485 with 2 antennas

 — Model RS-485 with antennas switch box

Click  .

The Sort Station is configured.

Test and calibrate the system as described in the *User Guide* chapter.

Part 3
Operation Guide

First Time Operation

This guide contains information about:

- ❑ Pneumatic system, first time operation
- ❑ Testing ID range and communication
- ❑ Calibrating the Weigh Load Bars
- ❑ On-site AfiWeigh Terminal calibration

Pneumatic System: First Time Operation

Perform the following procedure to ensure the pneumatic system is functioning properly:

1. Turn on the air compressor.
2. Ensure that the manual on/off valve is open.
3. Turn the adjustment knob of the pressure regulator until working pressure is 5 Bar.

NOTE	The adjustment knob is a locking knob. Pull the knob away from the body; it clicks into the adjustment position. Turn the knob clockwise to increase the pressure and counter-clockwise to decrease the pressure. To prevent accidental change of setting, after adjustment push the knob back into the locked position.

4. Inspect the tubing connections. Ensure that there are no leaks.

Testing Antenna Range and Communication

Following installation, ensure that the system is functioning properly. The following procedure enables the technician to test any of the configuration options.

5. Prepare the tags. In all cases, standard SAE Test Tags—with Led and Dip switch—are required.
6. The system supports two type tags 200 kHz (orange case) & 80 kHz (blue case)
7. The 200 kHz tag is part numbered 4086388; the 80 kHz tag is part numbered 4087388. If testing a sort system, define one or two additional tags to match the sort number code for the Sorting Gates in the system. Each tag must be matched to a different Sorting Gate.
8. Launch AfiFarm and click  (AfiMen real-time icon, near the clock). In the Real-time window, click the 

tab. Ensure that the IDeal icon, the Weigh Control icon and the weighing platform icons are blue.
9. If testing a weigh only or a Weigh/Sort Station, cover the weighing photocell. If testing only a sort station, cover the Cow Photocell.

10. On the AfiWeigh Terminal display, a green LED lights when the Weight Photocell is covered. A Red LED illuminates when the Cow photocell is covered. The IDeal Tx LED flashes and the large 7 segment display shows the current antenna.
11. Set the Test Tag Dip switch to OFF.
12. Pass the Test Tag at a height of 70 mm (2¾ in) along an approximate radius of 800 mm (32 in) from the antenna. The range must cover as much of the Weigh Elevation Platform as possible but extend no more than 50 mm (2 in) into the Weighing Platform.
    - **If the antenna range is set properly, the Led on the Test Tag flashes.**
    - **If the antenna range is not set properly, remove the cover of the IDeal and locate potentiometer P2. The potentiometer controls the antenna range. Turn the potentiometer anticlockwise to increase the range and Turn-clockwise to decrease the range.**

NOTES	
	❑ For optimal system performance, all antennas must be elevated only up to 150 mm (6 in) above where the cows pass through.
	❑ Ensure that the range covers as much of the Weigh Elevation Platform as possible without extending more than 50 mm (2 in) into the Weighing Platform; there are **no gaps** in the reception.

To test the receiving range:

1. Pass the Test Tag through a point on the radius illustrated above. The green Led on the IDeal flashes for an instant indicating that the antenna has received the tag's transmission.
2. Uncover the Weighing Photocell while walking on the Weighing Platform. The weight appears on the AfiWeigh Terminal display; ensure that it also appears on the computer screen.

To test sort and weight:

Figure 32 illustrates the range of the antenna in the combined AfiSort/AfiWeigh configuration.

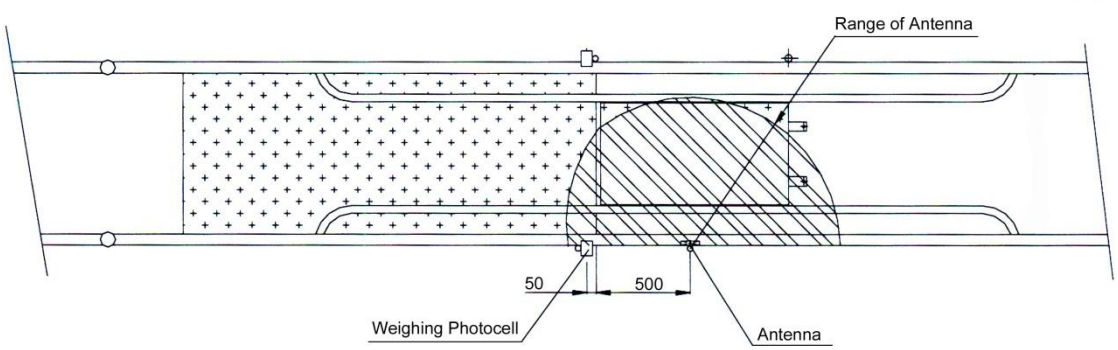


Figure 32: Testing Antenna Range for Combined AfiSort/AfiWeigh

1. Using AfiFarm define an ID tag with sorting code and gate (see *AfiFarm User Manual*).

NOTE	If there are three sorting directions, you have to define ID tags for each direction.

2. Cover the weighing photocell.
3. Perform identification with one of the defined tags.
4. Cover the Cow Photocell and ensure that the matching Sorting Gate functions.
5. Uncover the Cow Photocell and ensure that, after approximately 30 seconds, the Sorting Gate returns to its normal, default status.
6. If applicable, repeat steps 2–4 with the second defined tag.
7. Operate Sorting Gate 1 with the manual switch and ensure that the gate works. Return the manual switch to its original position.
8. If applicable, repeat step 6 for the second Sorting Gate.

Calibrating the Weighing System

NOTE	The Weighing System must be calibrated on installation. It must be recalibrated in the following cases: once a year; when any connected assemblies are changed; and if results appear incorrect.

Before performing the calibration, ensure that the Weighing Platform is:

- ❑ Clean and has no weight on it
- ❑ Free of obstructions beneath the platform, and that the platform can move freely.

To calibrate the Weigh Station:

NOTE	Do not perform Weigh Station calibration using a moving weight (such as a person or cow). Perform calibration with a minimum weight of 300 kg (660 lb).

1. Verify that the weigh platform is clear.
2. Press 

until **CAL O** appears.
3. Press 

. **CAL O** is displayed (flashing) while the unit compiles the value.
   Then **Success** is displayed briefly, and on the LCD with smaller digits, 000 is permanently displayed.
   If a value other than 000 appears, repeat steps 2 and 3 until 000 remains permanently.
4. Press 

until **PUT LOAD** appears (flashing).
5. Type the amount of kilograms or pounds of the weight used for calibration (for example 300 [kilograms]).
6. Place the calibration weight on the Weigh Platform.
7. Press 

CAL is displayed (flashing) while the unit compiles the value.

   Then **Success** appears briefly, and the amount of the calibration weight is displayed on the small LCD.

If a value other than the weight on the platform is displayed, repeat steps 4 – 7 until the correct value appears.

Entering the threshold value

The threshold value determines the minimum amount of weight that will activate the weighing process.

1. Press 

until **TRSHLD** is displayed
2. Enter a value of 1.
3. Press 

. **Success** is displayed briefly.

Changing display units between Kg and Lb

1. Click 

. **SET UN** is displayed, and the current unit type (KG or LB) flashes.
2. Click 

.or 

to scroll to the desired unit. The unit changes to the selected unit.
3. Click 

. **Success** is displayed briefly. The selected unit is stored and locked.

Communication indicators on the Display Panel

Communication between the *AfiWeigh* terminal *and the computer*

A circling arrow around the computer icon indicates proper communication between the *AfiWeigh* terminal display and the computer.

When the computer blinks and there is no arrow circling around it, there is no communication between the *AfiWeigh* terminal display and the computer.

Communication between the AfiWeigh terminal and the *AfiScale* card

When ABSENT appears on the display, then there is a communication fault between the *AfiScale* card, and the *AfiWeigh* terminal display.

When a system is set for kilograms, and LB appears on the display panel, there may be a communication fault between the AfiScale card, and the AfiWeigh terminal display.

Manual Gate Operation

Gates can be manually operated, from the AfiWeigh Terminal Display keyboard, as follows:

- To activate gate 1, press F and 1.
- To activate gate 2, press F and 2 ABC.
- To activate gate 3, press F and 3 DEF.
- To activate gate 4, press F and 4 GHI.

Upgrading Software

In order to upgrade software, the AfiWeigh terminal must be in a "Loader" mode. To put the AfiWeigh terminal in loader mode, press F and 5 JKL.

The software upload is carried out by a program that is referred to as "AfiLoader."

To check the current software version that is in the AfiWeigh Terminal, press F and 0.

Backlight Display

To turn off the display backlight, press F and .8B

Operation Sequence

This section, on the following pages, contains operation sequence flow charts for each of the three configuration options.

Sort System Operation Sequence

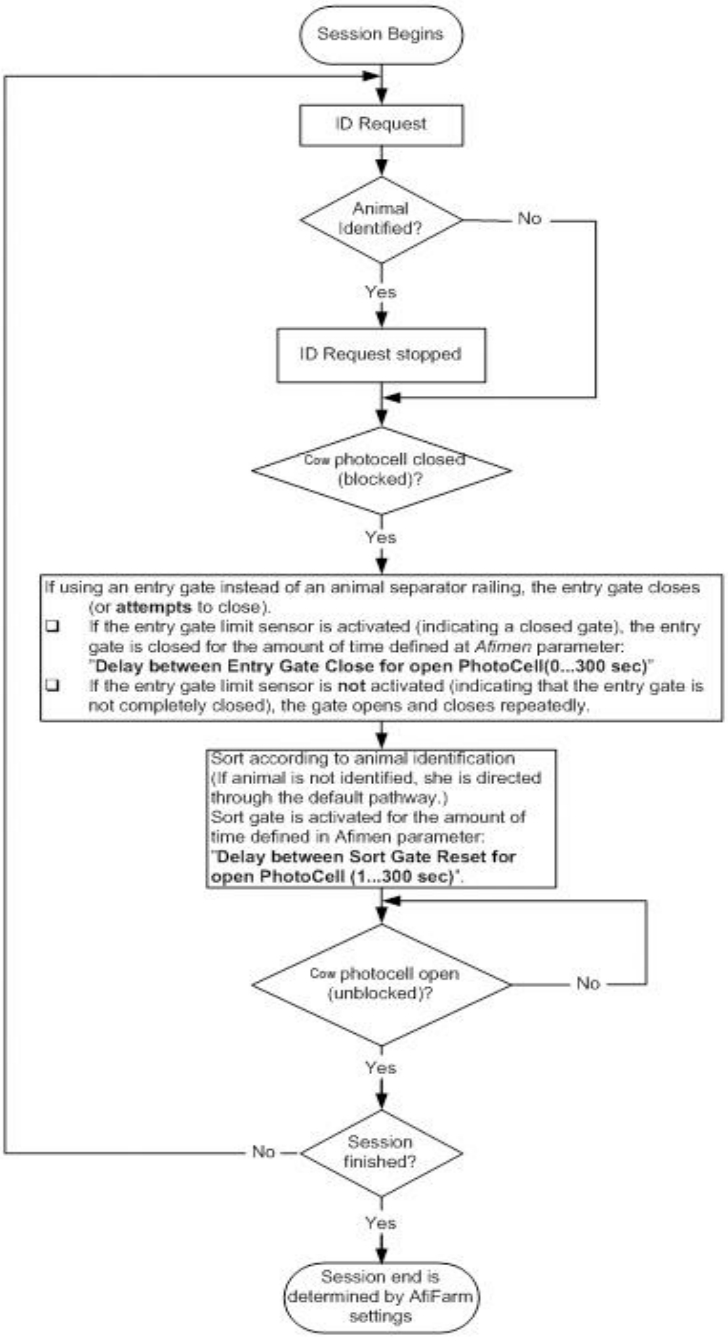


Figure 33: Sort System Operation Sequence

NOTE	Separation between cows is essential for efficient Sort Gate operation. When a cow requiring treatment is diverted to the treatment area, the sort gate remains in the "treatment diversion" position for an amount of time (as defined by AfiMen parameter Delay between Sort Gate Reset for open Photocell (1…300 sec)). If two cows overlap and the photocell is not cleared, the gate remains open and the second cow, not requiring treatment, will also be directed into the treatment area.

Weigh System Operation Sequence

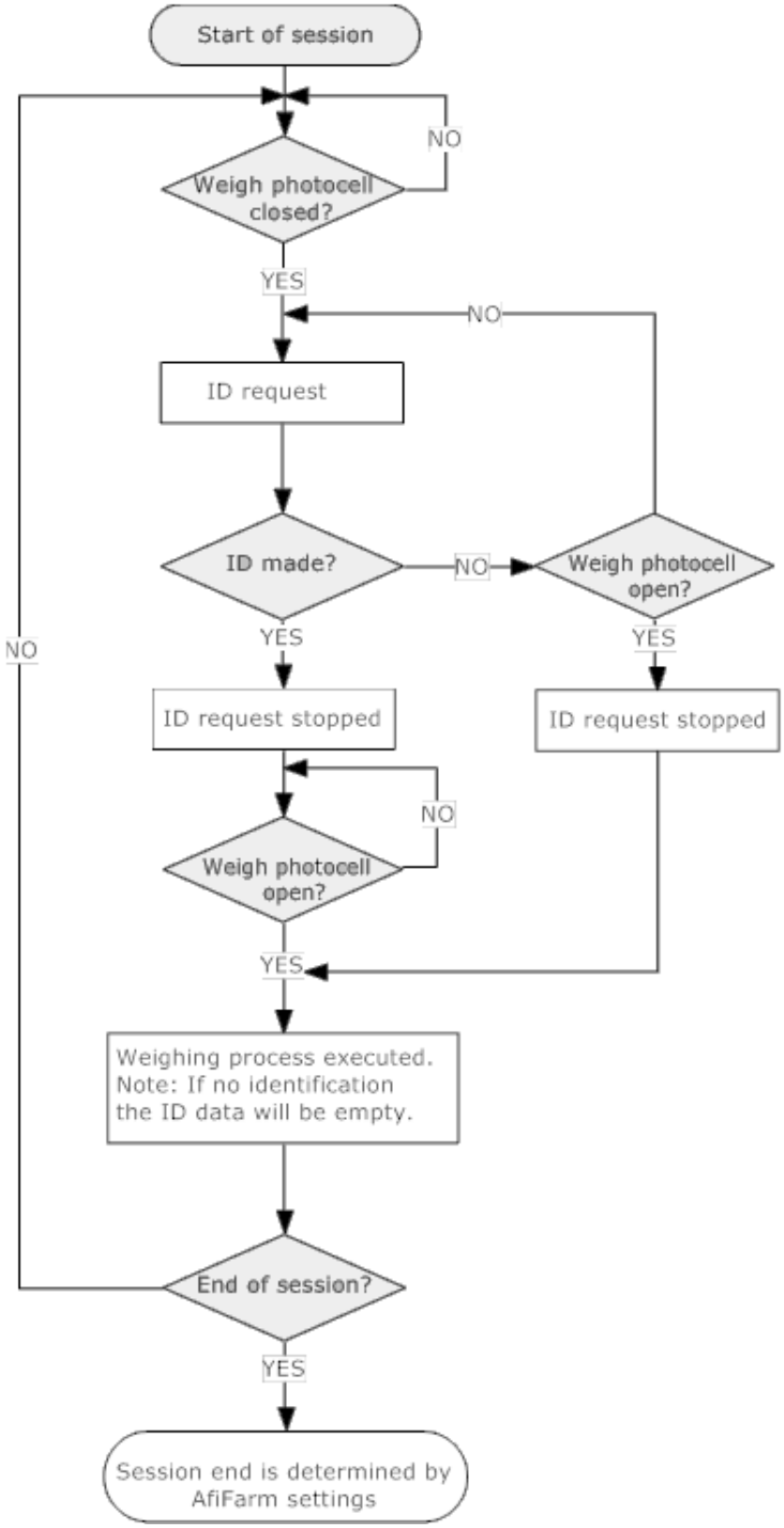
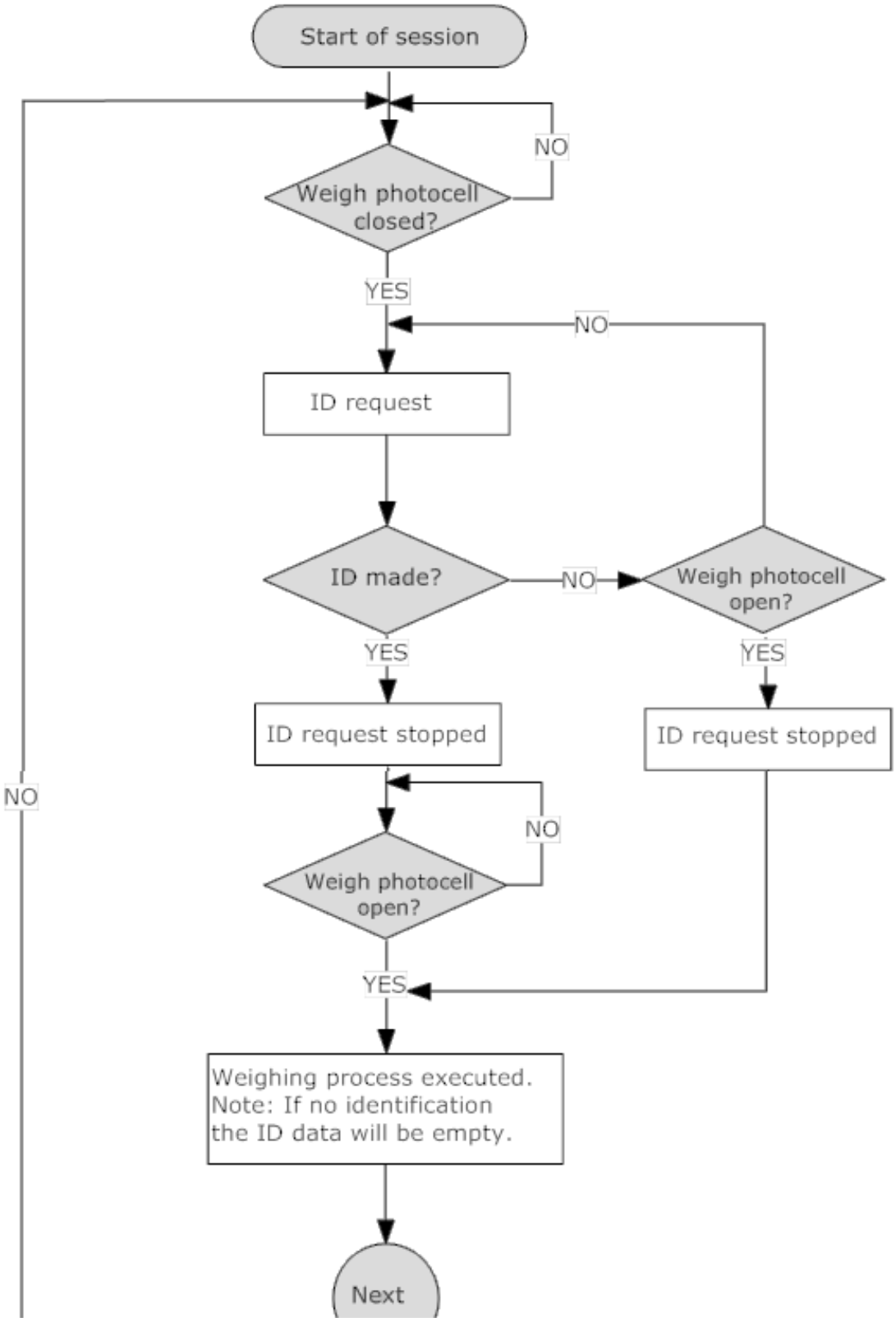


Figure 34: Weigh System Operation Sequence

Weigh and Sort Operation Sequence



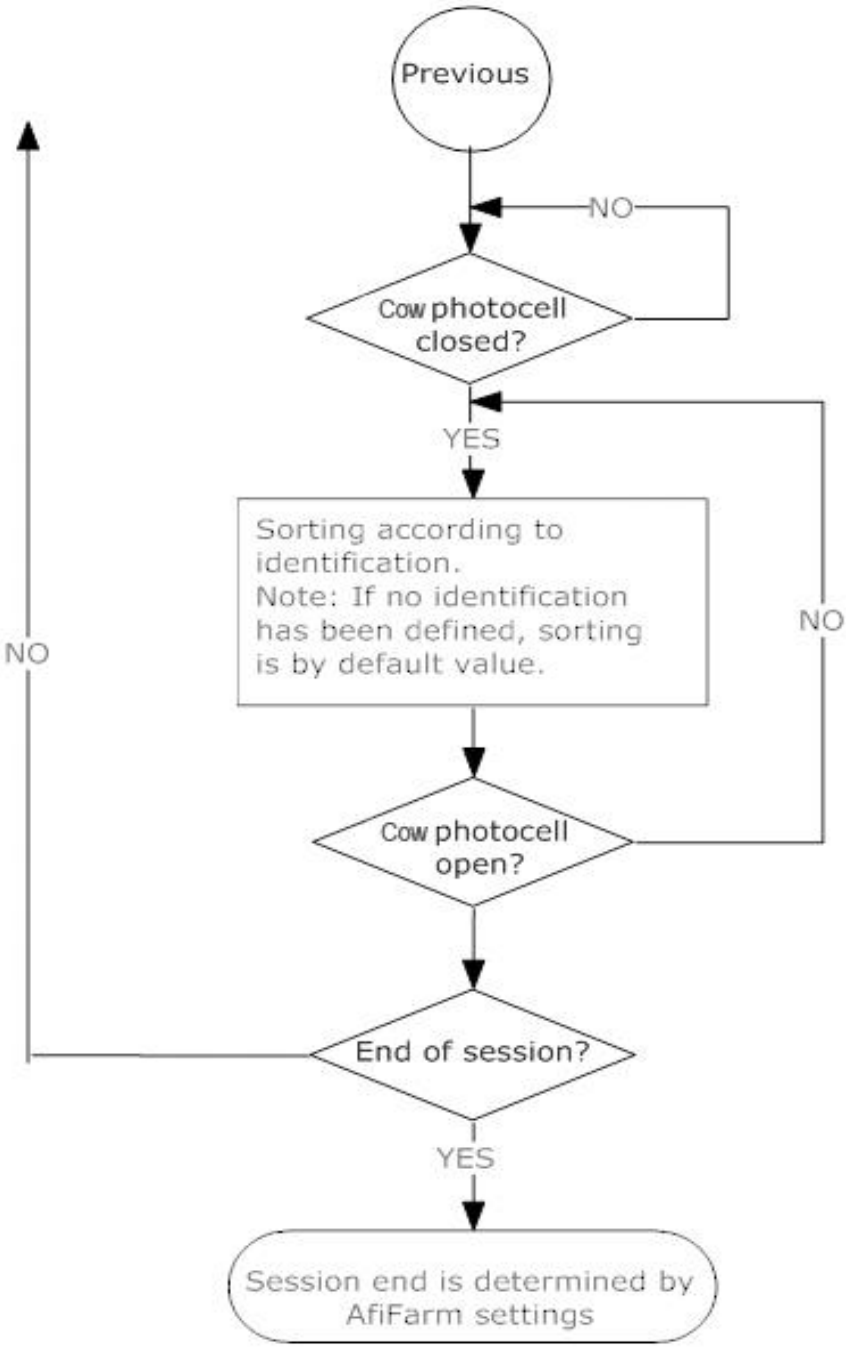
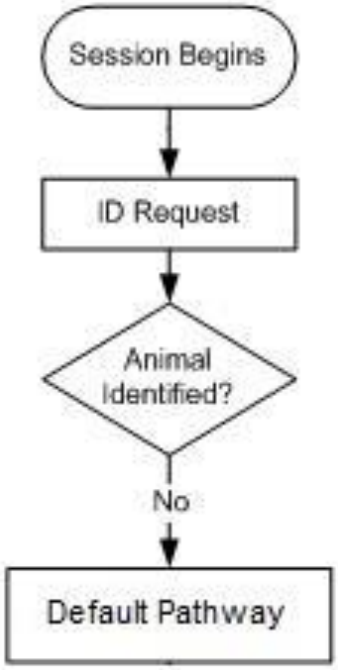


Figure 35: Weigh and Sort Operation Sequence

Logic for Animal not identified

This section presents the system's implemented logic, activated when an animal is not identified by the antenna.



When the system has an unidentified animal, one of the following options can be selected as the default system behavior:

1. Send the animal back to the sort entrance

2. Send the animal for manual action

3. Send the animal to the same location where the last animal was identified

The preferred option has been found to be number 3 - sending the animal back to the location of last-identified animal. This is according to research, which has shown that in most cases of an unidentified cow, it is the same cow that had already been identified by the system. We learned that as cows do not like changes in their routine, when they are sent to a place other than their normal routine they refuse to progress and stay in their position. After several seconds, when the sorting gate closes, the cow photocell starts searching for a new cow, while the previous cow is still in the sorting station and its sorting command had been deleted.

By choosing option number 3 this problem can be prevented.

Setting a default pathway: Refer to AfiFarm user manual.

Part 4
Troubleshooting

Troubleshooting

This section contains information designed to help locate and repair faults in the system. Because every system is made up of separate units, this document is divided into troubleshooting segments. Each segment focuses upon a different unit of the system. Be aware of the fact that the troubleshooting process results in overlaps between units and may involve checks of more than one unit.

NOTE	Before beginning a troubleshooting procedure, it is recommended ensuring that all wires in the Electric Box are properly seated and securely attached.

Voltage and Test Points

Table 7 provides the test points for the various voltages in the system.

Table 7: Voltage and Test Points

Function and Voltage	Units	Voltage Range		Test Point		Notes and Location
		Low	High	Connector Block	Connector Block	
Power IN: 24 VAC	VAC	21.5	26.5	(~) L	N	
Power Supply IN: 24 VAC	VAC	21.5	26.5	24 VAC	24 VAC	
IDeal Power IN: 24 VAC	VAC	21	27	J3/IDeal	J3/IDeal	
Weigh Load Bars Input	VDC	4.95	5.05	12	17	

- The fuses can be tested by measuring the voltage on both sides of the fuse. The common probe must be connected to the relevant circuit.
- Polarity measurement of DC voltage is very important.

System Troubleshooting

Use the following table to locate the appropriate troubleshooting procedure:

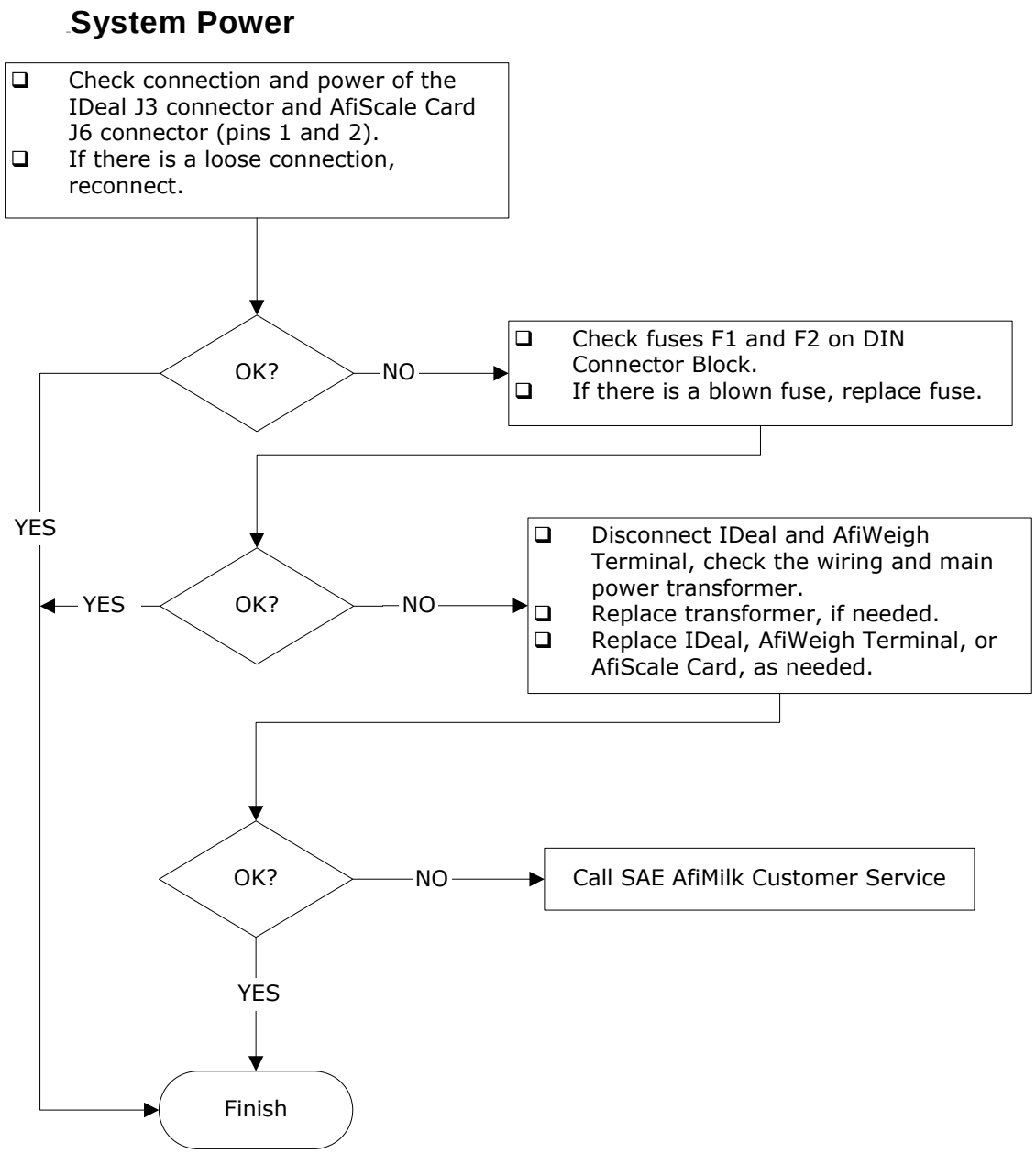


Figure 36: System Power Check Procedure

ID Tag Transmission

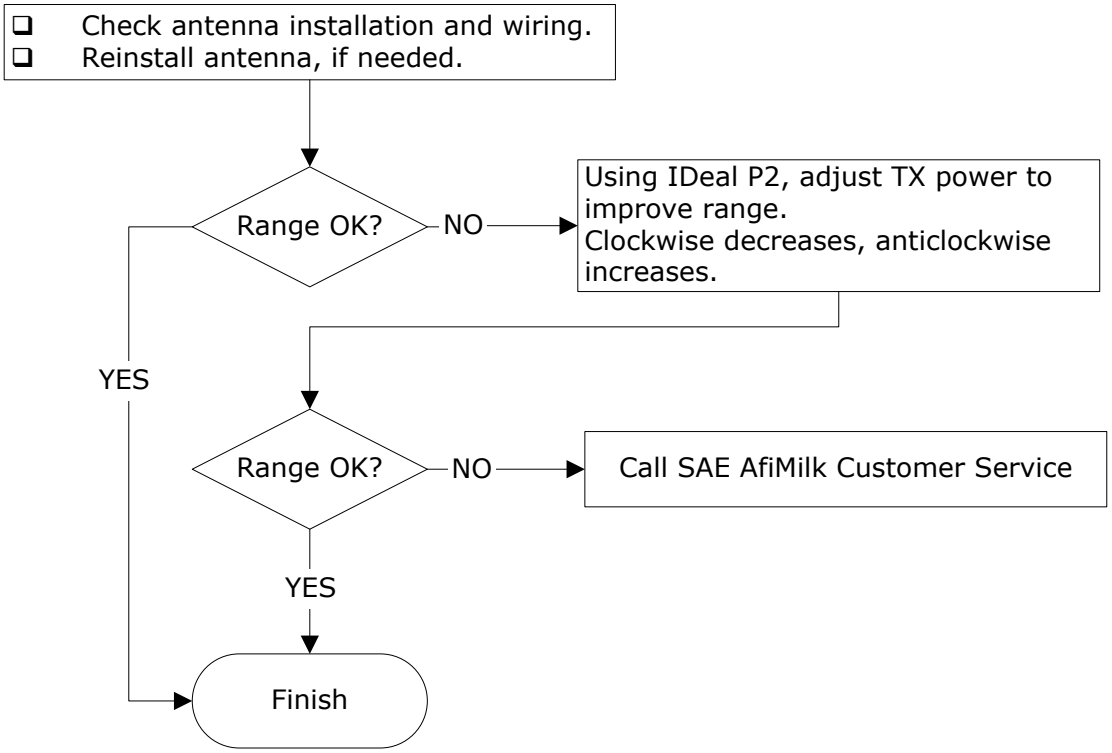


Figure 37: IDeal Transmission Problem Procedure

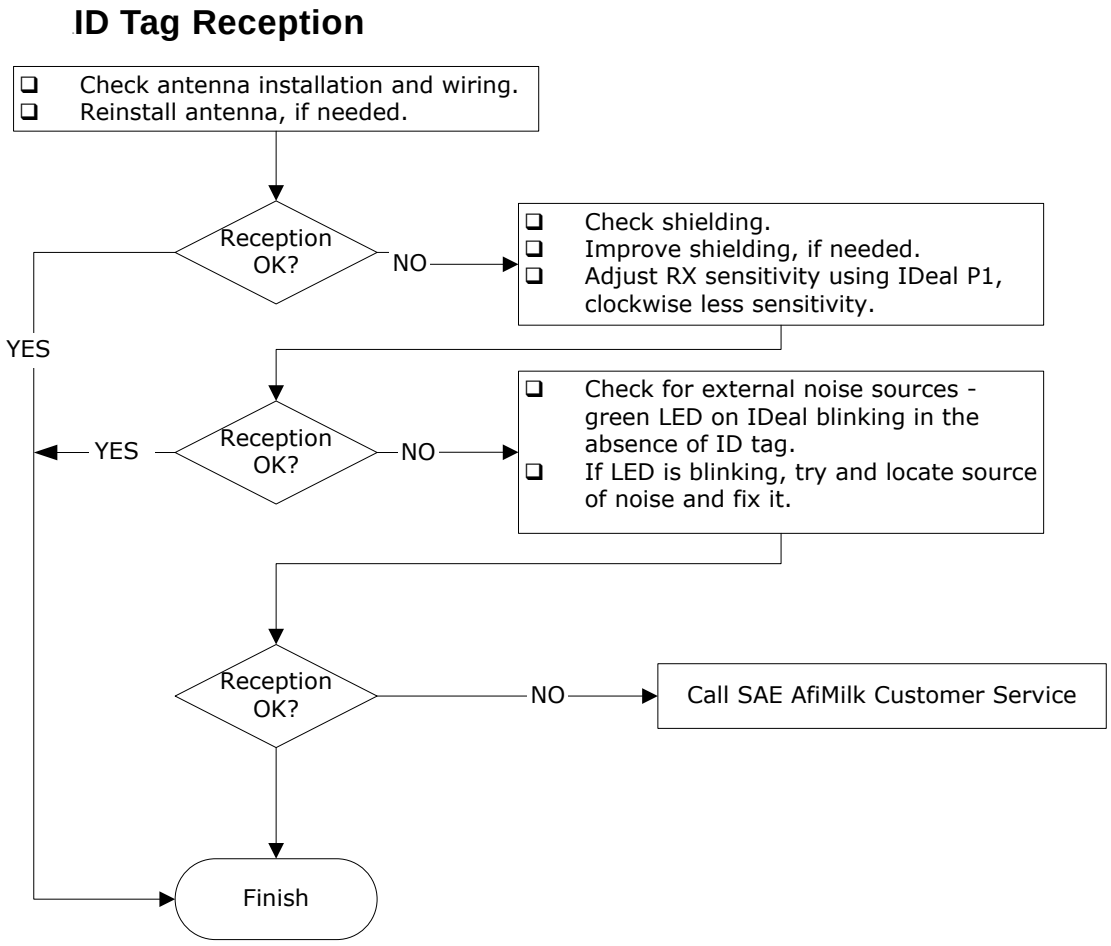


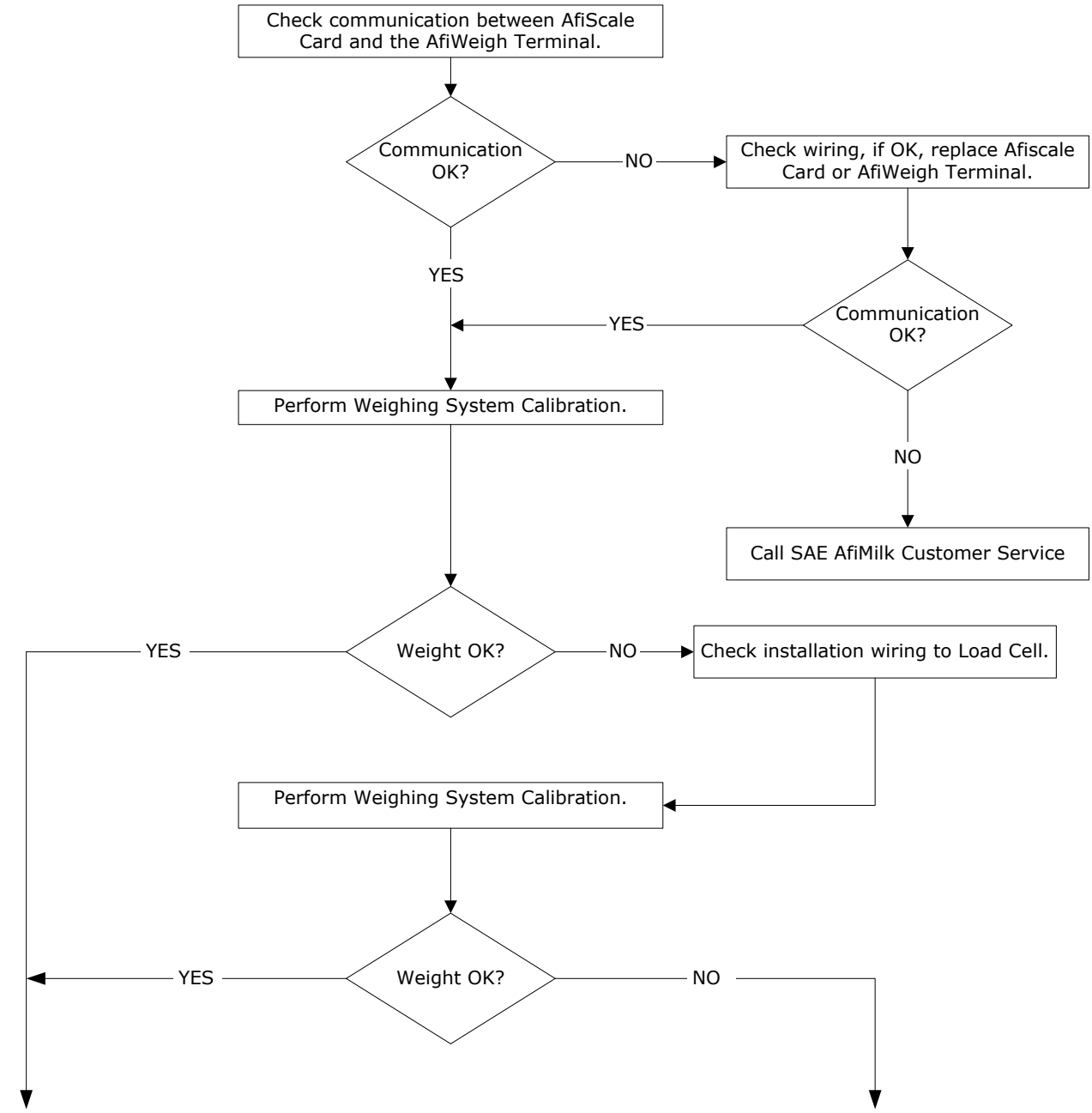
Figure 38: Reception Problem Procedure

Weigh Station Troubleshooting

This procedure assumes that the 24 VAC from mains, fuses F1, F2, AfiWeigh Terminal, AfiScale Card, identification system and communication have already been checked and found to be in order.

NOTES

- Since the Load Cell is expensive, it is recommended that SAE Afimilk customer service be called for determining if the Load Cell really needs to be changed.
- Due to the procedure's length, the figure is spread over two pages.



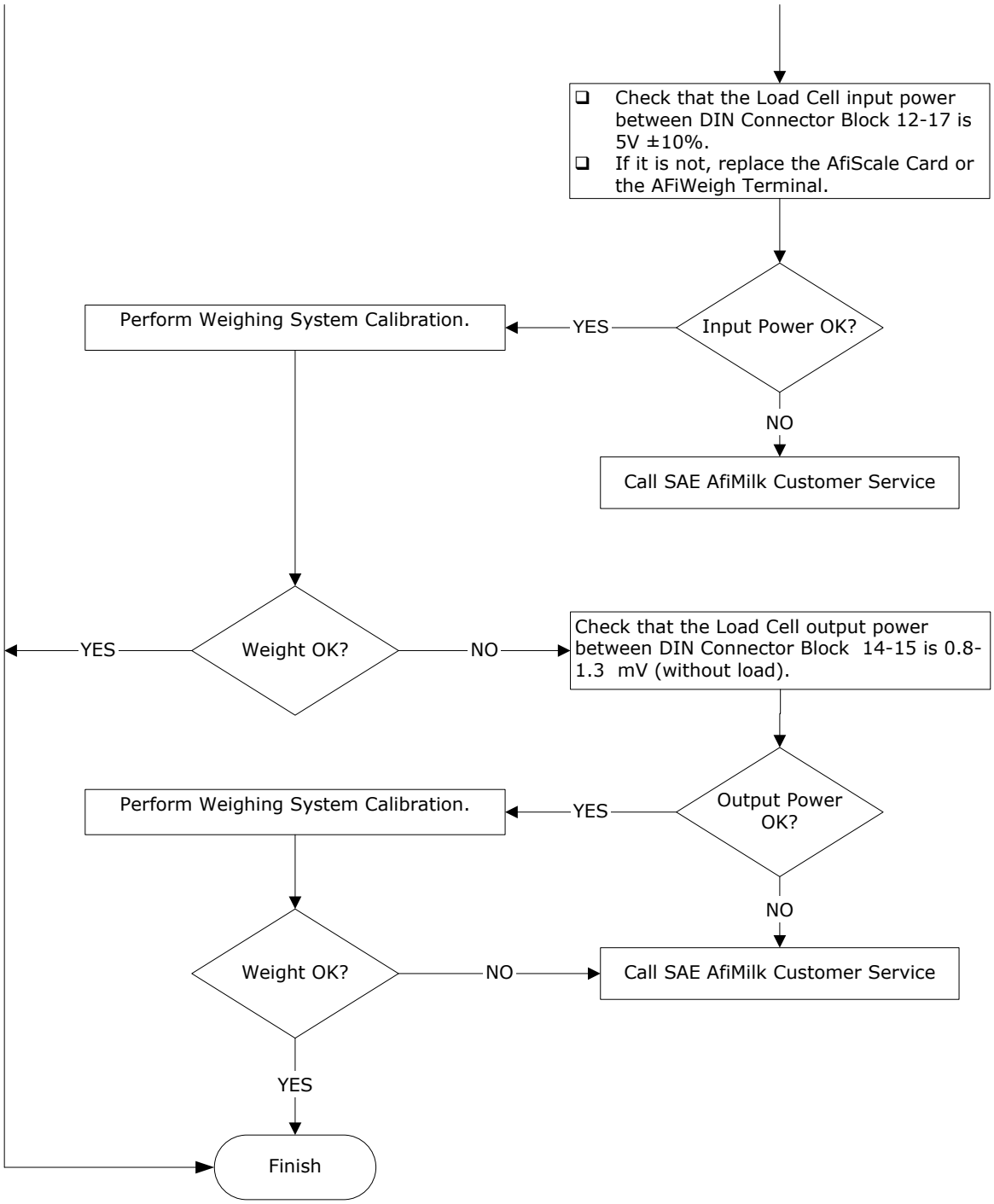


Figure 39: Weigh Problem Procedure

Load Cell Troubleshooting

This section describes the troubleshooting procedure when the Load Cell malfunctions.

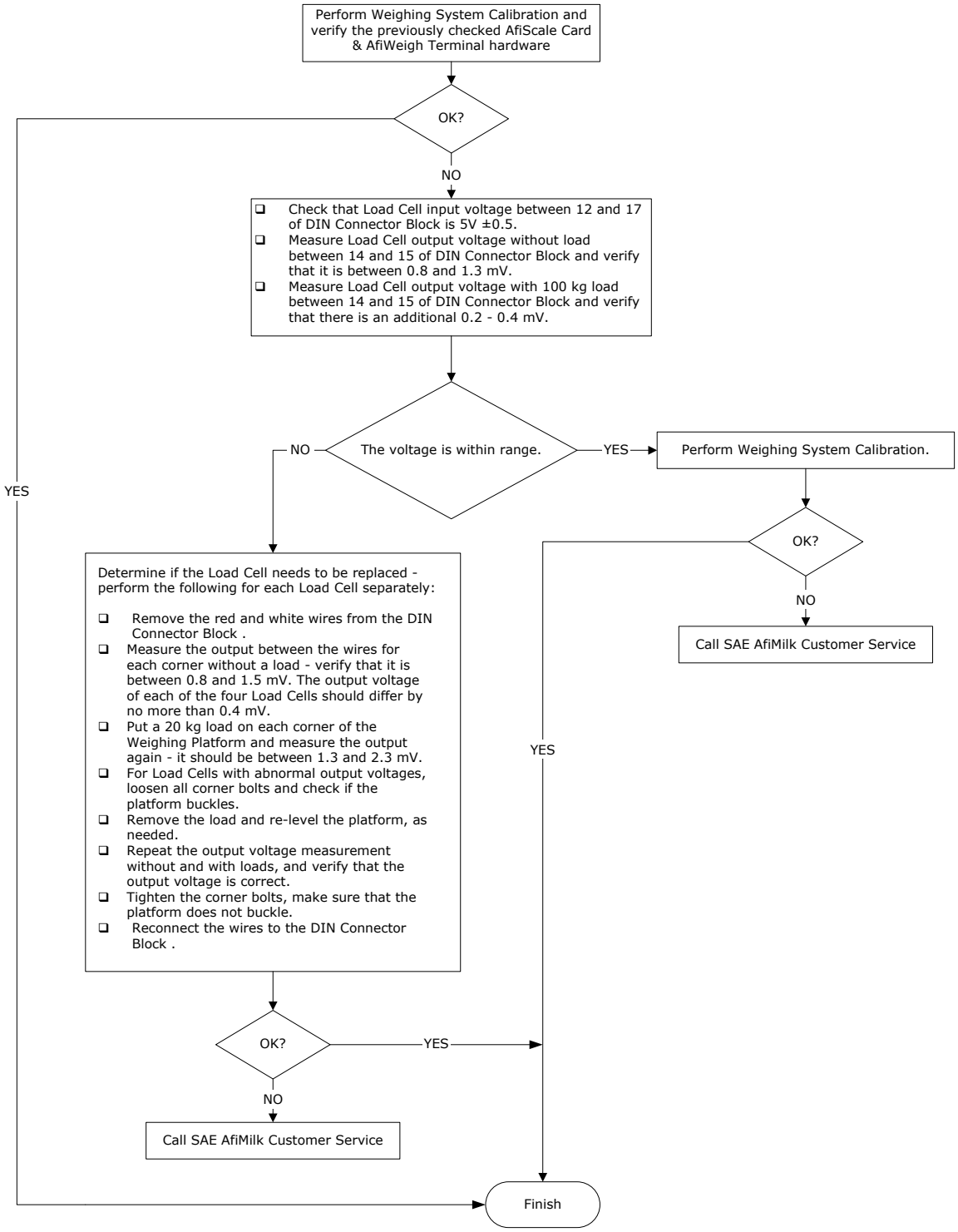


Figure 40: Load Cell Malfunctions Troubleshooting Procedure

AfiSort Station Troubleshooting

This procedure assumes that the 24 VAC from mains, fuses F1, F2, AfiWeigh Terminal, AfiScale Card, identification system and communication have already been checked and found to be in order.

To locate the problem in the AfiSort Station, perform the following procedure.

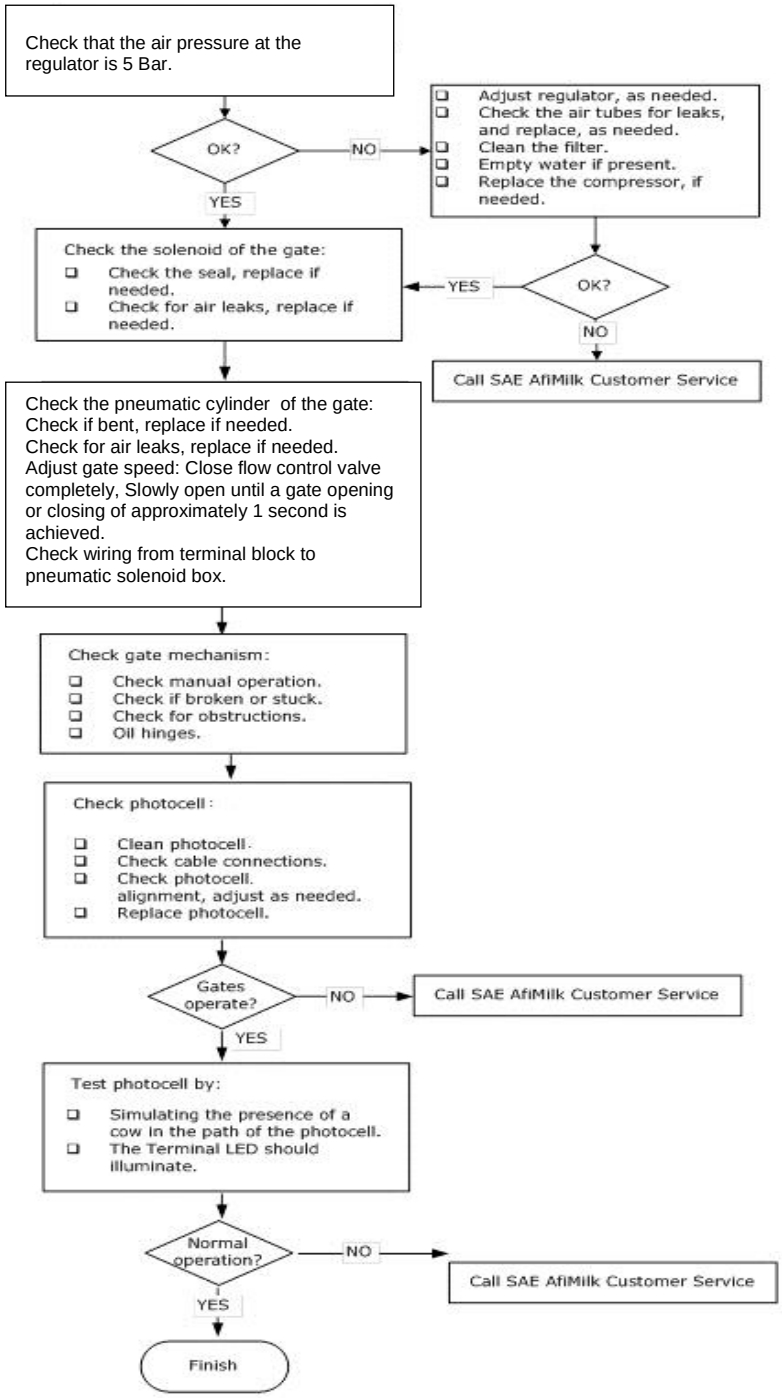


Figure 41: AfiSort Station Troubleshooting Procedure

Separation Solutions

Once the cows are accustomed to the station, several adjustments may still need to be made. As well, in the event of problems either maintaining separation between cows, cows retreating from the exit area, or identification, the station may require the installation of an accessory.

This section describes solutions to:

- ❑ Configuring Sorting Gate secondary position
- ❑ Installation with second Sorting Gate
- ❑ Mechanical non-return gate
- ❑ Solutions to cow separation problems
- ❑ The loop antenna

CAUTION	Hose down the area around the Weigh Load Bars at least twice a week. Accumulated cow manure affects the operation of the weighing platform. Afimilk will not be responsible for malfunctions resulting from prolonged contact with accumulated manure.

Configuring Gate Parameters

Two parameters control time spans of gate openings.

To change the parameters

1. Launch AfiFarm and click  (AfiMen real-time icon, near the clock).
2. In the Real-time window, click the  tab, and then click the  button.

   The Sort Parameters screen is displayed.
3. In the Sort Parameters window, enter the desired time spans:
   - **The first parameter defines the amount of seconds the entry gate is closed, when a cow is detected by the photocell.**

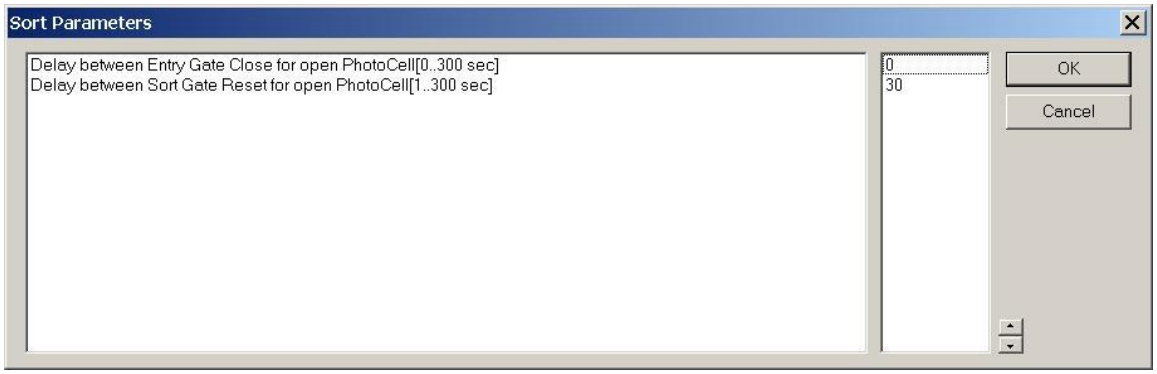


Figure 42: Sort Parameters Screen

- **The secondary position of the sort station is when cows are diverted into the treatment yard. After a cow has been diverted into the treatment yard, and if an additional cow is not identified, the gate remains in this secondary position for 30 seconds. If an additional cow is not detected within these 30 seconds, the gate returns to the default position (cows are directed to the primary area). The default setting for this time span is 30 seconds; however, it can be changed in the second parameter.**

* This delay in reset is to prevent excessive opening and closing of the Sorting Gate.

4. Click OK. The parameters are set to the new time spans.

Mechanical Non-Return Gate

In the event that it is not possible to modify the exit path or the entrance to the treatment yard as described in the previous section, Afimilk recommends the installation of a mechanical non-return gate.

The non-return gate is a fully mechanical double-gate; neither pneumatics nor electricity is required. The cow pushes the gates open as it passes through. The gates close after the cow has passed.

Location of the mechanical non-return gate will depend upon factors at the site.

Solutions to Separation Problems

Separation between cows is critical to the proper functioning of **every** system. In the event that the entrance paths, side rails, path-narrowing rails, and Separator fail to create the necessary separation between cows, Afimilk recommends the installation of one of the accessories described below.

Installing an Entry Gate

If 100% identification of cows is demanded, the dairy must install an entry gate. The entry gate creates the necessary separation between **every** cow. Different types of gates exist. Afimilk recommends the use of a double-gate as illustrated below:

Figure 43: Entry Double Gate

Installation instructions vary according to the type of gate ordered.

Upgrade Replacement

If changing from the PLC Controller System to the AfiWeigh/AfiScale system, the Electric Box is the only component that has to be replaced with the new model, in accordance to the configuration option. All sensors and the pneumatic system remain the same.

If expanding the AfiWeigh system to the combined AfiWeigh/AfiSort system, then the gates and sensors have to be upgraded.

If expanding the AfiSort system to the combined AfiWeigh/AfiSort system, then the AfiWeigh Weighing Platform has to be installed and the AfiScale Card has to be installed in the Electric Box.

The system supports 4 outputs and 2 inputs as follows:

- **Outputs:** Sort for Gates 1-4 (AfiFarm software configuration can only assign up to gate 4)
- **Inputs:** Sort/Weigh for photocells
- **Limit Inputs:** Up to 2 inputs indicating the status of the gates

To upgrade the system software application:

1. AfiScale Card has to be replaced with a new card matching the application.
2. For the AfiWeigh Terminal, run the **AfiLoader** application. This will lead you through the process of upgrading the software.