

User manual

## **Avimax**

Code No. 99-94-0482 GB

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## EC Declaration of Conformity



**Big Dutchman.**

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In accordance with the EC directive:

- Machinery Directive 2006/42/EC, annex II, part 1, section A



The product named below was developed, designed and manufactured in accordance with the above mentioned EC / EU Directive and under the sole responsibility of Big Dutchman.

Description	Avimax
Serial number and year of construction	According to the customer order no.

The following harmonised standards were applied:

- DIN EN ISO 12100:2011-03 Safety of machinery – General principles for design – Risk assessment and risk reduction
- EN 60204-1:2018 Safety of machinery – Electrical equipment of machines – Part 1: General requirements
- DIN EN ISO 13850:2016-05 Safety of machinery – Emergency stop function – Principles for design

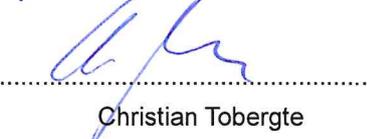
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<b>1</b>	<b>About this manual</b>	<b>1</b>
1.1	Structure of the safety instructions	2
1.2	Supplier's documentation	2
<b>2</b>	<b>Safety</b>	<b>3</b>
2.1	General safety regulations	3
2.2	Operator's responsibility	5
2.3	Staff qualifications	5
2.4	Personal protective equipment	6
2.5	Designated use	7
2.6	Ordering of spare parts	7
2.7	Safety instructions when operating electrical appliances	8
2.7.1	Protective-equipotential bonding (earthing) of the system	8
2.8	System-specific safety regulations	9
2.8.1	Safety symbols on the system	9
2.8.2	Danger zone	10
2.8.2.1	Feeding system	10
2.8.2.2	Water supply	10
2.8.2.3	Manure removal	10
2.8.2.4	Ventilation system	10
<b>3</b>	<b>System description</b>	<b>11</b>
<b>4</b>	<b>Climate concepts</b>	<b>12</b>
4.1	Heating (no birds in the house)	12
4.2	After the moving-in procedure	14
4.3	Ventilation without roof fresh air	15
4.4	Ventilation with roof fresh air (Fumus)	16
<b>5</b>	<b>Initial operation</b>	<b>17</b>
5.1	Important notes on putting gear motors into operation (aeration)	18
<b>6</b>	<b>Operation of the system</b>	<b>19</b>
6.1	Preparations for the moving-in procedure	19
6.1.0.1	Airing / ventilation	19
6.1.0.2	Heating / heat requirements	21
6.1.0.3	Feed supply	21
6.1.0.4	Feeding system	22
6.1.0.5	Water supply	23
6.2	Moving birds in	25
6.2.1	Stocking density	26

6.2.2	Moving-in procedure . . . . .	28
<b>6.3</b>	<b>Daily tasks . . . . .</b>	<b>29</b>
6.3.1	House temperature . . . . .	30
6.3.2	Feeding system . . . . .	33
6.3.3	Water supply . . . . .	34
6.3.4	Lighting program . . . . .	37
6.3.5	Manure removal intervals . . . . .	38
<b>6.4</b>	<b>Preparation of the moving-out procedure . . . . .</b>	<b>40</b>
6.4.1	Climate before and after moving the birds out . . . . .	41
6.4.2	Light . . . . .	41
6.4.3	Shutting off the feed supply . . . . .	41
6.4.4	Position of the lift . . . . .	42
6.4.5	Manure removal . . . . .	42
6.4.6	Manure curtains . . . . .	43
<b>6.5</b>	<b>Moving birds out . . . . .</b>	<b>44</b>
<b>6.6</b>	<b>Adjustment and monitoring processes during the moving-out procedure . . . . .</b>	<b>48</b>
6.6.1	Monitoring of the pressure roller distances at the manure removal drive . . . . .	48
6.6.2	Adjusting the pressure roller support . . . . .	49
6.6.3	Readjusting the manure belts . . . . .	52
6.6.4	Checking the manure belt tension . . . . .	53
6.6.5	Readjusting the chain tension of the broiler transport elements . . . . .	54
<b>6.7</b>	<b>After the moving-out procedure . . . . .</b>	<b>55</b>
<b>7</b>	<b>Maintenance . . . . .</b>	<b>56</b>
7.1	Drinking system . . . . .	57
7.2	Feeding system . . . . .	58
7.3	Manure belt drive . . . . .	59
<b>8</b>	<b>Cleaning and disinfection . . . . .</b>	<b>60</b>
8.1	Service life of equipment . . . . .	60
8.2	Disinfection . . . . .	61
8.3	Hygiene . . . . .	62
8.4	Information regarding silicon dioxide for mite control . . . . .	63
8.5	Before cleaning . . . . .	63
8.6	Comparison between wet and dry cleaning . . . . .	64
8.7	Wet cleaning . . . . .	64
8.8	Dry cleaning . . . . .	66
8.9	Drinking system . . . . .	67
8.10	Feeding system . . . . .	68
8.11	Manure removal . . . . .	69
<b>9</b>	<b>Checklist key points summary . . . . .</b>	<b>70</b>

## 1 About this manual

Observe the instructions in this manual to ensure correct and safe use of the system.

Keep this manual safe for future use.

All persons assembling, operating, cleaning and servicing this system must be familiar with the contents of this manual.

These persons must always have access to the manual. Keep this manual in the immediate vicinity of the system for this reason.

Observe the comprised safety instructions!

If this manual is damaged or lost, request a new copy from **Big Dutchman**.

This manual is protected by copyright. The information and drawings included in this manual may not be copied without the manufacturer's consent, nor may they be misused or disclosed to third parties.

The contents of this manual may be altered without prior notice.

If you find mistakes or unclear information in this manual, please do not hesitate to let us know.

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## 1.1 Structure of the safety instructions

### **DANGER!**

This indicates risks that will lead to personal injury resulting in death or to serious injuries.

---

### **WARNING!**

This indicates risks that could lead to personal injury resulting in death or to serious injuries.

---

### **CAUTION!**

This indicates risks or insecure procedures that could lead to moderate or minor injuries.

---

### **NOTICE!**

This indicates notes preventing property damage and leading to an effective, economic and environmentally-conscious handling of the system.

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## 1.2 Supplier's documentation

The supplier's documentation includes all instructions for components that are supplied by **Big Dutchman** but not manufactured by **Big Dutchman**, for example motors. These instructions are usually supplied with the respective component. If this is not the case or if the language of the corresponding country is not included, please request this documentation from **Big Dutchman** .

It is essential to observe the instructions in the supplier's documentation!

## 2 Safety

### 2.1 General safety regulations

Only work with suitable tools and observe the local accident prevention regulations.

 **WARNING!**

Live parts may be bare when performing different types of tasks. Touching live parts can lead to injuries caused by electric shock and short circuits.

- ▶ Set the main switch to "Off" before starting any repair or maintenance tasks.
- ▶ Secure the system against reactivation.
- ▶ Attach a fixed sign to indicate that maintenance and repair tasks are in process!
- ▶ Never touch bare electrical components.
- ▶ Equipment with bare electrical components must not be used by the operating staff.

Check safety and function control devices to ensure safe and accurate operation after carrying out any tasks.

Observe the regulations of local water distribution and power supply companies.

 **WARNING!**

Defective or disassembled safety devices can lead to serious injuries or to death!

- ▶ It is strictly forbidden to remove or put out of operation any safety device.
- ▶ If safety devices are damaged, immediately put the system out of operation. Lock the main switch in zero position and eliminate any damage.
- ▶ Make sure that all safety devices are properly mounted and function after work on the system has been completed and before putting the system into operation (again).

**⚠ WARNING!**

- ▶ Parts lying about on the system and in its vicinity can cause persons to stumble and / or fall and thus risk injuring themselves by contact with system components.
- ▶ Parts lying about in or on the components can lead to serious damage of the system.
- ▶ Never deposit objects (e.g. spare parts, replaced parts, tools, cleaning tools etc.) in the accessible areas of the system or in the surrounding areas after having worked on the system!
- ▶ **Before** putting the system into operation again, assure yourself that all loose or replaced parts have been removed from the system components!

**⚠ DANGER!**

Persons may be electrocuted or suffer serious electrical injuries if water from leaking hoses, seals and pipes reaches live parts.

- ▶ Disconnect the main power supply.
- ▶ Interrupt the main water supply.
- ▶ Only now may you enter the part of the house where large quantities of water have escaped.

**i NOTICE!**

Leaking hoses, seals and pipes can cause structural damage or destroy electrical systems by short circuits.

- ▶ Check regularly whether large quantities of water are escaping and eliminate the leaks as soon as possible.

**⚠ WARNING!**

Children must not access the system. The safety distances for the system are not designed for children. A risk of injury cannot be excluded, even for supervised children.

## 2.2 Operator's responsibility

The operator is subject to the legal obligations regarding occupational safety and is responsible for the staff's safety. All safety, accident prevention and environmental protection regulations applicable for the area of use of the system must be observed. The following is especially important:

The operator must clearly specify responsibilities for operation, maintenance and cleaning.

The operator must provide the staff with the necessary personal protective equipment.

The operator is responsible for

- using the system in compliance with the designated use;
- ensuring that the system is only operated in an excellent state from the technical point of view and that maintenance intervals are observed;
- ensuring that his staff is trained to use the system;
- ensuring that operation instructions are prepared for the system.

## 2.3 Staff qualifications

Staff must consist of qualified persons who can be expected to perform their tasks reliably. Persons whose ability to respond is impaired, e.g. by alcohol, drugs or medication, must not work on the system. The operator is responsible for which persons he employs. **Big Dutchman** does not assume any liability for personal injury and property damage caused by insufficiently qualified staff.

## 2.4 Personal protective equipment



### WARNING!

The following instructions apply to any task carried out on the system.

- ▶ Wear **close-fitting protective clothing** and **protective footwear**.
- ▶ Use **protective gloves** where there is a risk of hand injuries and **safety goggles** where there is a risk of eye injuries.
- ▶ Do not wear **any rings, necklaces, watches, scarves, ties or other items** which could get caught in parts of the system.
- ▶ Make sure that **long hair is always tied back**. Hair can get caught in driven or rotating working units or parts of the system, resulting in serious injuries.
- ▶ When working underneath the system **always** wear a **hard hat!**



## 2.5 Designated use

The **Big Dutchman** system may only be used for the purpose for which it is designated. Any deviating use is considered non-designated use. The manufacturer shall not be liable for any damage resulting from such non-designated use. The user alone bears the risk. The designated use also includes the exact compliance with operating, maintenance and assembly requirements of the manufacturer.

## 2.6 Ordering of spare parts

### CAUTION!

For your own safety, use original **Big Dutchman** spare parts only. For third-party products that have not been released or recommended and for modifications (e.g. software, control units), judging whether there is a safety risk in connection with **Big Dutchman** systems is not possible.

### NOTICE!

The exact description of the spare parts to be ordered can be found by means of the position number in the spare parts list.

#### Indicate the following when ordering spare parts:

- the code number and description of the spare part;
- the customer number or order number;
- the current supply, e.g. 230 / 400 V – 3 Ph – 50 / 60 Hz.

## 2.7 Safety instructions when operating electrical appliances

### NOTICE!

Only qualified electricians may install and work on electric parts / assembly groups in accordance with electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).

### WARNING!

If an electric part is open, dangerous electric tensions are bare. Be aware of the danger and keep staff of other professions away from the danger zone.

### NOTICE!

Do not install control devices directly in the house but in the service room to prevent corrosion caused by e.g. ammonia gas.

### 2.7.1 Protective-equipotential bonding (earthing) of the system

The system must be earthed professionally by the operator or a company commissioned by him at suitable points and according to the valid local guidelines and standards (e.g. IEC 60364-7-705 mod. 2006 / DIN VDE 0100-705: Low-voltage electrical installations – part 7-705: Requirements for special installations or locations – Agricultural and horticultural premises) for protective-equipotential bonding.

The earthing points must be connected with the foundation earth electrode.

#### **Recommended earthing points:**

1 x per system row near the foundation earth electrode.

**The material required for earthing is not included in the Big Dutchman delivery.**

## 2.8 System-specific safety regulations

The system is designed according to the state of technology and meets current safety requirements. Nevertheless, there are residual risks, which can be prevented as follows.

### **WARNING!**

Danger of drawing-in due to rollers, chains, gear wheels and belts!

- ▶ Disconnect the system from the power supply before starting any work on the system, because the system may turn on unexpectedly when operated automatically.
- ▶ Secure the system against reactivation.
- ▶ Prevent contact with rotating and driven system parts in general!
- ▶ Assure yourself that all safety devices have been attached correctly.

### 2.8.1 Safety symbols on the system

#### **NOTICE!**

**Safety symbols and instructions on the system must always be easily visible and undamaged.**

- ▶ Clean safety symbols in case they are dirty, e.g. due to dust, animal excrement, feed remains, oil or grease.
- ▶ Immediately replace damaged, lost or illegible safety symbols.
- ▶ If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.

## 2.8.2 Danger zone

There are hazard areas where a risk of injury exists

- due to rotating parts
- due to electrical current in case of non-reliable or defective switching-off of overload current.
- Parts lying about on the system and in its vicinity can cause persons to stumble and/or fall and thus risk injuring themselves by contact with system components.
- Lack of knowledge about the structural design of the system can lead to injury.
- Parts lying about in or on the components can lead to serious damage of the system.

### 2.8.2.1 Feeding system

- Rotating and sliding parts of the feeding system can lead to injuries!

### 2.8.2.2 Water supply

- Leaky hoses, gaskets and nipple drinkers might cause water damage in the house and destroy structural as well as electrical devices.
- Danger of electric shocks
- Danger of short circuits

### 2.8.2.3 Manure removal

- Rotating parts (drive rollers, guide rollers and idler rollers, etc.) might lead to severe injuries!

### 2.8.2.4 Ventilation system

- Rotating fans can lead to severe injuries.
- Fans can start due to their automatic control units.

### 3 System description

**Big Dutchman Avimax** is a multi-tier cage system for broiler rearing and fattening.

All supporting elements are manufactured from hot-dipped galvanised steel plates. Separating wire meshes, cage fronts and the top wire mesh are Galfan (ZnAl)-coated. The cage floor consists of an elastic, animal-friendly plastic net flooring.

Feed is supplied by height adjustable Augermatic lines with feed pans which are controlled by a sensor while being filled. Drinker lines are also height adjustable to ensure optimal access for the birds. Foldable cage fronts allow easy access to the cage to move the birds in and to check on them.

The manure drops from each tier onto the manure belts. At the end of the installation, the manure is transported out of the house from all tiers by a manure cross conveyor, e.g. into the manure stock. The broilers are moved out with the patented pivoting floor system or a sliding floor system. The birds are transported to the end of the installation by the cleaned manure belt and then by a lift system and a level conveyor from the house into transport boxes or containers.

The following table provides a short overview of the main differences between floor and cage management of broilers.

	Floor management	Cage management
Flooring	Concrete and litter	Plastic flooring (no litter)
Bird movement	free movement (birds can choose their own comfortable zone)	Fixed location in the house (position of the cage)
Ventilation	Birds only on ground level	Multiple tiers with different conditions (e.g. influence of house floor and wall insulation)
Feeding	Feed wastages not noticeable (mixed with litter)	Feed wastages recognised easily (corrective measures possible)
Manure removal	After each batch	Daily manure removal (from day 21)

Compared to traditional floor management, three times as many birds can be kept on the same house floor area with the modern Big Dutchman broiler cage. Due to the higher number of birds, requirements regarding the housing system, ventilation, feed supply and storage, lighting, manure removal and the daily tasks of moving out have also increased.

## 4 Climate concepts

The house ventilation depends on the current phase of the batch. It is important to keep the parameters significant for each section in mind for each phase.

### 4.1 Heating (no birds in the house)

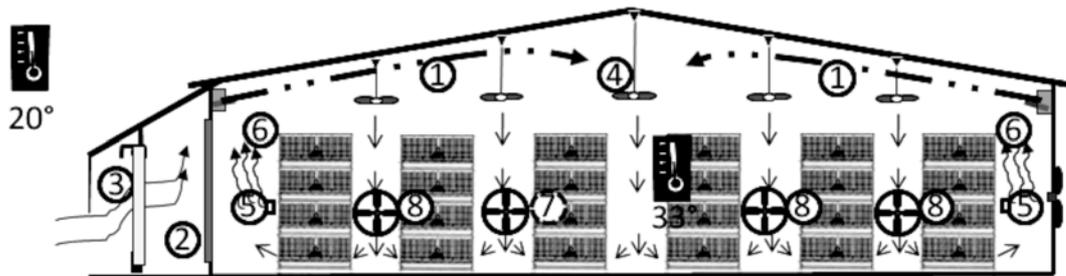


Figure 4-1: Installation without roof fresh air

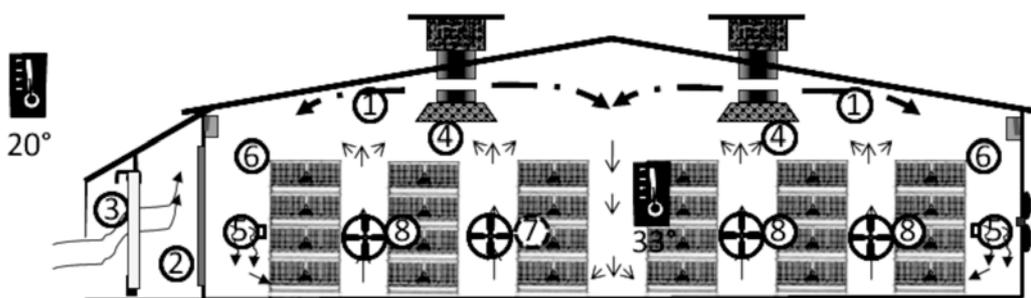


Figure 4-2: Installation with roof fresh air (Fumus)

Item	Description
1	Fresh air, airflow
2	Air inlets
3	Air supply
4	Fresh air chimneys, supporting fans, mixed-air fans
5	Heating devices
6	Rising air
7	Fan
8	Fan groups
9	Fan groups

Table 4-1: Items of the climate concepts, page 20, 23, 24

It is important to start heating early enough that the whole house can be heated.

Make sure that the nozzles of the heating devices (5) are clean and that the connection pressure is the same so that the devices' performance is identical.

Fumus fresh air chimneys, mixed-air fans and supporting fans (4) which distribute heat at the ceiling or the outer aisle have to run now to warm all parts of the installation evenly.

The warm air must be distributed by the fans in the heating devices (5) or by mixed-air fans or Fumus (4) in a way that the rising air (6) rotates evenly anywhere in the house.

Ensure that all leakages are closed completely. Weak points are usually the manure cross channel and large gates in the gable.

If applicable, the Combi Cross Tunnel fans should be sealed with insulated plates.

During this time, the reduced minimum ventilation only has to ensure that the CO<sup>2</sup> level of the air is not too high. Normally, the climate control is set to shortly open the fresh air inlets every five minutes so that the air is exchanged by a short air stream (1). If the climate computer has been set to this cyclical ventilation, a fan (7) in the front and back gable are active during this time to produce a vacuum when the fresh air system is opened.

## 4.2 After the moving-in procedure

Check the temperature after moving the animals in. It should correspond with the figures listed in chapter 6.1.0.1 "Airing / ventilation" .

Heating devices which may have been moved during the moving-in procedure should not blow directly into the cage.

Watch the animals' behaviour. If the birds form groups, this may indicate that the temperature is too low.

Pay special attention to the lower tiers as they get cold very quickly. During this time, the ceiling fans or Fumus fans (4) rotate quickly to keep the warm air moving at all times. This ensures that the surrounding temperature is the same for all birds.

Check the air quality after some hours and adjust the minimum ventilation, if necessary.

If the installation is equipped with a high pressure system for humidification, you can now start to carefully reduce the value set for the start of the installation.

The humidification should not run too much, i.e. it should be possible to achieve the desired values depending on the season and region. For example, a set aim of 70 percent air humidity is not recommended if this value can only be achieved by constant water spraying which drenches the birds' down feathers.

Furthermore, make sure that the upper tiers do not receive a draft because of spoilers at the fresh air inlets set incorrectly or a diagonally suspended distributor of the Fumus.

The climate control is now going to automatically increase the minimum ventilation in accordance with the birds' growth. The control may further increase the ventilation performance during the day due to high temperatures.

As indicated by the following illustrations, the other fan groups (8) are switched on one after the other.

The fresh air inlets or the pivoting flap for fresh air in case of the Fumus continue opening and the cyclical ventilation is replaced by a constant fresh air supply (1).

The mixed-air fans and fans in the fresh air chimney will be turned off in the case of a higher air exchange rate because a threshold level is usually set in the climate computer. This saves energy and prevents needless air movements.

### 4.3 Ventilation without roof fresh air

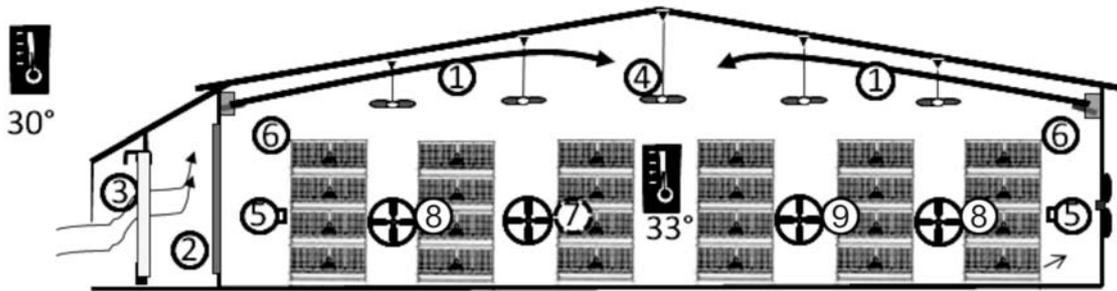


Figure 4-3: Ventilation without roof fresh air

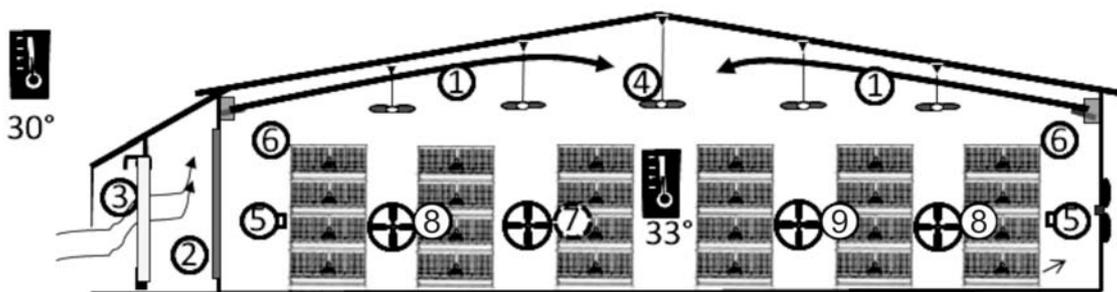


Figure 4-4: Lateral ventilation without roof fresh air

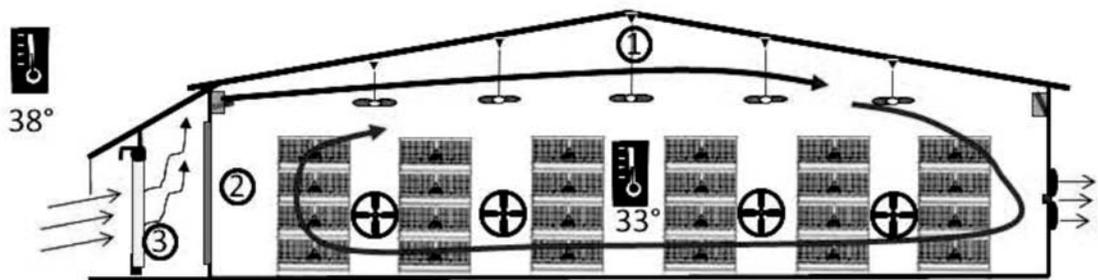


Figure 4-5: Cooling with Soft Tunnel for smaller birds

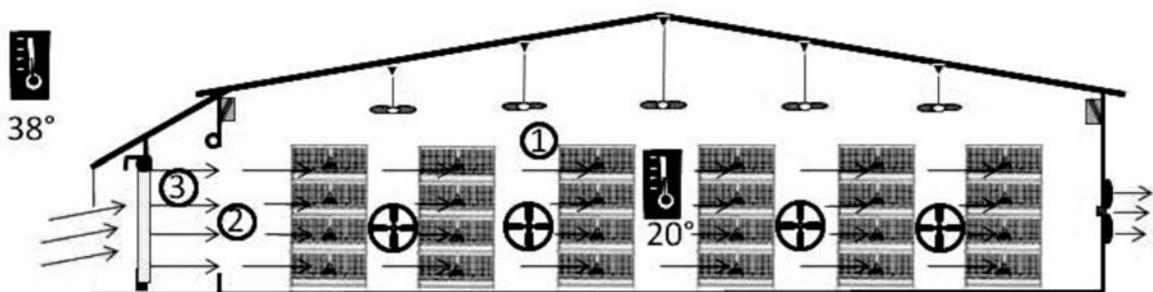


Figure 4-6: Cross Tunnel

### 4.4 Ventilation with roof fresh air (Fumus)

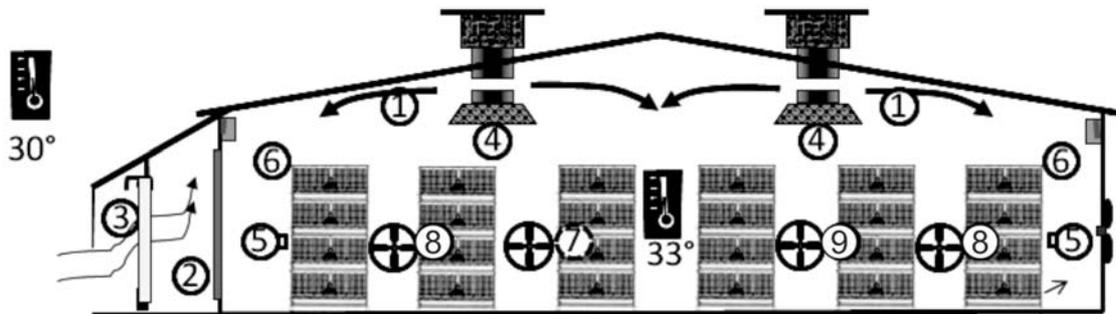


Figure 4-7: Minimum ventilation with roof fresh air (Fumus)

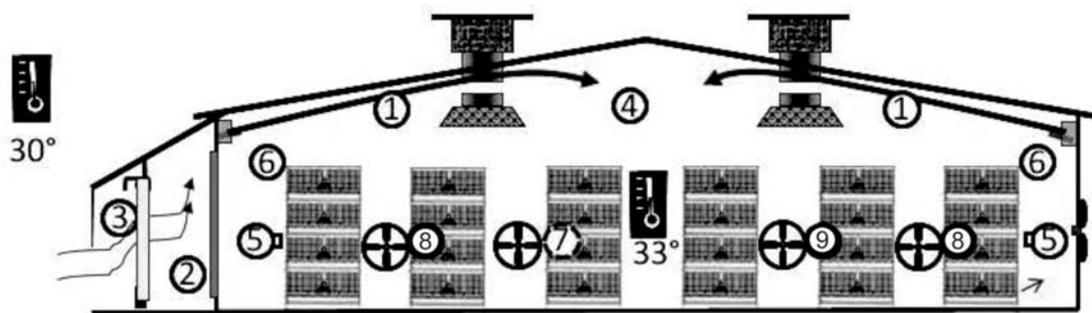


Figure 4-8: Lateral ventilation with roof fresh air

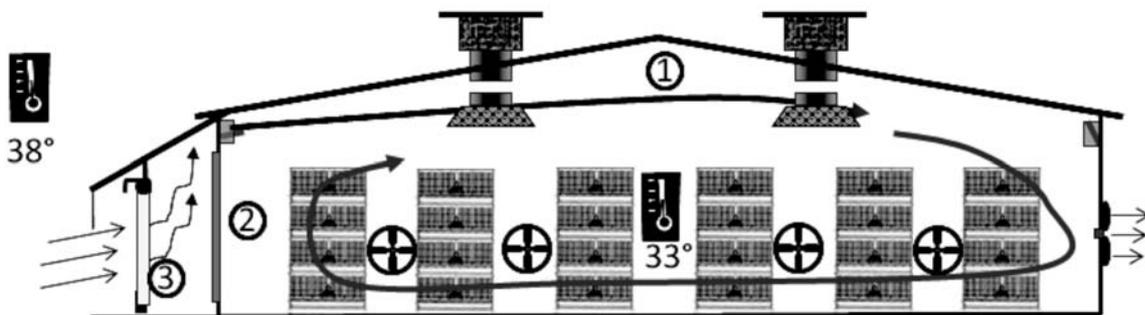


Figure 4-9: Cooling with Soft Tunnel for smaller birds

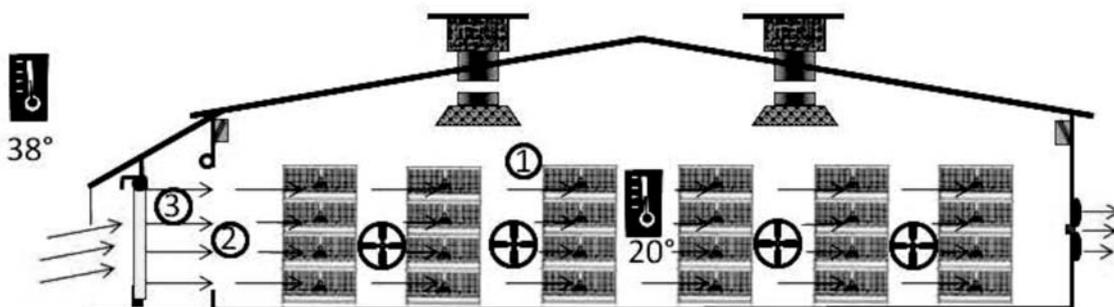


Figure 4-10: Cross Tunnel

## 5 Initial operation

### **WARNING!**

Only take the device into operation after all components and all protective equipment have been completely integrated into the system.

- Inspect the entire system visually.
- Check whether all mounting tasks have been duly completed.
- Check the faultless mechanical working of all moving parts.
- Check the sense of rotation of the driving motor and all other motors.
- Check the emergency stop function.
- Test the different operating procedures.
- Check whether the safety switches work.

Initial operation must be carried out by a qualified technician with the respective proof of knowledge (service technician).

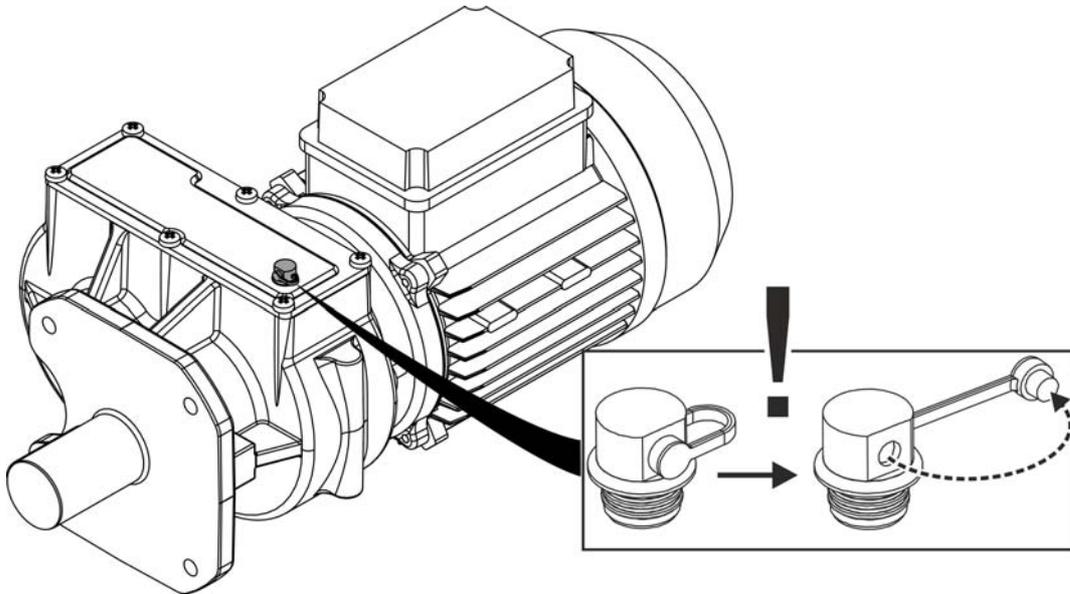
The following protocols must be filled out during initial operation and made available to the operator:

- Confirmation minutes (code no. 00-00-1411)
- Inspection minutes for poultry house equipment (code no. 00-00-1441)
- Inspection minutes poultry house climate (code no. 00-00-1561)

## 5.1 Important notes on putting gear motors into operation (aeration)

### NOTICE!

**Before putting the gear motors into operation, open the vent plugs of the gear motors if there is no automatic aeration included.**



## 6 Operation of the system

**The following aspects should be considered before operating the installation!**

- Initial operation must have been carried out by a qualified technician with the respective proof of knowledge (service technician).
- The installation's operator must have received all minutes required by **Big Dutchman** and completely filled out: confirmation minutes and the additional inspection protocols, if applicable.

### 6.1 Preparations for the moving-in procedure

The first days of the chicks' lives are most important as these are highly influential on the further development of the birds. This is why the preparations for the moving-in procedure should be understood as an important part of successful production. The following factors should be considered:

#### Key points preparations for the moving-in procedure

#### NOTICE!

- Start the production computer two to three days before moving the chicks in.
- Heat the house before moving the birds in until a temperature of 30°C is reached at the bird level and a temperature of 32°C at the cage floors. The correct moving-in temperature is the most important factor and significantly influences the fattening process.
- Check if all pivoting and sliding floors were closed correctly after the last moving-out procedure.
- Rinse all drinker lines and drip cups before moving birds in to remove any disinfectants and harmful substances.
- On the first day, set a water pressure which causes the nipples to form a drop, but make sure they do not drip. This ensures that the chicks will easily find the water.
- Fill the Augermatic feed line shortly before moving the birds in so that they can immediately start eating.
- The feed pans should be flooded for the first days to facilitate feed intake.

#### 6.1.0.1 Airing / ventilation

The house should be aired well before heating so that no harmful gases from the disinfection remain in the house.

The CO<sub>2</sub> level in the house should not amount to more than 3,000 ppm when the birds are moved in as a higher level could negatively influence the fattening performance. A good air quality and an even air temperature are the best conditions for an optimal development of the birds.

The birds can only be supplied with fresh air if the house is sealed and insulated well. Unplanned air entrances in the walls should be closed as soon as possible.

Part of the climate is also the air humidity, not just the temperature. These two should always be considered together. In the following, please find a table which illustrates that you can lower the house temperature if the humidity is constantly high.

Table 6-1: Temperature and humidity as a function of bird age

Age (Days)	Normal set value		Temperature and humidity				
	Temp. °C	Humidity	Ideal				
			40%	50%	60%	70%	80%
0	30.0	60-70	36.0	33.2	30.8	29.2	27.0
3	28.0	60-70	33.7	32.1	28.9	27.3	26.0
6	27.0	60-70	32.5	29.9	27.7	26.0	24.0
9	26.0	60-70	31.3	28.6	26.7	25.0	23.0
12	25.0	60-70	30.2	27.8	25.7	24.0	23.0
15	24.0	60-70	29.0	26.8	24.8	23.0	22.0
18	23.0	60-70	27.7	25.5	23.6	21.9	21.0
21	22.0	60-70	26.9	24.7	22.7	21.3	20.0
24	21.0	60-70	25.7	23.5	21.7	20.2	19.0
27	20.0	60-70	24.8	22.7	20.7	19.3	18.0

Table 6-1 illustrates the relation between air humidity and effective temperature. If the relative air humidity is not within the desired range, the temperature should be adjusted, as shown in the table. This means that the house temperature should be raised if the air humidity is lower than 60 percent.

Constantly check the birds' behaviour to ensure a good start of the fattening period and a good daily weight gain.

### 6.1.0.2 Heating / heat requirements

Chicks cannot regulate their body temperature on their own during the first week of their life, which is why the ambient temperature in the house plays an important role when they are moved in. If the house temperature is not at an optimum, this means a lot of stress for the chicks, which in turn influences their feed and water consumption and their development negatively.

That is why the house should be heated to an appropriate temperature before moving-in (see chapter 4.1). It is important for the heat to be distributed evenly in all tiers and rows of the house.

Experience shows that the temperature is lower near the manure removal as the area of the manure cross removal is frequently not insulated sufficiently. Here you should pay attention to a good insulation.

30°C are a good moving-in temperature. However, you should ask your breeder for the temperature ideal for your birds.

The house temperature should be checked regularly during the heating phase and adjusted where necessary.

#### NOTICE!

Measure the temperature in the lower tiers - it has to correspond with the moving-in temperature!

#### NOTICE!

The best indicator for the temperature is the behaviour of the birds.

If the temperature is too low, the birds crowd together and groups are formed in the individual cages. This can also be recognised by irregular manure spreading on the manure belt.

In case of temperatures being too high, birds are lying in the system with spread wings and open beaks. An even distribution of the birds shows that the temperature is ideal.

### 6.1.0.3 Feed supply

Before the feed lines can be filled, they must first be moved to the lowest position. The flooding mechanism of the feed pans is only active when the pans are standing on the cage floor and the Augermatic tube has been lowered to the outer cylinder of the feed pans. The flooding mechanism causes a higher feed level (see figure: flooded pan). The pans remain in this position for the first three days, thus facilitating the chicks' access to feed.



Figure 6-1: Feed pan on the cage floor

The system rows can now be supplied with feed one after the other. After all rows have been supplied, you should check if all pans are filled sufficiently.

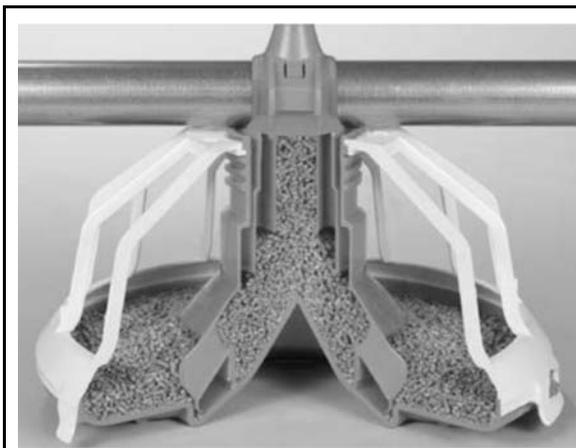


Figure 5-2: Flooded pan

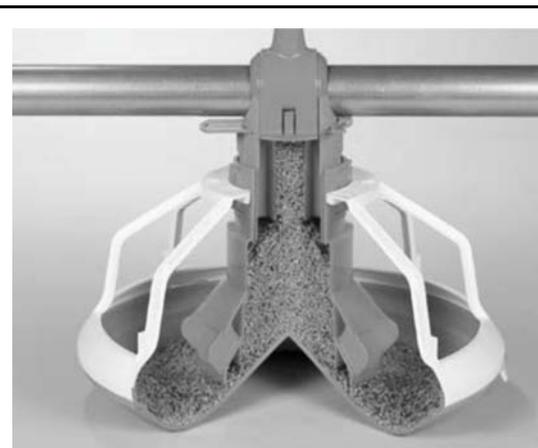


Figure 5-3: Pan not flooded

Additional feed served on chick paper is not required.

#### 6.1.0.4 Feeding system

The broiler cage Avimax is supplied with feed from one or more silos by means of a feed circuit. The Flex Vey line (1) transports the feed from the silo into the house and transfers it to the transfer funnel (A). This is where the actual feed circuit starts. Starting from this funnel, the feed is transported through the line (2) to the transfer unit (B) and again through the line (3) back to the funnel. During the transport back to the funnel, the feed is dispensed into the feed hoppers of each tier (C) by means of outlets and drop tubes.

The tiers are supplied by means of a central Augermatic feed auger with Fluxx feed pans. Each feed pan stores a sufficient amount of feed to continuously supply the birds with feed.

The Augermatic lines are controlled by sensors situated in the last feed pans. As soon as one Augermatic line is activated, the feed starts to circulate. A sensor at the transfer funnel (A) controls the feed supply from the silo to the circuit.

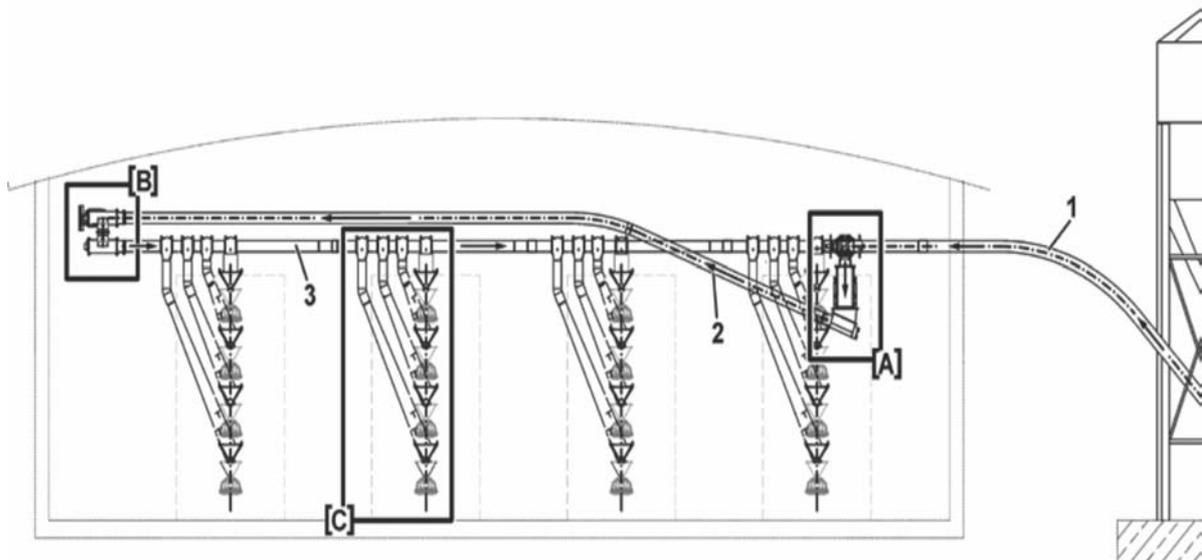


Figure 6-2: Overview Flex Vey system

- Make sure that all feed pans with grill are closed tightly!
- From the third day of life, the Augermatic line must be lifted, but the pans must remain on the cage floor. This turns off the flooding mechanism so that the feed level in the pan is still optimal. The feed level in the pan is regulated by an adjustment mechanism. When adjusting the feed level, remember to consider the feed type and texture. The feed level in the pan depends on the feed composition (meal/pellets).

### Feed pan adjustment mechanism

The feed level can be adjusted simply by pushing up and turning the pan. The numbers on the outer cylinder display the current opening position of the pan. 1 means a low feed level while 7 stands for a high feed level.

#### 6.1.0.5 Water supply

Before moving the birds in, all drinker lines should be cleaned thoroughly with clean water to remove cleaning agents and disinfectants.

The drinker lines should be moved to the lowest position in all tiers so that the chicks can easily and quickly find the water. The lines should only be filled with fresh and clean water shortly before moving the birds in. Make sure that all nipples are functioning correctly. A water drop should be visible at each nipple so that the chicks can easily find the water.

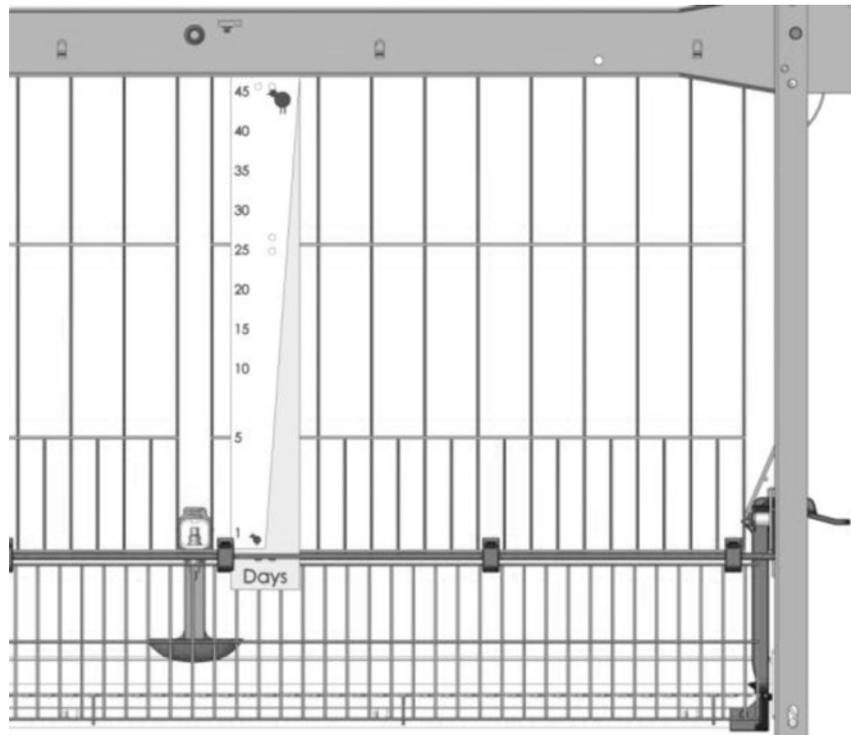


Figure 6-3: Height adjustment drinker line

## 6.2 Moving birds in

### Key points for the first days after moving the birds in

#### NOTICE!

- During the first hours and days after moving the birds in, make sure that all birds have found feed and water.
- The light should be turned on at 100 percent during the first seven days, see chapter 6.3.4 "Lighting program".
- On the first morning after moving the birds in, check if their crops are filled with feed and water. The crops of birds which have taken in water and feed are full, soft and rounded. If the crop is filled and hard, the bird ate but did not drink.
  - 95 to 100 percent of crops should be filled 24 hours after moving-in.
- The flooding mechanism should be turned off starting with the third day. To achieve this, the Augermatic line is lifted while the feed pans remain on the floor.

---

The birds are moved into the Avimax broiler cages from the aisles. All chicks should be moved into one house at once (ideally within one or two days).

Experience shows that the feed composition should be adapted to the fattening age. If there are birds with different ages in one house, the feed cannot be exactly adapted to the bird age. This would mean that the different developmental stages of the birds could not be optimally supported and the birds would not reach their full production performance. There would also be disadvantages regarding hygiene and health.

To avoid germs inside the house, the hygiene management should be considered very important. Vehicles, equipment and staff should be disinfected before entering the farm area.

The chicks should be moved to the cages quickly and carefully as soon as they are delivered. The longer the chicks stay in the boxes, the larger the risk of dehydration. Possible consequences include increased mortality during the first days and slow weight gain.

## 6.2.1 Stocking density

The broiler cage Avimax is designed for a final fattening weight of 50 kg/m<sup>2</sup>. This means:

- **Avimax 150 transit**

Final fattening weight of 180 kg per tier section.

Example: 100 birds can be kept per tier section if the slaughter weight amounts to 1.8 kilograms.

Final fattening weight	No. of birds per	No. of birds per	No. of birds per
per bird [g]	cage	nipple	feed pan
1500	120	10	60
1800	100	8.3	50
2250	80	6.6	40
2500	72	6	36
2800	64	5.3	32
3000	60	5	30

- **Avimax 160 sliding**

Final fattening weight of 192 kg per tier section.

Example: 106 birds can be kept per tier section if the slaughter weight amounts to 1.8 kilograms.

Final fattening weight	No. of birds per	No. of birds per	No. of birds per
per bird [g]	cage	nipple	feed pan
1500	128	10.7	64
1800	106	8.8	53
2250	85	7	42.5
2500	76	6.3	38
2800	68	5.7	34
3000	64	5.3	32

To guarantee an even feed supply of all pans over the whole duration of the batch, some important requirements must be met:

** NOTICE!**

In each tier, the number of birds in the last cage, in which the feed control pan with sensor is installed, must be ten percent higher than the average stocking density of the row. This ensures that the feed drive unit for each tier starts regularly, thus filling all pans evenly.

---

** NOTICE!**

The chicks should be left alone for approximately one hour after moving-in so they can relax and familiarise themselves with the new environment. After this hour, check if all chicks can easily access water and feed. The equipment and the temperature should be adjusted if required.

---

## 6.2.2 Moving-in procedure

Good organisation and correct preparation are always the key for efficient and thus rapid completion of the moving-in and moving-out procedure, also for Avimax systems. Avoid unusually stressful situations and injured birds. Ensure that the birds are moved in quickly but carefully.

The birds must generally be moved into the rows from the bottom to the top tier.

If this is not the case, the installation may become top-heavy and thus statically overloaded!

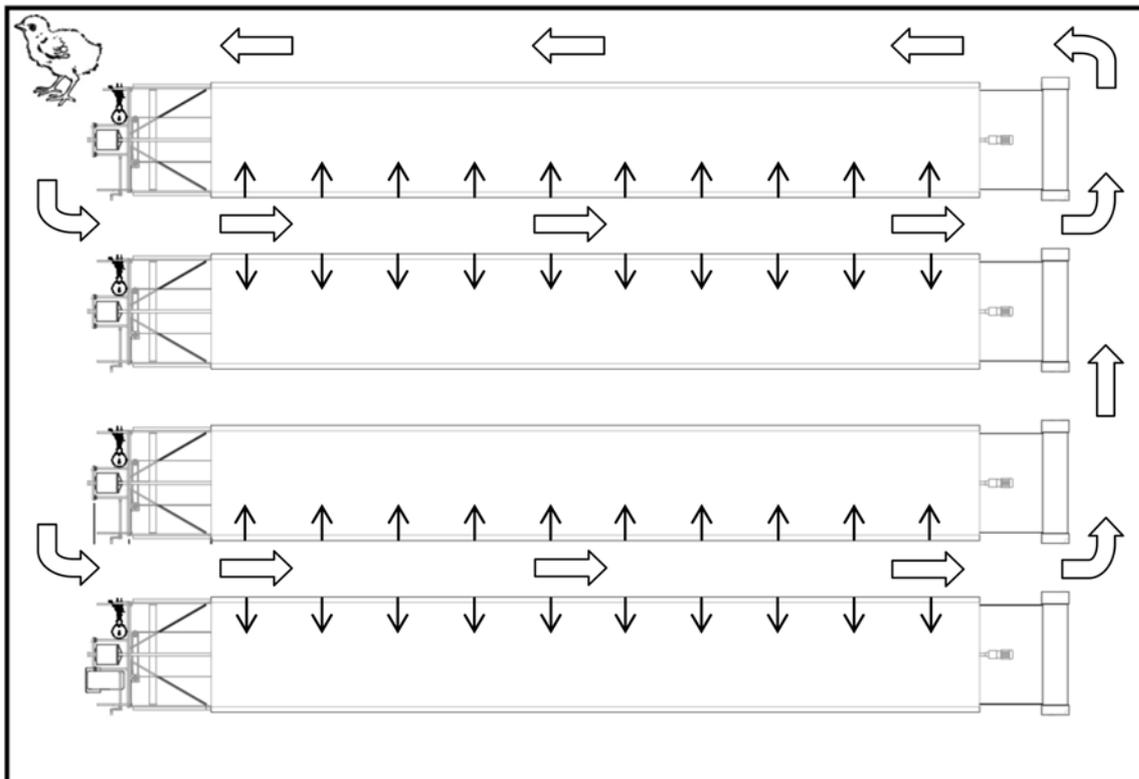


Figure 6-4: Proposed route for the moving-in procedure

Leave the lights turned on for 24 hours after moving the birds in so that the birds can adapt to the new surroundings and familiarise themselves with them.

## 6.3 Daily tasks

### Key points for the daily inspection of birds

#### NOTICE!

Check and document the following every day after the lights are switched on in your house:

- functioning of drinker and feed lines (exact monitoring of water and feed consumption can provide valuable information for bird management),
- careful selection of birds and daily documentation of your selections and losses,
- house climate (ventilation, house temperature),
- lighting,
- physique and behaviour of the birds,
- birds' health,
- manure composition.
- Please be careful when driving the inspection cart so as not to damage house equipment.



Figure 6-5: Inspection cart

### 6.3.1 House temperature

#### Temperature

The ideal house temperature depends on the birds' age. Day-old chicks need a warm climate to have a good start.

Colder parts of the house are frequently the reason for an imperfect start of some birds' fattening process. These are often caused by leakages in the gable.

It is very common that the openings of the cross belts are not closed after manure removal. You should already ensure good insulation and possibilities for air-tight sealing during the construction stage.

For the correct inside temperature as well as further recommendations please refer to the table in chapter 5.2.1.

Apart from the sealing of the building, it is important to distribute fresh air evenly in the house.

Depending on the installed system, fresh air chimneys suck air into the building without using a high negative pressure and distribute the air by means of spreader discs.

The negative pressure is later increased continuously and may amount to 25 pascal - if the ceiling chimneys are completely opened - before the fresh air is supplied by side wall inlets.

If these fresh air chimneys used in colder climate zones are not installed, air is taken in cyclically during the first days by opening the inlets at both side walls. To move warmed air into the middle of the building in a house with a width of 18 meters, a negative pressure of approximately 25 pascal is required.

It is important to set the spoilers above the inlets in a way that the airflow is not deflected by obstacles at the ceiling.

Apart from the temperature and the humidity, the computer also calculates the correct air speed in accordance with the birds' age. The values which the computer tries to reach or to not exceed depend on the system similar to the following table:

Again, the birds' behaviour must be monitored closely.

Birds lie flat on the floor and are hiding from the air flow = increase the temperature to reduce ventilation and air speed.

Birds are panting = increase the air speed by reducing the temperature and thus increasing the ventilation level.

Birds are panting in spite of an adequate air speed = start cooling earlier.

 **NOTICE!**

**Caution!**

Never turn off components of the exhaust air or fresh air systems. The air speed is essential after a certain age.

Never turn the cooling system on or off uncontrolled or manually. Excessive air humidity in combination with too high temperatures can cause the birds' death.

**Alarm system:**

Always make sure that the alarm system is active and tested regularly as prescribed.

**Power supply:**

Ensure that power is supplied at any time and plan for the case of emergencies. Train your farm staff according to these plans. Compared to floor management, cage systems develop more heat, which requires faster action.

## Airing / ventilation

The most efficient method to distribute air correctly in the house is minimum ventilation, which is connected with the negative pressure procedure. With this system, fresh air coming in through the air flaps will move to the top of the house and mix with the warm air. The lateral air flaps at the opening shall be opened at least five centimetres wide to ensure a good mixing of air in the house. The house should be insulated well to guarantee optimal functioning of the ventilation system. The perfect air speed at bird level is very important throughout the whole grow-out and especially during the beginning of the batch.

Day	System	
	Combi Tunnel	Combi Cross Tunnel
1	0.2 m/s	0.2 m/s
7	0.3 m/s	0.3 m/s
14	0.4 m/s	0.4 m/s
21	0.6 m/s	0.6 m/s
28	1.5 m/s	1.0 m/s
35	2.5m/s	1.6 m/s
42	3.5 m/s	1.6 m/s
49	3.5 m/s	1.6 m/s

### 6.3.2 Feeding system

During the first week of life until approximately day ten, the feed pans should stand on the cage floor. This facilitates the chicks' access to feed. As feed is the largest expense factor for broiler production, the feed pans should be lifted from day eleven so that the pan rim is level with the back of the birds. Feed wastages can be prevented by the regularly adjusting the feed pan height to the bird age.

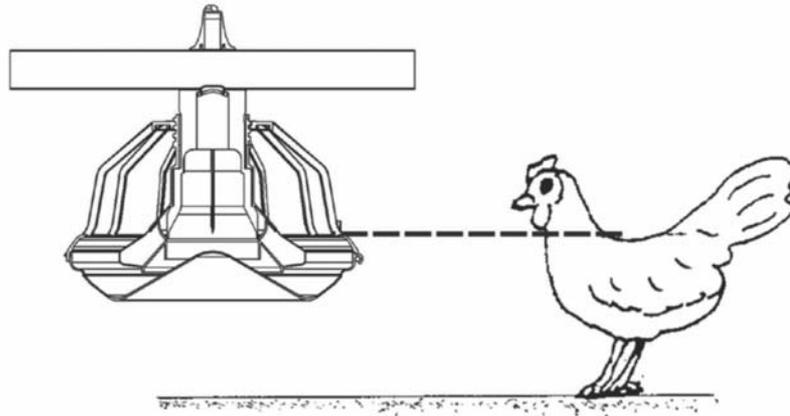


Figure 6-6: Adjustment of feed pan height

### 6.3.3 Water supply

A good water quality is an important factor for efficient broiler production. The water should not contain too many mineral nutrients or be contaminated. To determine the water quality, the pH-value, iron and contaminant content should be checked regularly. The use of drinking water for the birds is ideal.

The water source should also be inspected. If the water contains amounts of iron or salt which are too high, this may cause an accumulation at the nipples.

Feed and water consumption must be documented daily during the batch. Water consumption increases if the temperature rises. Water consumption increases by 6.5 percent per 1°C if the outside temperature is 21°C and rising.

#### NOTICE!

In areas with tropical climate, water consumption doubles. Water may not be cooler than 5°C or warmer than 30°C. Ideally, the water temperature should amount to 10 to 14°C. Water consumption rises in accordance with the birds' age. If the water consumption decreases, the house climate should be checked.

Any required water-soluble medicaments or vitamins can be added to the water supply with the medicator for medical treatment. For additional information on the medicator, please refer to the manual "Installation and Operation Instructions Medikator 9-3400 I/h".

#### CAUTION!

Immediately stop any leakages! Leaking water can cause the floors to be slippery if it mixes with dirt or feed remains.

#### NOTICE!

At least once per day, check **all connections, couplings and drink nipples for a tight seal.**

#### NOTICE!

Document the broilers' water consumption every day to be able to notice changes and find their causes.

	Day:	1.-7.	8.-21.	>21.			
	A	10 cm	10-15 cm	15-25 cm			
	A: maximum of 25 cm! First week = water level 10 cm						
	Day:	1.-3.	4.-5.	6.-7.	8.-11.	12.-13.	14.-15.
	B	14 cm	18 cm	22 cm	25 cm	27 cm	28 cm
	Day:	16.-17.	18.-19.	20.-21.	22.-23.	24.-27.	28.-29.
	B	30 cm	31 cm	33 cm	34 cm	36 cm	38 cm
	Day:	30.-31.	32.-35.	36.-41.	42.-44.	45.-49.	50.-51.
	B	39 cm	40 cm	43 cm	46 cm	47 cm	49 cm

Figure 6-7: Height drinker line

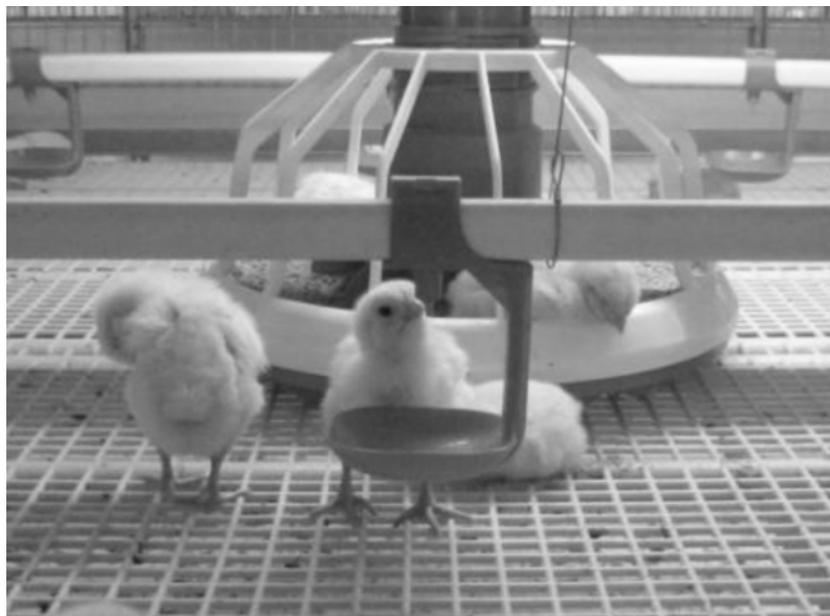


Figure 6-8: Drinker line

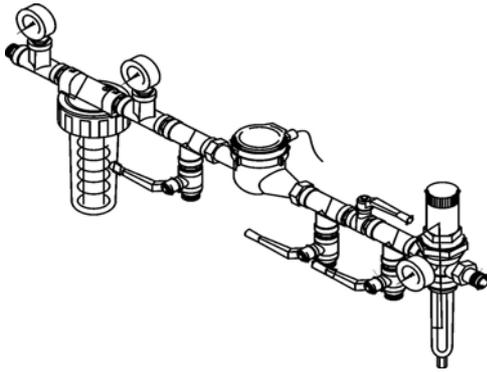


Figure 6-9: Water connection unit

- Check the system inlet pressure daily and ensure a sufficient primary pressure if applicable.
- The primary pressure has to be between 1.5 and 6 bar on site.
- Check the water filter daily and clean it if the pressure difference exceeds 0.5 bar.
- Inspect the pressure reducer/filter combination daily.

The outlet pressure may amount to a maximum of 3 bar; clean the filter if necessary.

- Every day, do a spot check to ensure that the nipples in each drink line are functioning properly. It is recommended to do this at the breather end of the house.
- Clean and flush the nipple pipes and water collection cups every month.

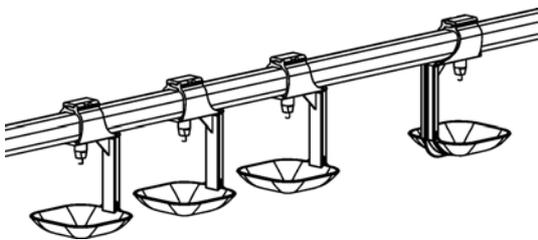


Figure 6-10: Nipple drinkers

The cage system is equipped with nipple drinkers and water collection cups.

- Check the height of all water columns in the breathing units at the end of each drinker line daily and correct it, if necessary.

### 6.3.4 Lighting program

The correct lighting concept is one of the most important factors for successful broiler production with the broiler cage Avimax. The lighting should be even in all cages. The system, especially the feed pans, should be lighted well especially during the first days to make sure the birds can easily find feed.

The settings for light intensity and lighting program should comply with the breeding company's guidelines and statutory provisions. Usually, the light intensity is set to 100 percent during the first seven days. The light is then dimmed step by step to achieve an illuminance of 5 to 10 lux by the end of the batch.

#### **Big Dutchman offers two lighting concepts:**

a) Energy-saving light bulb in the inspection aisle

Energy-saving light bulbs are installed at two alternating heights in the aisle. In each aisle, the light bulbs are furthermore offset by one section length. The light cones thus intersect and light the feed pans optimally.

Thanks to this well thought-out distribution of light bulbs, the lighting in all compartments of each tier is adapted perfectly to the birds' needs and the acquisition as well as energy costs are reduced to a minimum.

b) Big LED in the cage

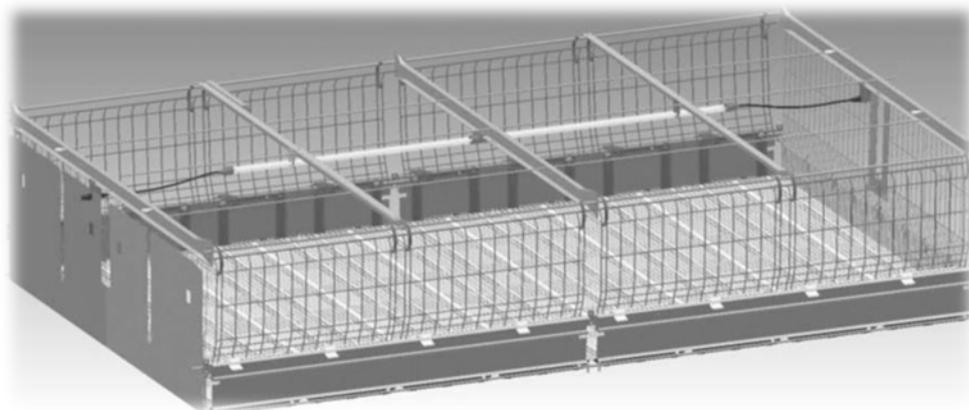


Figure 6-11: LED lighting

This LED lighting is a full spectrum cage lighting, adapted to the specific needs of the birds. Thanks to more colours blue and red on the optical spectrum not visible for humans and a homogeneous lighting, the housing conditions for fattening poultry are improved in the areas of stress reduction, fattening and mortality.

Furthermore, the LED has an integrated moving-out lighting. Its blue light guarantees a certain safety at work for the moving-out farm staff and keeps the birds calm which reduces stress.

Additionally, the blue light may be used as "moonlight" during the dark phase. First findings show that this leads to a reduction of released adrenalin. Aggressive eating behaviour and related back injuries after the light is switched on can be reduced this way.

### Key points for the lighting program

#### NOTICE!

- Leave the light switched on for 24 hours after moving-in to ensure that the chicks consume sufficient amounts of water and feed.
- In the second night, turn the lights off for one hour to determine the beginning of the dark phase. If this time has been established once, it may not be changed again for this batch.
- The duration of the dark phase must only be controlled by the time when the light is switched on. The birds quickly learn when the dark phase starts and will fill their crops with feed and water before the light is turned off.
- Use one dark phase within 24 hours.
- Increase the number of dark hours when the birds are seven days old.
- Reduce the light intensity to keep the birds calm.

Live weight at slaughtering	Age (days)	Course of the day (hours)	
Less than 2.5 kg	0-7	23 light	1 dark
	8 to 3 days before slaughtering	20 light	4 dark
	until slaughtering	23 light	1 dark
More than 2.5 kg	0-7	23 light	1 dark
	8 to 3 days before slaughtering	18 light	6 dark
	until slaughtering	23 light	1 dark

Table 6-2: Standard lighting program, source: Cobb Broiler Management Guide

### 6.3.5 Manure removal intervals

The following dates for manure removal should be heeded to avoid overloading:

TIERALTER (TAGE)							
1	2	3	4	5	6	7	
8	9	10	11	12	13	14	• first week: removal once
15	16	17	18	19	20	21	• second and third week: removal every other day
22	23	24	25	26	27	...	• from day 21: manure removal daily

The manure belt scraper must be cleaned after manure removal.

## 6.4 Preparation of the moving-out procedure

### Key points for the preparation of the moving-out procedure

#### NOTICE!

- Shorten the dark phase three days before moving the birds out.
- Turn off the feed supply ten to twelve hours before moving the birds out.
- Remove manure immediately before moving the birds out!

In the following, the basic procedure before, during and after moving the birds out are described.

The area around the rotating table should be large enough to allow the staff to quickly pick up the broilers from the table and to load them onto the truck easily.

Good preparation and organisation of each step from the loading of the birds at the rotating table to the slaughterhouse are required to realise the desired moving-out capacities and short waiting periods. Qualified and a sufficient number of staff, secured transport logistics, continual power supply as well as the best possible protection of the birds against any weather conditions are necessary for this.

Before moving the birds out, please read the information in the chapter "Manure removal/Moving out" for the control cabinet and the user panel.

This documentation can be helpful for the moving-out procedure with your Avimax installation. The basic idea is the use of manure belts to collect the birds outside of the house and to load them onto trucks. The following guidelines are intended to improve the procedure. For the moving-out procedure, specific steps quite different from the usual tasks have to be carried out.

### 6.4.1 Climate before and after moving the birds out

#### Before moving the birds out:



Caution! Risk of suffocating or heat stroke!

The risk lies in the fact that the house gets too cold so that the ventilation system automatically lowers the ventilation level. This means that neither fresh air nor heat are transported into the house.

Prevent this from happening by specifically adjusting the minimum ventilation so that the computer cannot lower the ventilation to a dangerous level. Checking the house climate after long moving-out procedures is essential.

#### After moving the birds out:

If the moving-out procedure is paused at the end of the day, set all values back and reset all settings carried out manually at the control cabinet and the alarm system.

It is important that the manure belt is unhinged during longer interruptions to close the doors. This causes negative pressure in the house which is essential for an even air flow.

### 6.4.2 Light

To ensure that the herd is calm during the moving-out procedure, the dark phases have to be shortened. This should take place three days before moving the birds out.

### 6.4.3 Shutting off the feed supply

The feed supply has to be shut off in the respective tier approximately ten to twelve hours before the birds are moved out to ensure that no feed remains in the Augermatic system, thus facilitating the cleaning process later.

To achieve this, the shut-offs of the Flex Vey circuit are closed for each tier. As soon as the remaining feed has been transported from the Augermatic system into the feed pans, all drive units have to be turned off. This prevents unnecessary wear of the Augermatic line.

The birds should have access to water as long as possible and only be blocked from it if absolutely required.

### 6.4.4 Position of the lift

The lift cross conveyor must be in parking position (topmost position).



Figure 6-12: Position of the lift

### 6.4.5 Manure removal

Manure should be removed from the respective tier directly before the moving-out procedure to keep the manure belt as clean as possible. The scraper should also be cleaned after each moving-out procedure.

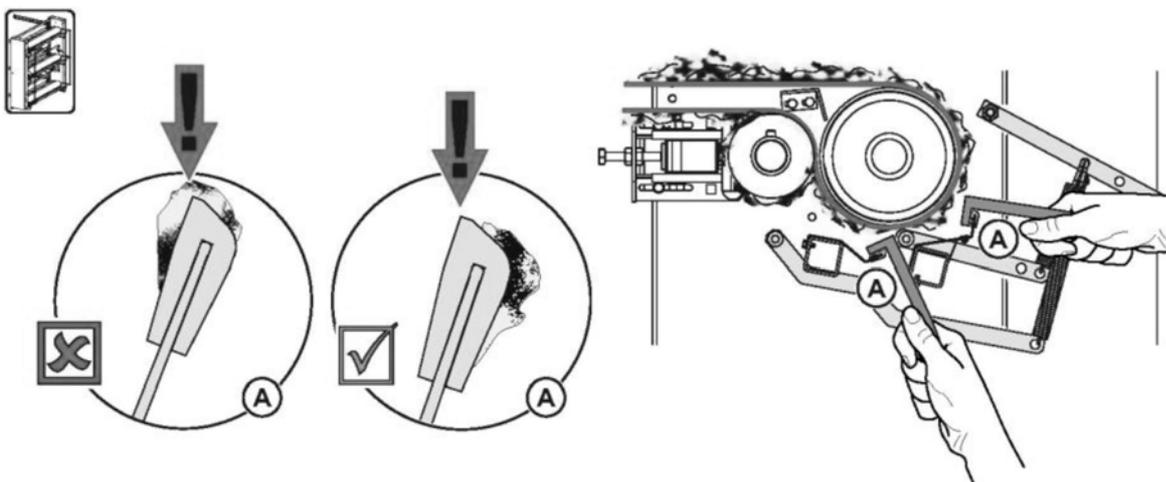


Figure 6-13: Cleaning of the scraper

This reduces unnecessary soiling of the cross conveyor, the level conveyor and the rotating table and keeps the birds as clean as possible, thus guaranteeing an optimal carcass quality.

** NOTICE!**

The moving-out procedure as well as the manure removal must be started at the topmost tier. This is important to ensure the correct weight distribution and stability of the installation!

---

**6.4.6 Manure curtains**

To prevent the manure curtains from getting soiled during the moving-out procedure, they should be taken off. If necessary, the curtains from the cross conveyor can be used for darkening purposes.

## 6.5 Moving birds out

### Key points for the moving-out procedure

#### **NOTICE!**

- Darken the end set transfer areas.
- Turn on blue light in the whole house.
- Check the position of the broiler transfer points.
- Wait at least 60 seconds per tier section before opening the next floor.
- Only open the floors while the manure belts are running.

Always start with the rows farthest away from the rotating table when moving birds out. Move out the birds in the topmost tier first and continue downwards.

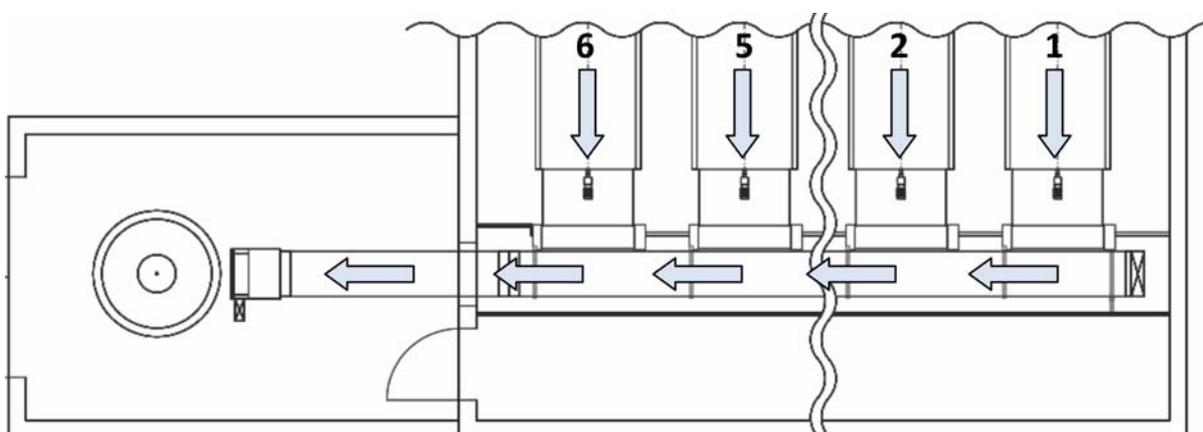


Figure 6-14: Course of moving-out procedure

Approximately 3,000 birds can be moved out per hour and row.

Where a sufficient number of staff is available, it is common to load approximately 6,000 birds per hour (two rows at the same time).

The next pages provide detailed information on the moving-out procedure.

1. The level conveyor is moved into the house, hooked into the lift cross conveyor at the correct position and fixed. For a simple connection of the level conveyor to the cross conveyor, the cross conveyor is lowered to the optimal height.
2. The transfer area between level conveyor and lift cross conveyor should be darkened with the curtain.
3. Close the curtains in the end set area so that this area is darkened and the transfer area is closed.

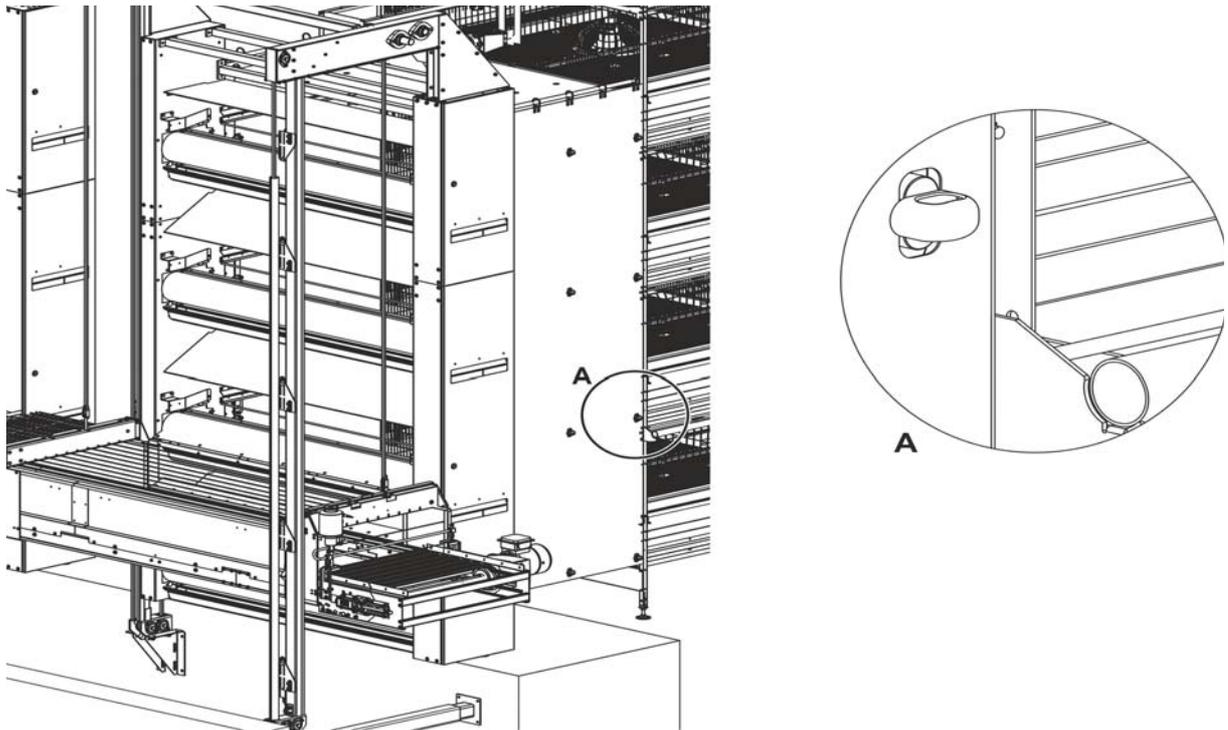


Figure 6-15: Curtain fasteners in end set area

4. The lift cross conveyor must be lifted to the level of the topmost tier (switch on the control "moving out").
5. Check the broiler transfer points to ensure that they fit against the drive rollers of the manure belt drive.

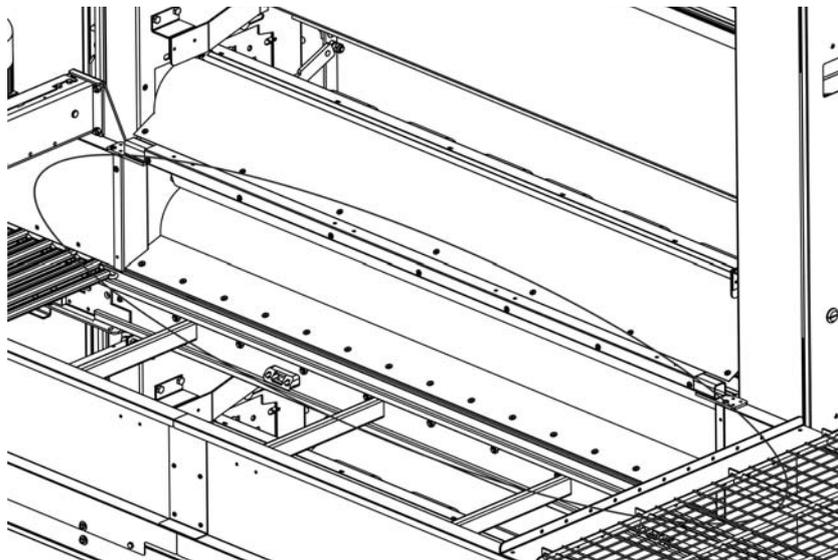


Figure 6-16: Drive roller manure belt drive

6. Position the rotating table.
7. Dim all LED bulbs in the house to blue light.

- Move the AMX 150 transit feed/water lines to the highest position.
- Remove the AMX 150 transit cross bar.

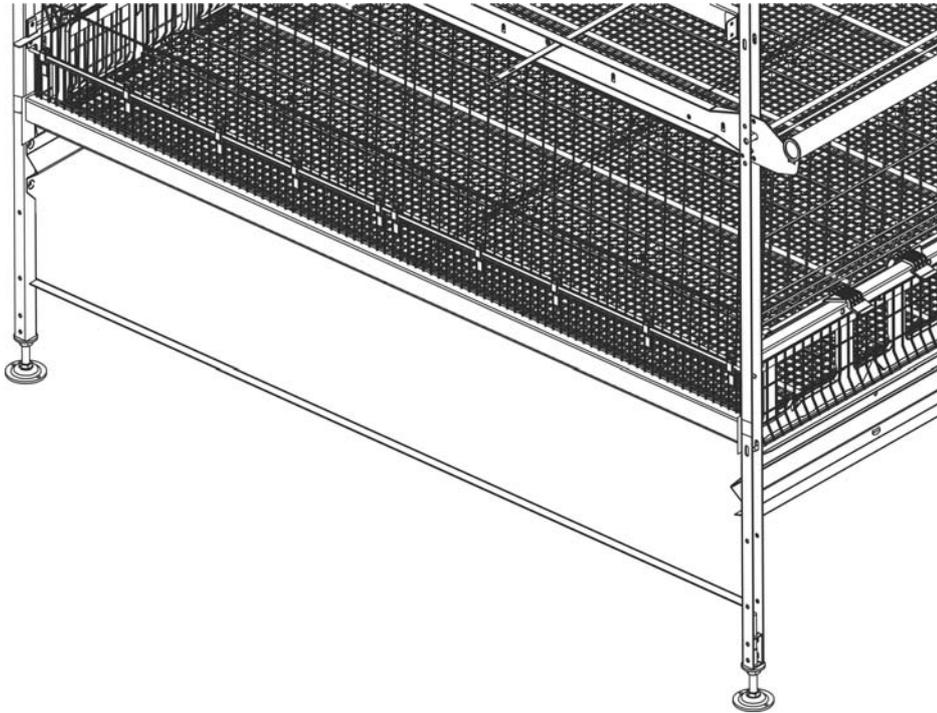
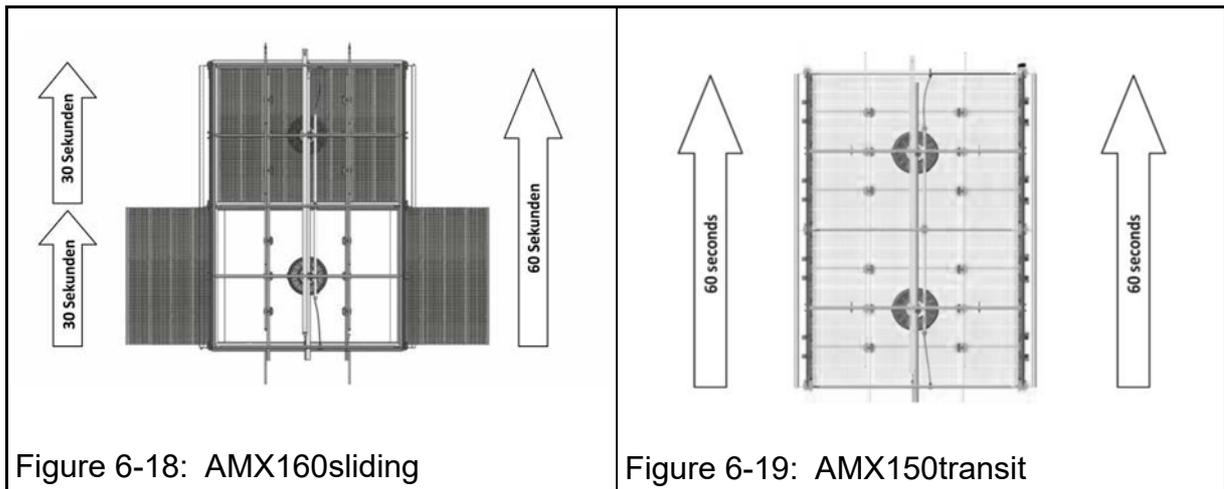


Figure 6-17: Removing the cross bar

8. Starting at the topmost tier, where the lift cross conveyor is situated, the floor elements are opened one after the other by two persons per row simultaneously only while the manure belt is running. The floors are opened starting at the manure belt drive (one floor after the other).
  - AMX160sliding: As soon as all birds of one sliding floor are on the manure belt, the floor must be moved back completely.
  - AMX150transit: To guarantee the transport of the birds on the manure belt, the pivoting floors must remain open.

Make sure to wait a minimum of 60 seconds per tier section to move the birds to the manure belt. If this is not the case, the manure belt drive may get overloaded.



**i NOTICE!**

Sliding and pivoting floors may only be opened when the manure belt is running!

9. When all birds of the tier have been moved out, all conveyor belts must be stopped by pressing the OFF button on the external user panel.
10. After the last birds of one tier have been moved to the manure belt, manure removal of the tier below can start. This prevents unnecessary waiting times.
11. The lift cross conveyor is lowered to the level of the next tier (also check the broiler transfer points, cf. item 5).
12. The conveyor belts can be turned on again with the ON button on the external panel.

## 6.6 Adjustment and monitoring processes during the moving-out procedure

### Key points during the moving-out procedure

#### **i** NOTICE!

- Check and readjust the pressure rollers.
- Readjust the manure belts.
- Check the chain tension of the cross and level conveyors.

### 6.6.1 Monitoring of the pressure roller distances at the manure removal drive

The distance between the gear wheels should amount to 3 millimetres. The distances (X) and (Y) of the pressure rollers must be identical at both sides of the manure belt drive.

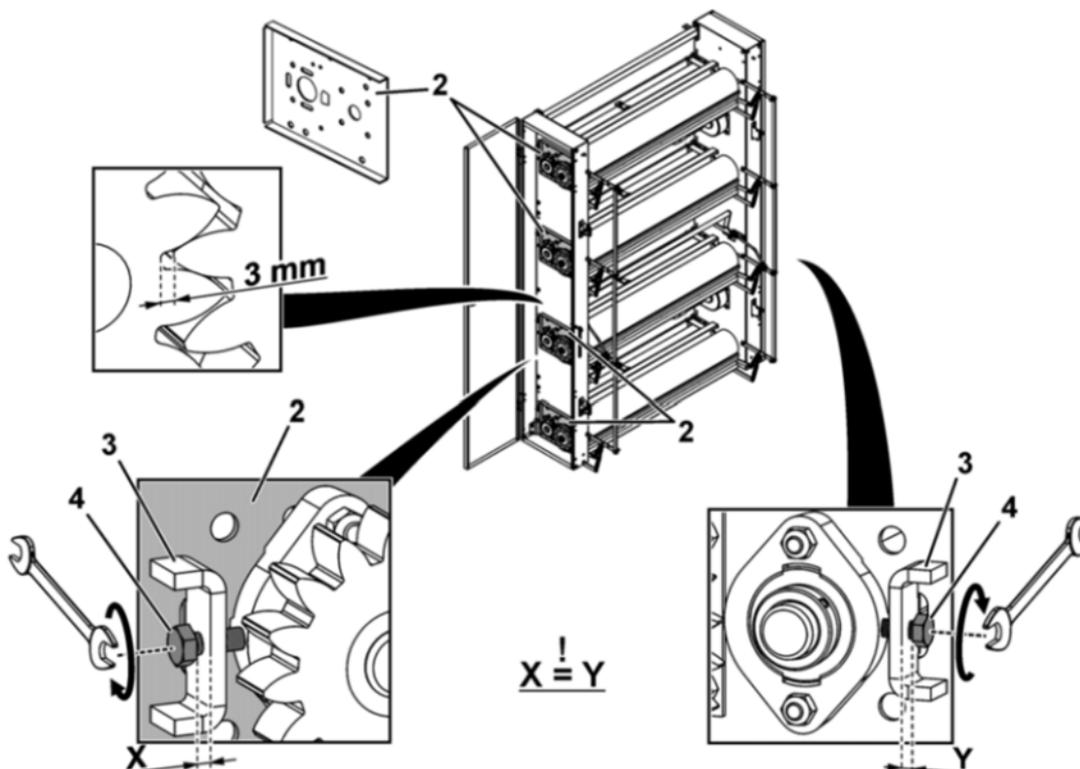


Figure 6-20: Cog wheels pressure roller manure belt drive

### 6.6.2 Adjusting the pressure roller support

Carefully increase tension of the support for pressure roller. If the belt slips, retighten both screws again by a half turn and check if the belt is running. Repeat this procedure if necessary.

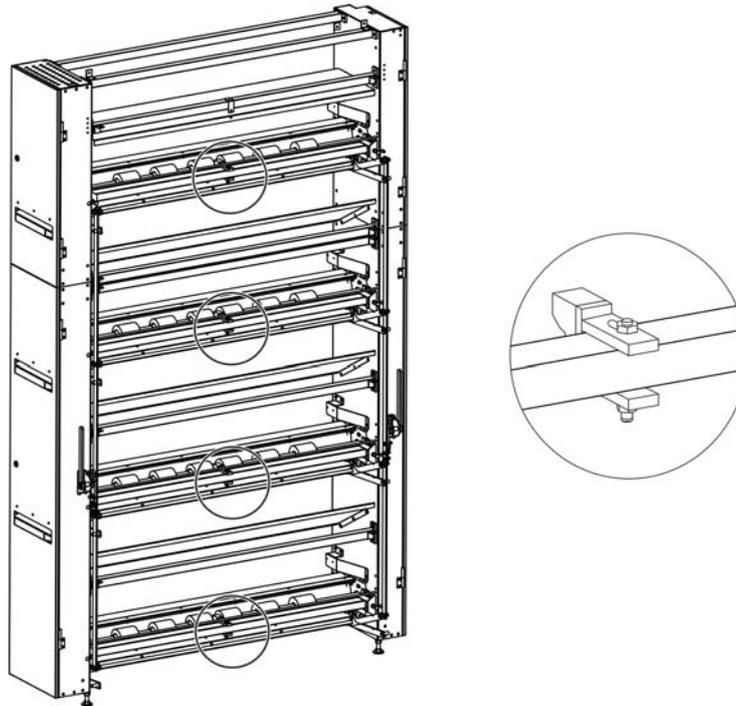
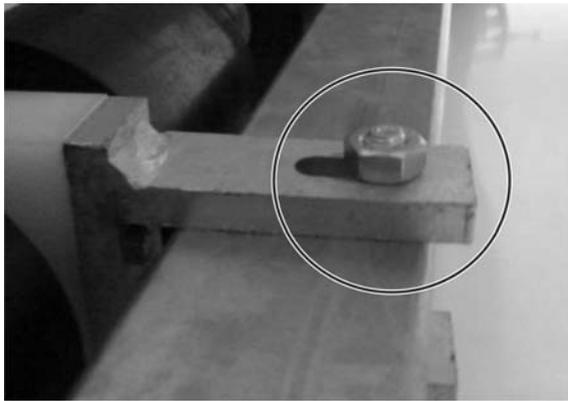
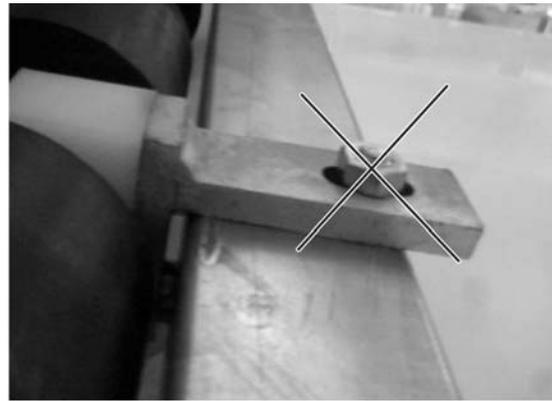


Figure 6-21: Pre-adjustment of the fastening bracket

Move the fastening bracket as far as possible over the long hole.



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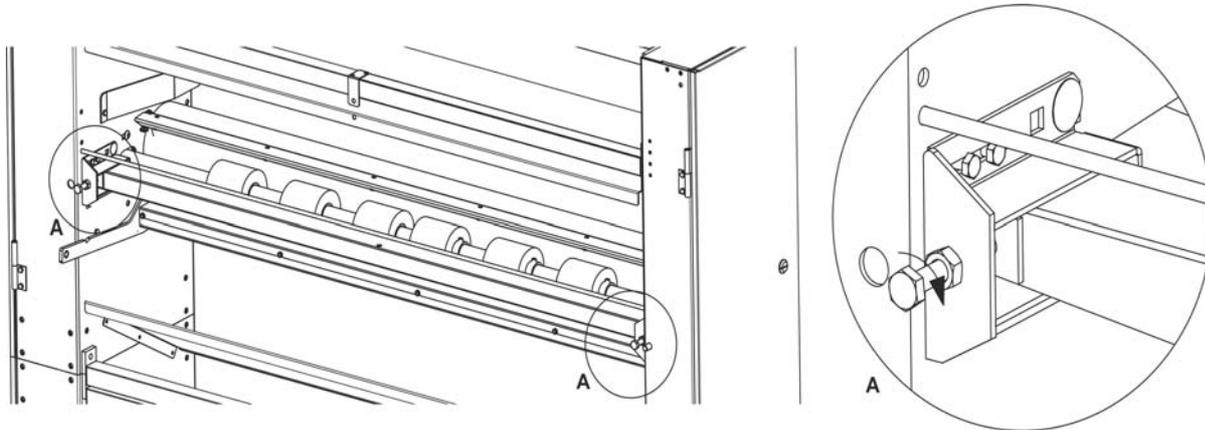


Figure 6-22: Supporting device pressure roller

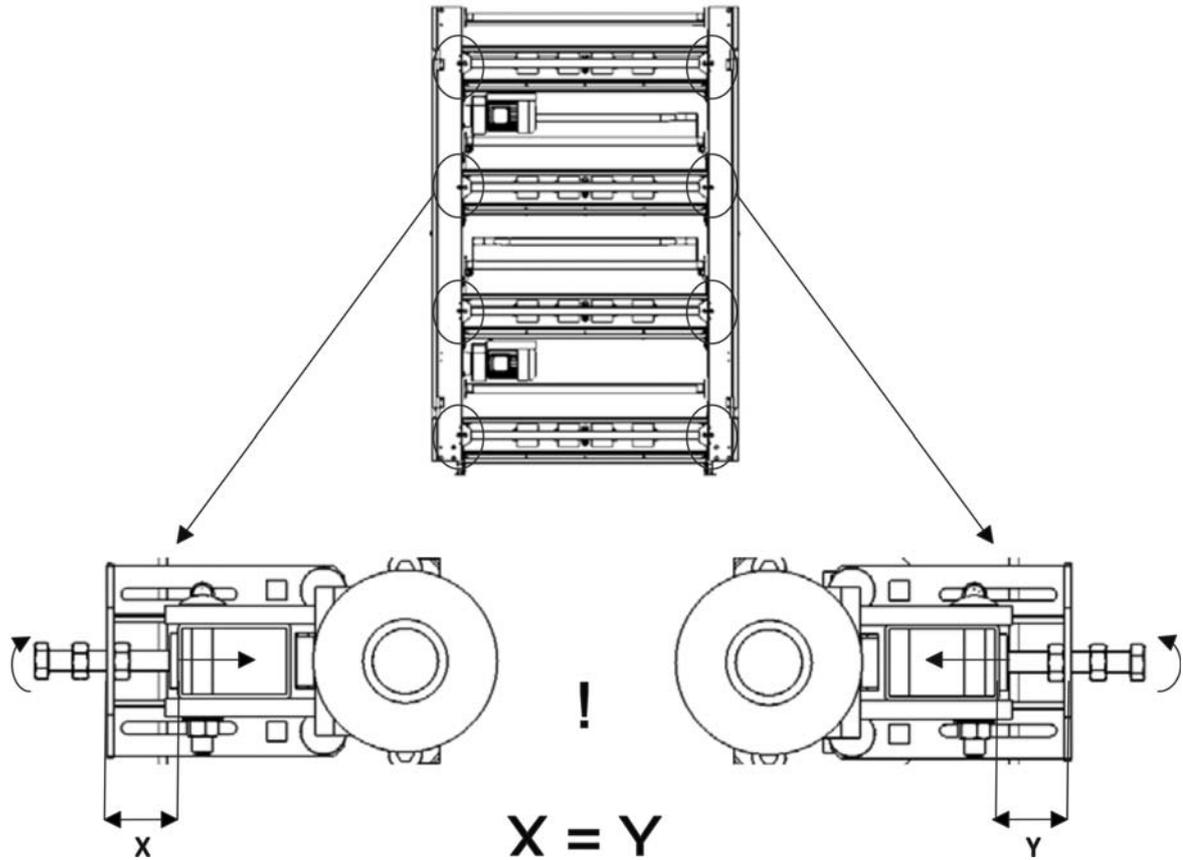


Figure 6-23: Tensioning the supporting device for the pressure roller

### 6.6.3 Readjusting the manure belts

Due to the large bird weight and a possibly uneven distribution on the manure belt, it may be necessary to readjust the manure belts.

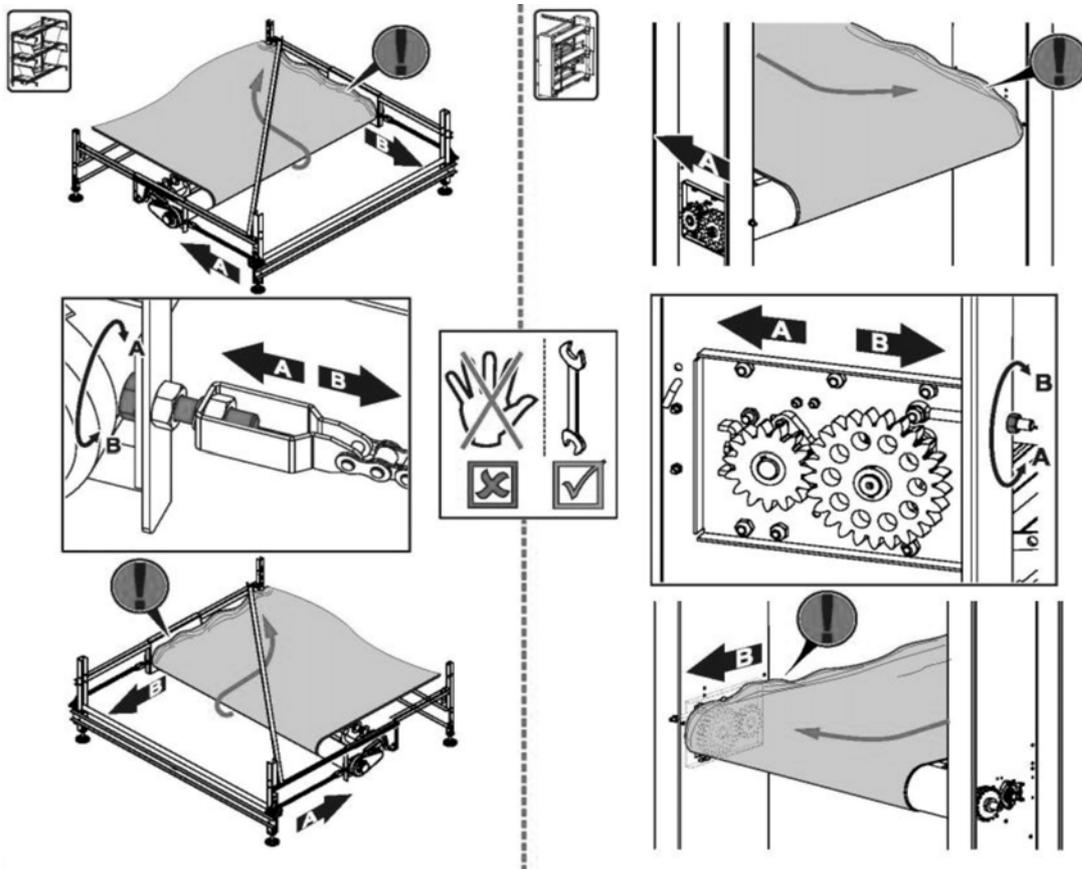


Figure 6-24: Readjustment of the manure belt

Information on the readjustment of the manure belts can also be found on the inside of the manure removal drive covers. They should be observed before manure removal.

### 6.6.4 Checking the manure belt tension

As the birds are heavy and may cause thermal expansion of the manure belt, sufficient tension of the belt should be checked.

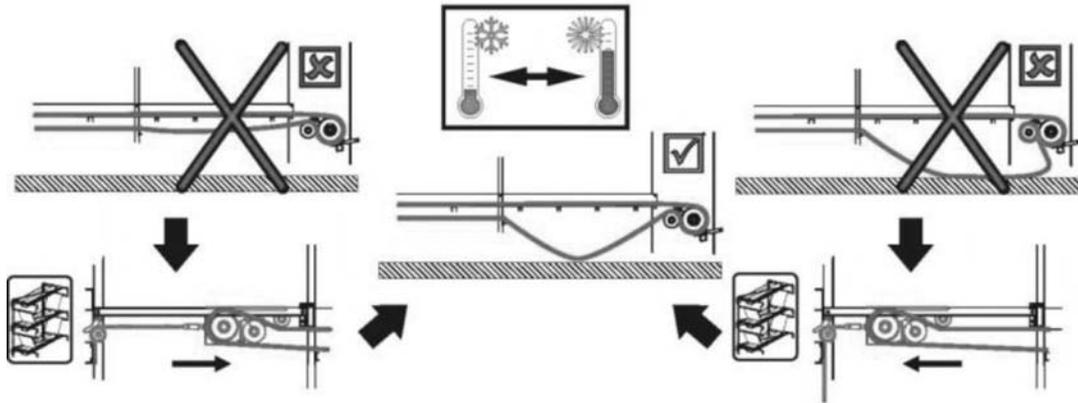


Figure 6-25: Manure belt tensioning

## 6.6.5 Readjusting the chain tension of the broiler transport elements

Readjust the cross conveyor and level conveyor chain tension if necessary.

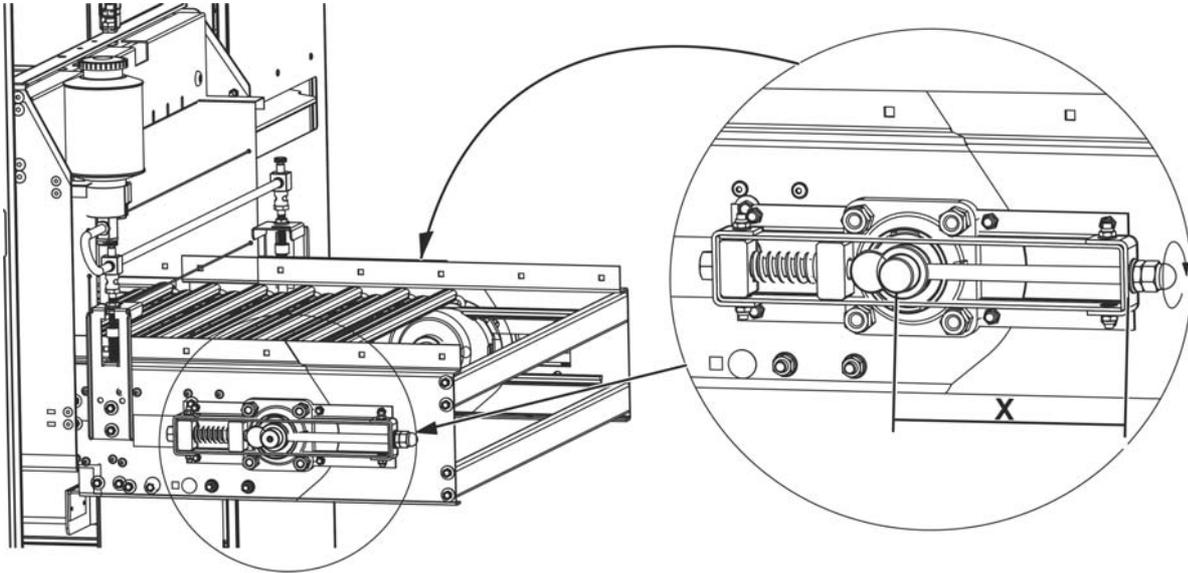


Figure 6-26: Cross conveyor

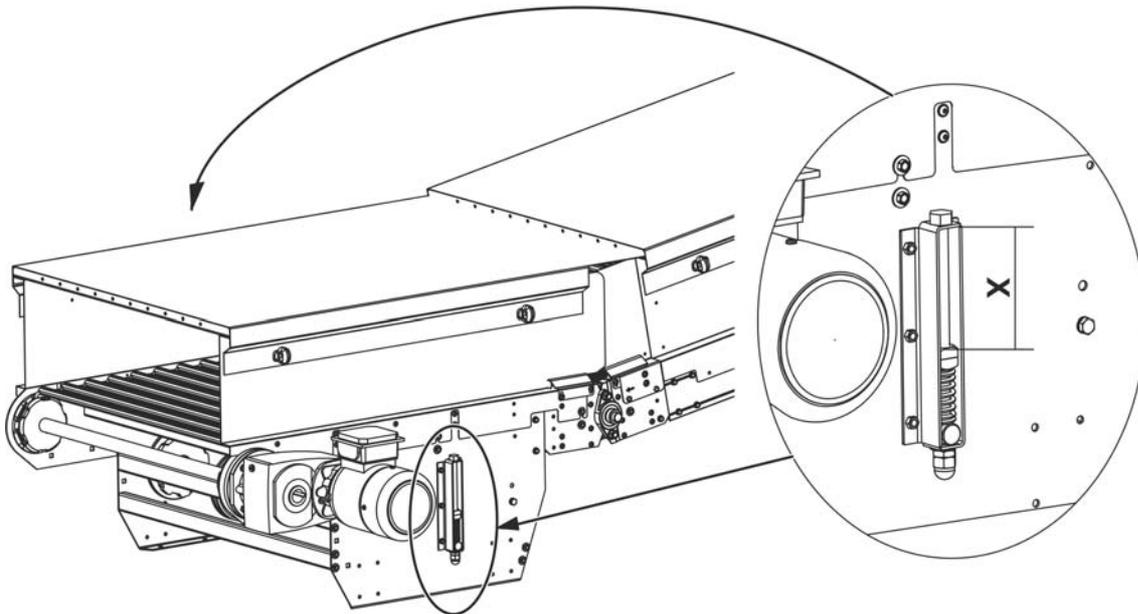


Figure 6-27: Level conveyor

"X" must be identical on both sides!

## 6.7 After the moving-out procedure

### Key points after the moving-out procedure

#### NOTICE!

- Completely release the tension of the manure belts.
  - Move the lift cross conveyor up into the parking position.
  - Thoroughly clean the lift cross conveyor, the level conveyor and the rotating table.
  - Thoroughly clean the moving-out area.
-

## 7 Maintenance

### CAUTION!

Never reach into the running installation. Before reaching into the installation, turn the system off and secure it against unintentional actuation.

Assure yourself beforehand that the main switch is in the OFF position and can not be put in the ON position without your knowledge.

### CAUTION!

Before carrying out repair or maintenance work, disconnect power supply and indicate this by a sign fixed to the main switch!

### CAUTION!

After repair or maintenance work, never place any objects (e.g. spare parts, replaced parts, tools, cleaning implements etc.) in the accessible areas of the system or around it!

Make sure that all loose or replaced parts have been removed from the system components **before** the system is taken into operation again!

Make yourself familiar with the construction of the system in sufficient light! If this is not possible at site, get all available information on the remaining dangers in connection with this system!

When working **under** the installation, always wear a safety helmet!

### CAUTION!

First disconnect main power supply and then enter the house compartment!

If you have to carry out maintenance, cleaning or repair work get the information beforehand, where the main electric switch is located.

Put main switch to "Off" and indicate maintenance or repair work by a sign fixed to the main switch!

Immediately disconnect main water supply!

### WARNING!

Never reach through the protective grills or blade flaps into a fan, even if it is not in operation!

## 7.1 Drinking system

### NOTICE!

If temperatures below 0°C are expected (with empty house), there is a risk that the nipple pipes will burst from becoming frozen.

The water supply tank must then be emptied, as a precaution.

---

- Immediately stop any leakages in the water pipes.
- Make sure that no dirt gets into the nipple pipes as this could either cause the nipples to leak or clog, or clog the nipple pipes.

## 7.2 Feeding system

- Under normal conditions, there is no need for oil or grease change.
- Carry out the change of oil in accordance with the directions of the gear motor manufacturer (see sticker at the gear motor). The lubricating grease for gear motors type ESTA amounts to 90 grams for 0,37 kW or 280 grams for 0,75 kW motors.
- In exceptional cases, e.g. after leakages, we recommend the following lubricants:

ARAL	aral grease FDO
BP	BP energrease HT-EP-00
CALYPSOL	calypsol D 8024
ESSO	esso fibrax EP 370
MOBILOIL	mobilflex 46
SHELL	shell special reductor grease H
	shell grease S 3655
	shell semnia grease-O
TEXACO	glissando GF 1464

Table 7-1: Overview lubricants

- Prevent condensation and cleaning water from penetrating the inside of these devices.
- Regularly clean the motors' cooling fins to prevent overheating.

## 7.3 Manure belt drive



### WARNING!

Never touch the driving, guide and deflection rollers when the manure collection is switched on!

Make sure that all covers and protecting covers are duly closed and secured!

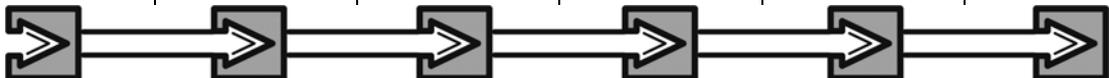
- Regularly lubricate all roller chains and chain wheels with a brush (oil: SAE 90).
- Regularly clean the motors' cooling fins to avoid overheating.
- Regularly check the pre-stressing of the roller chains and re-tension if necessary; also check the safety pin.
- After each batch:
  - Check chains, wheels and chain tensioner for wear.
  - Protect the motors from water during the cleaning process.
  - Lubricate the chain drives immediately after wet cleaning.

## 8 Cleaning and disinfection

- Shut off the power when cleaning live parts!
- Protect moisture-sensitive parts such as control cabinets and motors from splash water during wet cleaning by covering them!
- Water in combination with dust and feed remains can lead to slippery floors!
- Cleaning agents and disinfectants can cause corrosion! Observe the manufacturer's instructions!

### NOTICE!

If you use thermal disinfection, ensure that the temperature does not exceed 60°C. Temperatures above 60°C can damage the equipment in the house. **Specifically, plastics may deform.**

Rough cleaning, rodent control and insecticide use	Soaking	Cleaning	Washing, immediately followed by drying	Disinfection according to manufacturer's instructions. If prescribed: rinsing	Drying (immediately after completed disinfection)
					

### 8.1 Service life of equipment

Big Dutchman's Avimax system is made from one of the best corrosion-free steel grades available on the market. In some models, specific parts, especially in critical areas of the installation, are made of Galfan steel which provides the highest protection possible.

Still, it is common knowledge that some methods influence the product's service life negatively, independent of the quality of the corrosion protection and the supplier of the equipment. These unfavourable methods include:

- wet cleaning of the components if they are not immediately dried afterwards;
- high-pressure cleaning which may be more aggressive than normal cleaning, depending on the equipment and the duration of the cleaning process;
- use of disinfectants which can damage steel or plastics and shorten the service life if they are used in high concentrations or longer than necessary.

These notes also refer to the building if this is made of coated steel.

## 8.2 Disinfection

Many sanitation programs all over the world demand the use of disinfectants after the cleaning process. You should however keep in mind that many disinfectants may reduce the service life of your installation.

Big Dutchman therefore recommends asking the producer of the disinfectant if the product may damage coated steel, plastics or other parts of your equipment. We propose making the decision about the use of disinfectants by listing the advantages and disadvantages for each component of the installation as well as considering the requirements and goals of the sanitation program.

Systems like Avimax are usually installed in near airtight buildings. This allows the use of gaseous substances which eliminate germs. This is a method quite common in some parts of the world.

The precautionary measures mentioned above apply to all chemicals which are used in or near the installation, irrespective of their aggregate state.

Big Dutchman recommends drawing up a sanitation program in cooperation with your veterinarian as well as the responsible experts. Such programs should consider the hygiene level of your Avimax herd and the whole farm, the hygiene level of the chick supplier, common diseases in your region, programs which are required and/or recommended by the buyer of the broilers or the chick supplier as well as statutory requirements and/or recommendations. In the following, Big Dutchman will comment on specific methods based on experience with broiler installations the world over to contribute to this topic.

Today, it is more important than ever before to make sure that the areas in which animals are kept are not subjected to harmful substances which could cause diseases in humans or animals (germs). Due to the high number of birds and batches, broiler breeding in multi-tier systems like Avimax requires special precautionary measures.

## 8.3 Hygiene

Keeping the farm as hygienic as possible is an important factor in broiler production. Keep in mind that the poultry house cannot be sterile. It is important to reduce the number of pathogenic germs and to prevent their multiplication. Observe the following points to guarantee a hygienic farm:

- Keep the number of unnecessary visitors to the farm as low as possible. Visitors have to enter their name into the visitor book before entering the farm!
- The farm staff is not allowed to have contact to birds or other poultry outside of the farm!
- All vehicles should be disinfected before entering the farm. Install sprinkler hoses and wheel baths for the tyres at a place outside the farm!
- The farm should be fenced in! Only open the gate when required!
- No other poultry and birds may be on the farm!

Farms should always be safeguarded against invasion of wild birds, if possible! The buildings themselves must be protected against the invasion of birds of any kind (even the smallest oscine birds). This can be realised e.g. by installing bird screens in front of the ventilation openings.

- There should be no rodents on the farm! Draw up a plan for elimination and ensure that this plan is observed!
- Eliminate weed on the farm premises!
- No feed should left be open anywhere on the farm! Store feed in a dry place to which the animals have no access!
- Keep the number of unnecessary visitors to the farm as low as possible. Upon entering the farm / the buildings, all visitors should put on protective clothing and write down their name in the visitors' log!

The farm should be equipped with a showering facility to change clothes and to prevent the introduction of germs!

- The service room of every house should be equipped with hand sanitizer and disinfectant mats!
- Change your shoes every time you enter the house!
- All hygiene requirements should be complied with not only during the batch, but also during the entire service period!

## 8.4 Information regarding silicon dioxide for mite control

We would like to explain this topic briefly in order to avoid damage to the drive units caused by the incorrect application of silicon dioxide in the future.

In poultry houses, amorphous silicon dioxide is used as a biocide to eliminate harmful insects, such as red mites. It is also distributed under the trade name M-Ex Profi 80.

How it works: Silicon dioxide destroys the wax layer which surrounds the mites. The mites then dry out. The white powder is dissolved in water at a ratio of 1:6 to create a suspension that can easily be sprayed onto surfaces and equipment in the house using standard spraying technology.

The agent is easy to use, very effective and relatively inexpensive. Practical use has shown that the rough surface of the applied suspension causes extreme wear and tear on moving parts made of plastic or metal, however. Lubricants such as oils and greases are destroyed by silicon dioxide.

## 8.5 Before cleaning

The systems may be either wet-cleaned or dry-cleaned. Wet cleaning makes for a more effective disinfecting process.

The system should only be cleaned one week before putting the birds into the house, or the systems will be damp for a very long time and rust may form.

- Shut off the power when cleaning live parts!
- Protect moisture-sensitive parts such as control cabinets and motors from splash water during wet cleaning by covering them!
- Water in combination with dust and feed remains can lead to slippery floors!
- Cleaning agents and disinfectants can cause corrosion! Observe the manufacturer's instructions!
- Remove all feed remains and manure from the whole installation.
- Let the silo and the feed augers as well as the Augermatic tubes for litter distribution run dry! To do this, shut off the litter supply in the feed column.
- Hinge the manure belt scrapers away.

## 8.6 Comparison between wet and dry cleaning

Dry cleaning is the best option regarding a long service life of your system, but it may not be the right method for you. We learned from different customers worldwide that dry cleaning alone is not able to sufficiently reduce the number of germs, thus causing more diseases in the birds and in turn reducing the animal performance.

Wet cleaning removes biological substances and germs more efficiently from the system than dry cleaning.

If your program includes the use of disinfectants, you should also consider that biological substances might protect the germs.

The above mentioned points are caused by shorter and more frequent batches in broiler production. Young birds with low immune systems are exposed to germs which originate from the last herd and which were not eliminated during the cleaning process. Big Dutchman recommends talking about the details with your veterinarian.

## 8.7 Wet cleaning

If you decide on this method, soak the installation in water directly after manure removal. In the past, this has led to the best results. Do not only soak the equipment but also the interior of the building. Some of our customers reported that fat and protein breaking substances were also helpful.

After the room has been soaking for several hours, it should be cleaned starting with the ceiling down to the floor and from the front of the house towards the end, where the manure removal system is situated.

1. During the cleaning process, you should make sure that not too much water accumulates on the manure belts.
2. Ensure good lighting so that dirt can be easily spotted.
3. After cleaning, all surfaces and equipment should be rinsed with clean water.
4. The use of cross bars which lift the manure belts and let the water flow off faster is common in practice. Keep in mind that you have to remove these bars before starting the manure belts again. Do not operate the manure belts during the wet cleaning.
5. Drinkers and water containers not cleaned thoroughly are potentially dangerous. They should therefore always be thoroughly cleaned and disinfected (refer to chapter 8.9 "Drinking system"). Rigorously rinse the drinker lines after disinfection. Make sure that no disinfectants remain in the drinkers.

6. After wet cleaning, it may be necessary to turn on the feed lines to remove water and feed remains which may have accumulated and fall onto the belt now. It may be helpful to run the manure belts so that these remains are removed. Remember that running belts must be supervised closely when wet as these can slip and thus cause the manure belts to deviate.
7. Remove any remaining feed from the farm.
8. Some operators of Big Dutchman systems also clean the exterior of the building with water, especially near the air inlets. Note that some components of the system and the building should not be wet cleaned, e.g. electric motors, electric user panels and other parts which may be damaged by water.
9. Big Dutchman motors can be cleaned gently, but not with high-pressure cleaners.
10. Upon completion of the cleaning process, air the house to ensure fast drying. Pump cleaning water out of the manure cross channel.

## 8.8 Dry cleaning

Refer to the arguments listed under 6.2. If you choose this method, we recommend to run the exhaust air fans for some hours after the manure has been removed to dry everything, especially remaining droppings. Turn off the water supply for the cooling pads during this period. If the time period between the batches allows it, you may want to wait until the next day and then run the fans again for a few hours.

As soon as everything looks dry, you should loosen as much material as possible with brushes and brooms. If the material is dry, we advise you to use high-powered industrial vacuum cleaners. Some farm managers decide to use air blowers which clean larger areas faster. As this takes quite long and other houses may also be subjected to the material, we recommend using a vacuum cleaner.

## 8.9 Drinking system

- Lower the plastic hose endpiece at the end of the nipple tube line so that the outlet is approximately five centimetres above the nipple tube. This is necessary for letting the rinsing water escape and for preventing air from entering the nipple tube.
- Insert the water hose into the float tank outlet pipe connection and thoroughly rinse the nipple tube using mains water supply pressure. Depending on the length of the system, the rinsing process takes between two and four minutes.
- After the cleaning process, make sure that the water level in the float tank is correct.

The exterior of the drinkers should be cleaned according to the guidelines listed under 6.4 and 6.5. The interior of the drinker line should be subjected to the same procedures used for nipple drinkers in normal broiler floor management systems. Some customers routinely use a sodium hypochlorite or chlorine bleach dilution. The drinker lines should be rinsed thoroughly with clean water after treatment. Please bear in mind that some chemicals may damage plastic or even stainless steel components, especially if they are left soaking for too long. Ask the manufacturer about such chemicals before using them.

## 8.10 Feeding system

Ideally, the feed delivery date should be close to the moving-out date so that the silo, the Flex Vey system, the Augermatic line and the feed pans are empty when you want to stop the feeding.

If this is not possible, try to shut off the feed supply from the silo so early that the goal described above is achieved by all parts of the silo's outlet system. Where this option is not possible either, it may be necessary to remove the remaining feed by letting the line run dry as soon as the feed supply is switched off.

The pans should be open for dry cleaning, as shown in the picture below, to provide easy access to the pan interior.

During wet cleaning, it is recommended to leave the pans closed so that the pans can rotate under the pressure of the water jet. After the high-pressure cleaning, the pan should be opened as shown in the picture below so that the water can drain off. Also refer to the information under "Wet cleaning". Many of our customers also clean their silo from the inside and the outside.



Figure 8-1: Open feed pan

## 8.11 Manure removal

A thorough manure removal immediately after moving the birds out is always the first required step, regardless of the selected cleaning method. Different factors, e.g. topography, existence of natural or man-made barriers and large numbers of insects, birds and other animals which could carry germs, require a minimum safety distance from the house to the location where the manure is stored and/or processed. Your regional government office is likely to have the corresponding guidelines.

### NOTICE!

Please refer to the operating manual "Adjustment of the manure belt" regarding the maintenance of the manure removal system, especially the manure belt.

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## 9 Checklist key points summary

Key points preparations for the moving-in procedure		Note
<input type="checkbox"/>	Start the production computer two to three days before moving the chicks in.	
<input type="checkbox"/>	Heat the house before moving the birds in until a temperature of 30°C is reached at the bird level and a temperature of 32°C at the cage floors. The correct moving-in temperature is the most important factor and significantly influences the fattening process.	
<input type="checkbox"/>	Check if all pivoting and sliding floors were closed correctly after the last moving-out procedure.	
<input type="checkbox"/>	Rinse all drinker lines and drip cups before moving birds in to remove any disinfectants and harmful substances.	
<input type="checkbox"/>	On the first day, set a water pressure which causes the nipples to form a drop, but make sure they do not drip. This ensures that the chicks will easily find the water.	
<input type="checkbox"/>	Fill the Augermatic feed line shortly before moving the birds in so that they can immediately start eating.	
<input type="checkbox"/>	The feed pans should be flooded for the first days to facilitate feed intake.	

For a detailed description of all steps of the procedure, please refer to chapter 6.1 "Preparations for the moving-in procedure"





Key points for the first days after moving the birds in		Note
<input type="checkbox"/>	During the first hours and days after moving the birds in, make sure that all birds have found feed and water.	
<input type="checkbox"/>	The light should be turned on at 100 percent during the first seven days, see chapter 5.4.4 "Lighting program".	
<input type="checkbox"/>	On the first morning after moving the birds in, check if their crops are filled with feed and water. The crops of birds which have taken in water and feed are full, soft and rounded. If the crop is filled and hard, the bird ate but did not drink. – 95 to 100 percent of crops should be filled - 24 hours after moving-in.	
<input type="checkbox"/>	The flooding mechanism should be turned off starting with the third day. To achieve this, the Augermatic line is lifted while the feed pans remain on the floor.	

For a detailed description of all steps of the procedure, please refer to chapter 6.2 "Moving birds in"



Key points airing / ventilation		Note
<input type="checkbox"/>	Check the daily bird weight to achieve the desired weight for day seven by adjusting humidity and temperature, if necessary.	
<input type="checkbox"/>	Monitor the birds' behaviour to be able to judge the climate conditions.	
<input type="checkbox"/>	Use the temperature and the minimum ventilation to stimulate the birds' activity and appetite.	
<input type="checkbox"/>	If possible, try to maintain an air humidity of 60 to 70 percent during the first three days and later a humidity of more than 50 percent..	
<input type="checkbox"/>	If necessary, reduce the temperature if the humidity exceeds 70 percent and monitor the birds' behaviour.	

For a detailed description of all steps of the procedure, please refer to chapter 6.3.1 "House temperature"



Key points for the lighting program		Note
<input type="checkbox"/>	Leave the light switched on for 24 hours after moving-in to ensure that the chicks consume sufficient amounts of water and feed.	
<input type="checkbox"/>	In the second night, turn the lights off for one hour to determine the beginning of the dark phase. If this time has been established once, it may not be changed again for this batch.	
<input type="checkbox"/>	The duration of the dark phase must only be controlled by the time when the light is switched on. The birds quickly learn when the dark phase starts and will fill their crops with feed and water before the light is turned off.	
<input type="checkbox"/>	Use one dark phase within 24 hours.	
<input type="checkbox"/>	Increase the number of dark hours when the birds are seven days old..	
<input type="checkbox"/>	Reduce the light intensity to keep the birds calm.	

For a detailed description of all steps of the procedure, please refer to chapter 6.3.4 "Lighting program"



Key points for the daily birds control		Note
<input type="checkbox"/>	functioning of drinker and feed lines (exact monitoring of water and feed consumption can provide valuable information for bird management),	
<input type="checkbox"/>	careful selection of birds and daily documentation of your selections and losses,	
<input type="checkbox"/>	house climate (ventilation, house temperature),	
<input type="checkbox"/>	lighting,	
<input type="checkbox"/>	physique and behaviour of the birds,	
<input type="checkbox"/>	birds' health,	
<input type="checkbox"/>	manure composition.	

For a detailed description of all steps of the procedure, please refer to chapter 6.3 "Daily tasks"



Key points for the preparation of the moving-out procedure		Note
<input type="checkbox"/>	Shorten the dark phase three days before moving the birds out.	
<input type="checkbox"/>	Turn off the feed supply ten to twelve hours before moving the birds out.	
<input type="checkbox"/>	Remove manure immediately before moving the birds out!	

For a detailed description of all steps of the procedure, please refer to chapter 6.4 "Preparation of the moving-out procedure"



Key points for the moving-out procedure		Note
<input type="checkbox"/>	Lift the lift cross conveyor to the level of the topmost tier.	
<input type="checkbox"/>	Darken the end set transfer areas.	
<input type="checkbox"/>	Turn on blue light in the whole house.	
<input type="checkbox"/>	Check the position of the broiler transfer points.	
<input type="checkbox"/>	Use at least 60 seconds per tier section for opening the floors	
<input type="checkbox"/>	Only open the floors while the manure belts are running	

For a detailed description of all steps of the procedure, please refer to chapter 6.5 "Moving birds out"



Key points during the moving-out procedure		Note
<input type="checkbox"/>	Check and readjust the pressure rollers.	
<input type="checkbox"/>	Readjust the manure belts.	
<input type="checkbox"/>	Check the chain tension of the cross and level conveyors.	

For a detailed description of all steps of the procedure, please refer to chapter 6.6 "Adjustment and monitoring processes during the moving-out procedure"



Key points after the moving-out procedure		Note
<input type="checkbox"/>	Completely release the tension of the manure belts.	
<input type="checkbox"/>	Move the lift cross conveyor up into the parking position.	
<input type="checkbox"/>	Thoroughly clean the lift cross conveyor, the level conveyor and the rotating table.	
<input type="checkbox"/>	Thoroughly clean the moving-out area.	

For a detailed description of all steps of the procedure, please refer to chapter 6.7 "After the moving-out procedure"