

User Manual

Heat exchanger "Earny" V14

[Type 40,000i/30,000i/20,000i and Double Earny]

Code No. 99-97-2517

Edition: 01/2015 GB

These instructions are a translation of the original instructions!

EC Declaration of conformity



Big Dutchman

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In accordance with EC Directives:

- **Machines 2006/42/EG, Annex II / Part 1 / Chapter A**

Further applicable EC directives:

- Electromagnetic compatibility 2004/108/EC
- Low voltage 2006/95/EC



The product mentioned below was developed, constructed and produced in accordance with the above mentioned EC Directives and under sole responsibility of Big Dutchman.

Description:	System for heat recovery in poultry fattening houses
Type:	Heat exchanger Earny V14
System no. and year of construction:	see customer order no.

The following harmonised standards apply:

- EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
- EN 60204-1:2006/AC:2010: Safety of machinery - Electrical equipment of machines Part 1: General requirements

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07.01.2014

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Place

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Suction hose for compressor in the heat exchanger Earny

Practice has shown that the condensation water of a lot of compressors is only drained insufficiently. Especially in case of the heat exchanger Earny this increasingly causes failures.

Due to the not drained condensation water, the air quantity necessary for the cleaning is reduced and on the other hand, the pressure tank is damaged or possibly destroyed through the ammonia containing condensate.

Therefore, all heat exchangers Earny will now be supplied with a suction hose which has to be mounted on site during the mechanical inspection.

The suction hose connects the suction (1) of the compressor with the fresh air chamber (2) of the heat exchanger, as shown in figure 1.

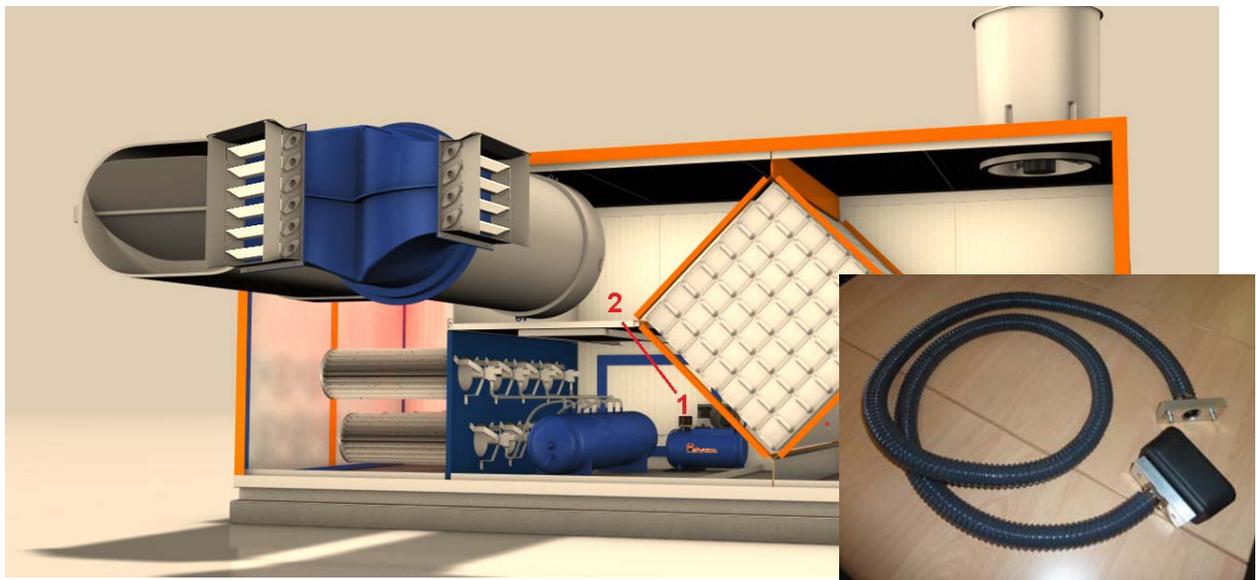


Fig. 1: Assembly site of the compressor suction in the heat exchanger Earny

The use of the suction hose reduces the amount of condensation water since the relative air humidity of the heated outside air is lower. Furthermore, the condensation water is free of ammonia.

The service life of the compressor is considerably increased through this measure.

The assembly of the suction hose requires that the compressor is further drained manually very month. Optionally, you can also use an automatic drain system.

The suction hose can also be ordered for existing heat exchangers of every size:

Code no.	Description
60-59-0101	Suction hose 2m with two flange plates for compressor Earny-TW

Optionally, you can also order an automatic drain system for compressors. For more details see the product information N° 708 of 25 July 2006.

Code no.	Description
20-50-3193	Automatic drain for compressor 230V 50/60Hz

Quick installation guide for the assembly of the suction hose:

The compressor must be disconnected from the mains voltage during the installation.

	
	
	
<p>1. Disassemble the air filter of the compressor.</p>	<p>2. Mount the flange on the position of the air filter.</p>
<p>3. Put on the hose.</p>	<p>4. Bore a hole in the fresh air chamber above the compressor.</p>
<p>5. Mount the air filter on the flange in the fresh air chamber.</p>	<p>6. Seal the hole (Sikaflex).</p>

Heinz Südkamp
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1 Basic instructions

**Important:**

Please take care of these documents and keep them close to the system **at all times for quick reference.**

All persons operating, maintaining and cleaning this system have to be familiar with the contents of these instructions.

Observe these security instructions whenever any work is carried out on this system!

Manuals can be reordered from **Big Dutchman** when necessary.

One of the following information is required to reorder a manual:

- the 8-digit code number of your language version [99-97-xxxx] as stated on your manual's cover;
- the complete title of the manual including information on the type of instruction;
- if stated, the 8-digit universal code number [99-94-xxxx] including information on the required language version.

1.1 Purpose of the BD manuals

Depending on the intended use, **Big Dutchman** provides the following documentation:

1. Assembly manual
2. User manual
3. Operation manual (assembly and use of the system)
4. Spare parts lists
5. "Local add-on manuals": (for products which differ from those of the original manual in specific countries).

The type of instruction of your manual can be found on the cover above the title.

1.2 EC declaration of conformity

We hereby declare that the system described in this manual corresponds to the relevant health and safety requirements according to the EC directive because of its design and construction as introduced to the market by us.

The declaration of conformity can be found at the beginning of the manual.

1.3 Basics

The **Big Dutchman** system has been built with state-of-the-art technology and meets the recognized technical safety requirements. The system is reliable. Upon operation, however, dangers to life and limb of the user or third persons or impairments of the system or other material property are still possible.

The system may only be operated, maintained and repaired

- in accordance with its designated use;
- in an excellent state from the safety and technical point of view;
- by persons who are familiar with the safety regulations.

Should specific problems occur which are not described in detail in these documents, we recommend you contact us for your own safety.

1.4 Explanation of the symbols and structure of these instructions

1.4.1 Structure of the safety instructions in this manual

Basic structure:

Pictograph	Type of danger
	Possible consequence(s) of non-compliance
Signal word	• Measure(s) against the danger

Meaning of the signal words:

Pictograph	Signal word	Meaning	Consequences of non-compliance
Possible personal injuries:			
possible safety symbols: see chapter 1.4.3	DANGER	directly dangerous situation	Will lead to death or severe injuries.
	WARNING	possibly dangerous situation	May lead to death or severe injuries.
	CAUTION	possibly dangerous situation	May lead to minor injuries.
Possible damage to property:			
	CAUTION		May lead to damage to property

1.4.2 Special safety symbols in the manual and on the system

These safety symbols (pictographs) illustrate remaining dangers when handling the system. They are used in the safety instructions of this manual (also refer to chapter 1.4.1) and on the system.

 <p>CAUTION</p>	<p>Safety symbols and instructions on the system must always be easily visible and undamaged.</p> <ul style="list-style-type: none"> • If they are soiled by dust, manure, feed remains, oil or grease, clean them with a water-detergent mixture. • Damaged, lost, or unreadable safety symbols have to be replaced immediately. • 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.
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	<p>Warning: general danger</p>
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	<p>Warning: dangerous electric tension</p>
---	--

	<p>Warning against reaching into an automatically starting fan.</p>
---	---

1.4.3 Structure of the general instructions in the manual

	<p>IMPORTANT!</p> <p>This symbol indicates important information. There is no risk of personal injuries or damage to property.</p>
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1.5 Necessary qualifications of the persons working with the system

1.5.1 Employing external personnel

	<p>IMPORTANT:</p> <p>The supervisor is responsible for the safety of external personnel.</p>
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Maintenance and repair works are frequently carried out by external personnel not familiar with the circumstances specific for the system and the inherent dangers.

You as operator are to survey the personnel and to define responsibilities and powers. Inform these people in detail on the dangers of their area of work. Check their method of working and intervene as soon as possible.

1.5.2 Operation of the system

The system may only be operated by persons who are competent and can guarantee proper handling due to special training or knowledge and practical experience with the system. The system operator or owner has the sole power of decision.

1.5.3 Maintenance and repairs

Maintenance and repair works may only be carried out by persons who are competent and can guarantee proper handling due to special training or knowledge and practical experience with the system. The system operator or owner has the sole power of decision.

1.5.4 Installing the gas supply

All works relating to the gas supply of a device (e.g. laying gas pipes and connecting the device to the gas supply, etc.) may only be carried out by an expert according to the effective DIN standards, DVGW rules, safety regulations and the provisions of the local gas supplier or the applicable national regulations.

1.5.5 Electrical installation

Work on the electric components may only be carried out by technically skilled personnel and according to German Industry Standards, VDE regulations, safety instructions and electro-technical regulations of the power supply industry (EVU) and the applicable national regulations.

1.6 Ordering of spare parts

The exact description of the spare parts to be ordered can be found by means of the position no. in the spare parts list.

 WARNING	Risk of injury and danger to life
	Operational safety is of paramount importance! Spare parts not released or recommended by Big Dutchman can cause severe injuries as their suitability for Big Dutchman systems cannot be assessed beforehand. <ul style="list-style-type: none"> • Only use spare parts released or recommended by Big Dutchman for your own safety.

Indicate the following when ordering spare parts:

- Code no. and description of the spare part or
Position no. including description and manual number in case of parts that are not encoded;
- Invoice number of the original delivery;
- Current supply, e.g. 230/400 V – 3 Ph – 50/60 Hz.

1.7 Obligations

Closely adhere to the instructions in this manual.

A basic condition for safe operation and trouble-free handling of this system is the knowledge of the basic safety instructions and regulations.

This manual, particularly the safety instructions, must be observed by all persons working on this system. Moreover, the regulations and instructions for the prevention of accidents valid at the respective place of use have to be observed.

The manufacturer is not responsible for any damage to the system resulting from changes not authorized by **Big Dutchman**.

1.8 Warranty and liability

Warranty and liability claims regarding personal injury or property damage are excluded if they result from one or several of the following causes:

- non-designated use of the system;
- improper operation of the system;
- operating the system with defective safety equipment or not duly fixed or not functioning safety and protective devices;
- non-compliance with the instructions in this manual regarding maintenance and upgrading of the system;
- unauthorized modifications to the system;
- improper repairs;
- disasters caused by foreign matter or force majeure.

1.9 Faults and power failures

We recommend the installation of alarm systems for a better control of your production units or the use of an automatic emergency battery system for supplying the system with power in case of a power failure. This will protect your animals and thus your own economic health.

To ensure that the control unit completes all started process steps correctly and shuts down properly in case of a power failure, we recommend the use of a UPS (uninterruptible power supply).

1.10 First aid

In the case of an accident, a first-aid kit must always be available at the place of work, unless otherwise specified. Material taken out and used is to be replaced immediately.

If you need help, describe the accident as follows:

- where it happened
- what happened
- the number of persons injured
- what type of injury
- who is reporting the accident.

1.11 Pollution abatement regulations

All works on and with the installation have to be carried out in compliance with the legal requirements concerning waste prevention and proper recycling / disposal of waste.

Special care has to be taken when carrying out installation, repair and maintenance works, as water pollutants like lubricating grease and oils as well as solvent-containing cleaning solutions may not pollute the soil or reach the canalisation! These materials have to be kept, transported, collected and disposed of in appropriate containers!

1.12 Waste disposal

After repairing the system, dispose of the packing material and remains which cannot be used further according to the legal provisions for recycling.

The same applies to the component parts after putting the installation out of service.

1.13 Notes for use

In the interest of further development, we reserve the right to modify the design and technical data.

No claims can therefore be derived from any information, illustration or drawing and description contained herein. Errors and omissions excepted!

Apart from the safety information in this manual and the obligatory accident prevention regulations applicable in the user's country, please heed the accepted technical rules (safe and expert working in accordance with UVV, VBG, VDE etc.).

1.14 Copyright

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

The contents of this manual can 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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2 Safety instructions

2.1 General safety instructions

	<p>Risk of injury</p> <p>Children in the area of the system are at risk of injury as they can often not be supervised sufficiently and are not able to recognize hazards.</p>
<p>WARNING</p>	<ul style="list-style-type: none"> • Ensure that children do not use the system as a playground and are not left unsupervised in the vicinity of the system. Explain remaining dangers fully to the children.

The respective safety precautions and other generally accepted regulations regarding safety and operational health have to be observed.

Please check safety and function control devices to ensure safe and accurate operation

- before putting the system into operation again
- in adequate intervals (confer maintenance intervals)
- after modifications or repairs.

Check the proper functioning of the system after any kind of repair works. You may only put the device into operation when all protective system have been put into place again.

Also observe the regulations of local water distribution and power supply companies.

2.2 Initial operation

	<p>The following must be strictly observed for initial operation:</p>
<p>CAUTION</p>	<ul style="list-style-type: none"> • Initial operation must be carried out by a qualified technician with the respective proof of knowledge (service technician). • The following protocols and minutes required by Big Dutchman must be filled out during initial operation and made available to the operator: confirmation minutes and, if necessary, the corresponding inspection minutes.

2.3 Personal safety instructions

These safety instructions are intended to make you familiar with important information on the handling of the system. They are important for your safety and for the safety of the system.

The farm staff has to familiarize itself with the function and arrangement of the safety devices, in particular of the emergency stop button.

The farm staff has to regularly participate in health and safety briefings (according to the provisions e.g. by trade associations).

Maintenance works may only be carried out by specially trained personnel.

 WARNING	Risk of injury
	<p>Lack of knowledge about the structural design of the system can lead to injury.</p> <ul style="list-style-type: none"> • Make yourself familiar with the design and construction of the system under sufficient lighting! • Inform yourself as responsible person for the system and your employees about the remaining dangers in connection with this system!

2.3.1 Instructions on accident prevention

Before operating, cleaning, maintaining or disassembling this system, the operator or person authorized by him is obliged to instruct any person carrying out any of these works on

- the remaining dangers when carrying out these tasks
- the applicable rules and regulations regarding accident prevention and to ensure they are complied with!

The basis for these are:

- the installation's technical documentation, specifically the included safety instructions,
- the applicable safety and health regulations applicable at the place of work.

2.3.2 Personal protective equipment and measures

 WARNING	Risk of injury
	<p>The following instructions apply to all works carried out on the system.</p> <ul style="list-style-type: none"> • 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 powered or rotating working units or parts of the installation, resulting in severe injuries. • When working underneath the installation always wear a hard hat!

2.4 Use of electrical appliances

You as the person responsible for the system or his agent have to ensure that the system with its electrical appliances is operated and maintained according to the local electro-technical regulations.

  WARNING	Risk of injury and danger to life
	<p>Dangerous electric tension may be bare in the case of open control units and may cause severe injuries or lead to death!</p> <ul style="list-style-type: none"> • Be aware of the danger and keep workers of other professions away from the danger zone. • Installations and works on electric components/building units may only be carried out by qualified persons according to electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).

- Immediately switch off the system in the event of malfunctions of the power supply units. Check that the electrical equipment is not alive.
- Check the electrical wiring and cables for recognisable damage before putting the system into operation again. Replace damaged wiring and cables before taking the system into operation.

- Only use the fuses indicated in the circuit diagram.

	Danger of short circuits
	<p>Never repair or shut defective fuses.</p> <ul style="list-style-type: none"> • Defective fuses should be replaced by new ones immediately.
WARNING	

- Never cover an electrical motor. This can cause high temperatures resulting in fires and the destruction of the equipment.
- Always keep the control cabinet and all terminal and connection boxes of the system locked.
- Damaged or broken plugs should be immediately replaced by an electrician.
- Do not pull the plug from the socket at the flexible cable.
- For the respective connections please see the enclosed connecting plan of the system parts delivered.

2.5 Special safety instructions

2.5.1 Danger zones

The individual zones of the **Big Dutchman** system are constructed differently. There are several ejecting, rotating or sliding parts that might be a risk if you are not familiar with their type of construction.

	Risk of injury
	<p>Lack of knowledge regarding the system's type of construction increases the risk of injury.</p> <ul style="list-style-type: none"> • Never reach into the running system. First stop the system and secure it against an inadvertent restart. • Assure yourself before reaching into the system that the main switch is in the OFF position and cannot be put in the ON position without your knowledge.
WARNING	

The system has been equipped with all mechanisms that guarantee a safe operation. In places where the danger zone could not be safeguarded totally, in consideration of the operational reliability, safety signs have been placed. They indicate remaining technical dangers when handling the system and give information on how to avoid these dangers.

For your safety, the following safety symbols have been fixed to the system. Please make yourself familiar with the meaning of these systems. The following explanatory notes will provide you with detailed information.

	<p>GENERAL DANGER!</p> <p>System starts working automatically. Before starting any repair, maintenance or cleaning works, put main switch to "OFF"!</p>
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	<p>DANGER OF CRUSHING due to rotating machine parts!</p> <p>Always lock and secure the safety devices before starting up the system. Protective devices may only be opened by authorized persons, when the system is idle.</p>
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	<p>DANGER OF ENTANGLEMENT due to operating auger, chain and/or rope sheaves!</p> <p>Never reach or climb into the feed hopper, the feed column, the feed pipes or the feed trough while the motor is running!</p>
--	--

	<p>GENERAL DANGER!</p> <p>Read the manual.</p>
---	---

 <p>CAUTION</p>	<p>Safety symbols and instructions on the system must always be easily visible and undamaged.</p> <ul style="list-style-type: none"> • If they are soiled by dust, manure, feed remains, oil or grease, clean them with a water-detergent mixture. • Damaged, lost, or unreadable safety symbols have to be replaced immediately. • 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.
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2.5.2 Entire system

Only use suitable tools and observe the local accident prevention regulations.

Ensure that the system is switched off before performing any service, repair or cleaning work or rectification of functional defects. Disconnect the system from the power supply and secure it against reactivation.

Protect the system by means of a sign fixed to the main switch reading "Do not put into operation!". Refer to maintenance works if necessary.

After any maintenance and repair works, check the proper functioning of the system.

	Risk of injury
	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.
WARNING	<p>Lack of knowledge about the structural design of the system can lead to injury.</p> <p>Party lying about in or on the components can lead to serious damage of the system.</p> <ul style="list-style-type: none"> • 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 have having carried out works on the system! • Make yourself familiar with the design and construction of the system under sufficient lighting! If this is not possible, inform yourself about any remaining dangers in connection with this system! • Before restarting the system, assure yourself that all loose or replaced parts have been removed from the system components! • The device may only be put into operation after all protective systems have been put into place again and are functioning.

2.5.3 Individual parts

2.5.3.1 Electrical components

	Risk of electric shocks and short circuits
	<p>Live parts may be bare while different kinds of work are carried out. Touching live parts might lead to injuries caused by electric shock and short circuits.</p>
WARNING	<ul style="list-style-type: none"> • Before performing any repair or maintenance work, turn the main switch to "OFF" and display a sign warning that repair or maintenance work is in progress! • Never touch bare electrical components. Equipment with bare electrical components must not be used by the farm staff.

2.5.3.2 Ventilation

	Risk of automatically starting fan
	<p>Fans might turn on suddenly and unexpectedly as they are controlled automatically. This can cause severe injuries!</p>
WARNING	<ul style="list-style-type: none"> • Never reach through the wire mesh guard or lamellar flaps into a fan, not even if it is not running. • Before performing any repair or maintenance work, turn the main switch to "Off" and display a sign warning that repair or maintenance work is in progress!

2.6 Safety contrivances

 	Risk of injury and danger of life
	<p>Defective or disassembled safety contrivances may cause severe injuries or lead to death!</p> <ul style="list-style-type: none"> • It is strictly forbidden to remove or put out of operation any safety contrivance. • Should the safety contrivances be damaged, the system has to be put out of operation immediately. The main switch must be locked in neutral position and any damage must be eliminated.
<p>WARNING</p>	<ul style="list-style-type: none"> • Before putting the system into operation again, make sure that all safety contrivances are assembled correctly and are functioning after works on the system have been carried out.

2.7 Dangers resulting from non-compliance with the safety instructions

Lack of compliance with these instructions can cause severe danger to personal life and limb and damage the environment or the installation and may lead to the forfeiture of any damage claims. The non-compliance with these instructions can specifically lead to:

- failure of vital functions of the system,
- failure of prescribed maintenance methods,
- risk of injury due to electrical, mechanical and chemical influences.

2.8 Overview of safety symbols and hazard warnings on the system

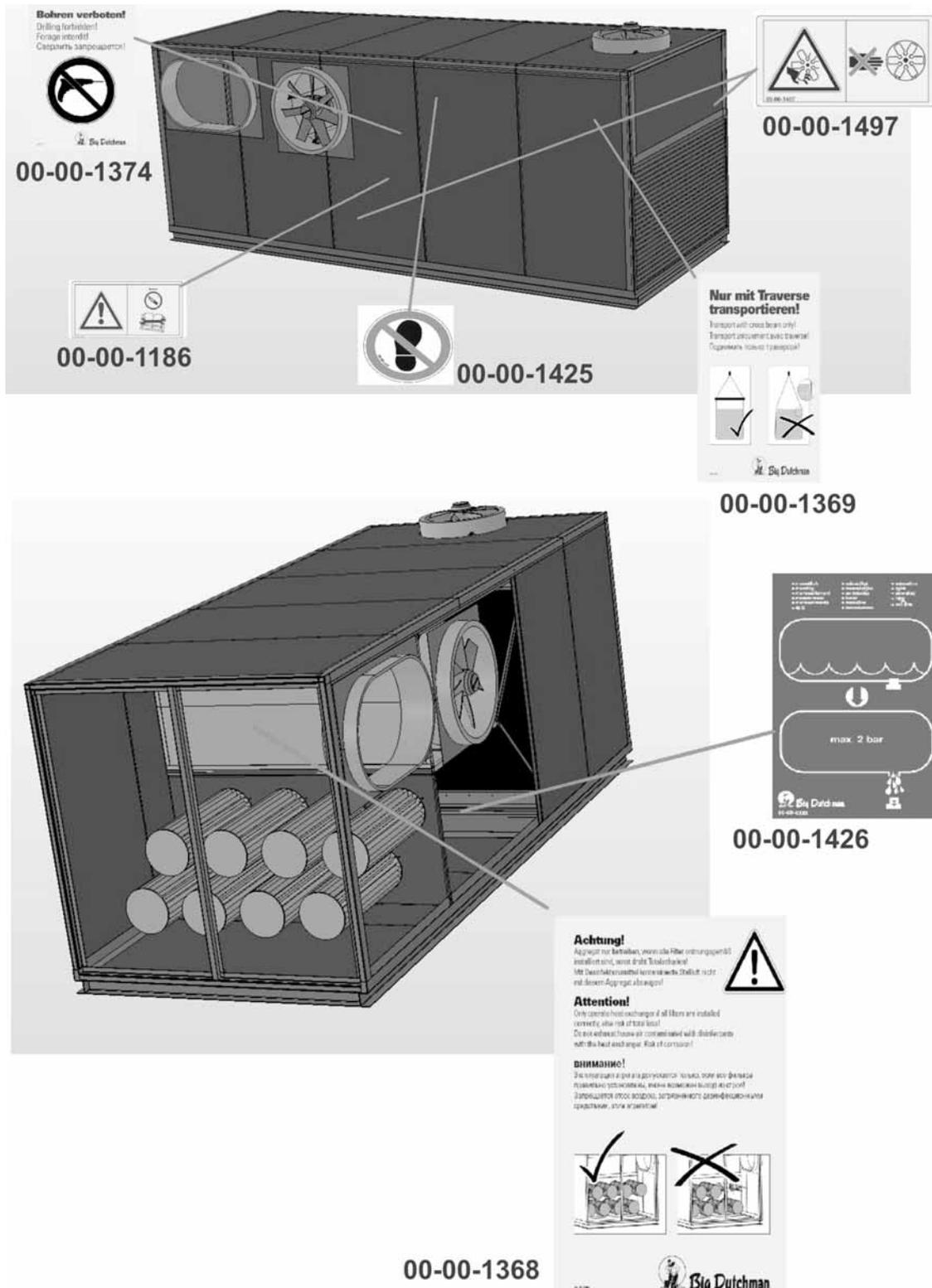


Figure 2-1: Overview of all safety symbols on the heat exchanger "Earny" V14

The pictograph 00-00-1425 (Entering this area is prohibited) is fixed on both sides of the heat exchanger.

3 System description

3.1 Overview of the heat exchanger "Earny" V14

Functional description:

The **Big Dutchman** heat exchanger is used to recover thermal energy from the **exhaust air** of broiler houses respectively poultry floor management systems.

Cold outside air is sucked in and then blown into the house by means of an axial fan.

The air flows through the heat exchanger elements with warm inside air passing through at the same time (=> 9 "Glossary"). The warm inside air is blown out of the house and sucked through the heat exchanger elements by means of an axial fan.

Since the heat exchanger operates according to the cross-flow principle, the two air streams do not come into contact, thus allowing only fresh and dry air without dust to enter the house.

The cooling down of the warm exhaust air leads to formation of condensation. The condensation is directed outside via a siphon (=> 9 "Glossary") and must be discharged through a tube or hose system (see illustration 3-1). It can be led into a water tank for the house's wash water, for example.

Pos.	Description	Function
1	Exhaust air from the house	Suction of the warm exhaust air
2	Filter area with service doors	The warm exhaust air is cleaned from dust by the filters.
3.1	Exhaust air fan	The exhaust air fan transports the exhaust air outward
3.2	Fresh air fan	The fresh air fan distributes the warm fresh air in the house
4	Cleaning unit (compressed air) with compressor	Filter cleaning with compressed air during the batch
5	Plate heat exchanger	Heat exchange between exhaust air and fresh air
6	Weather protection grille with filter for leaves	Protection of the heat exchanger against leaves, sand and rain
7	Electrical connection box with maintenance switch	Connecting the heat exchanger to the power supply and control unit
8+9+10	Service hatch	Inspection opening
11	Condensation drain	Collecting and draining condensation

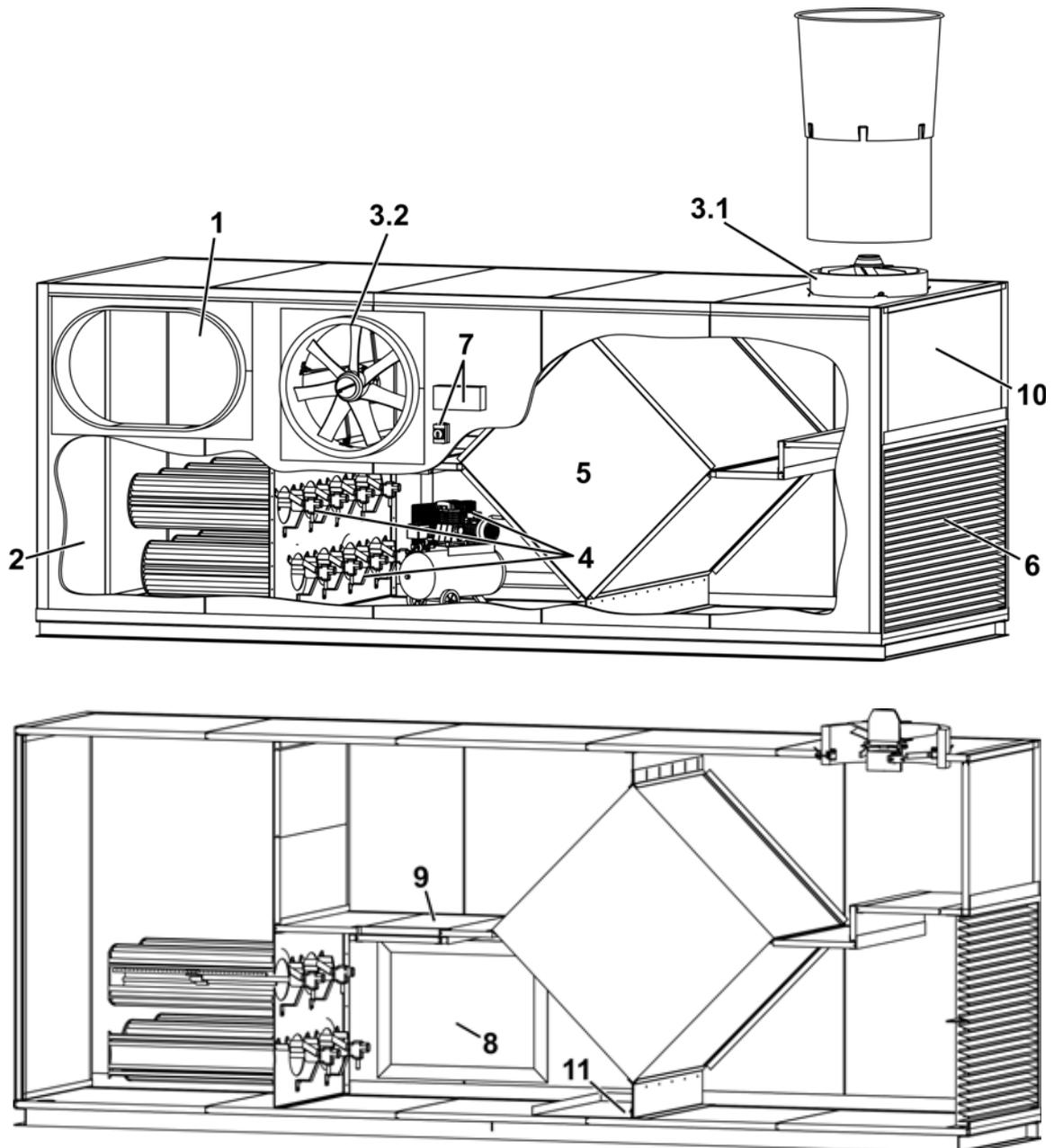


Figure 3-1: Components of the heat exchanger

3.2 Aluminium plate heat exchanger

Unlike the PVC tubular heat exchanger with its efficiency limited by the thermal conductivity of the PVC pipes, an aluminium plate heat exchanger achieves much better results due to its higher thermal conductivity (=> 9 "Glossary"). An efficiency of up to 80 % can be achieved on cold days.

Both air streams are guided through the aluminium plates (= heat exchanger element) according to the cross-flow principle. Since the spaces between of the single aluminium fins are very small, the dusty exhaust air must be filtered before entering the heat exchanger elements.

For this purpose, automatic filters are installed. These consist of several filtering cartridges which are cleaned automatically after a pre-set time interval to keep the pressure loss as low as possible.

3.3 Dedusting by means of compressed air



Dedusting by means of compressed air:

The filter cartridges are continuously charged with dust so that they have to be cleaned in certain intervals. These intervals mainly depend on the dust concentration in the house air and can thus vary. Generally, we recommend cleaning twice a day for 10 minutes per cleaning.

In case of automatic filter dedusting, one diaphragm valve is opened after the other by means of blowing an air blast with a pressure of 6 bar into the cartridge. Cleaning starts in the upper row. The dust removed from the row drops down onto the filters located below. These are cleaned next. The dust collected on the cartridge is blown off with high power.

The compressor has to transport approx. 60 litres of air per air blast. There should be a break of approx. 30-40 seconds between the individual air blasts in order to enable the compressor to recharge.

Solenoid valves:

The impulse solenoid valves are specifically designed for use in dedusting systems. They have a high passage rate as well as a long service life and they open and close extremely fast. They are therefore reliable and economical during operation. Integrated sound absorbers ensure low-noise operation of the valves and prevent foreign matter from intruding into the valve.

3.4 Technical specifications

Heat exchanger	Earny type 40,000	Earny type 30,000	Earny type 20,000	Double Earny
Length	5.20 m	5.20 m	5.20 m	5.20 m
Wide basic frames	2.29 m	1.69 m	1.38 m	2.29 m
Height	2.44 m without diffuser	2.44 m without diffuser	2.44 m without diffuser	2.44 m without diffuser
Weight	2250 kg	1500 kg	1200 kg	2500 kg
Operating voltage	3 ~ 380...480 V 50/60Hz			
Electrical power	8.6 kW	7.4 kW	approx. 6 kW	2 x 7.4 kW
Exhaust air fan	FN063 EC Motor			
Fresh air fan/ Output ¹	ZN80 EC Motor 20,000 m ³ /h	FN063 EC Motor 16,000 m ³ /h	ZN063 EC Motor 12,000 m ³ /h	ZN063 EC Motor 2 x 16,000 m ³ /h
Heat recovery rate ²	170 kW maximum	108 kW maximum	81-6 kW	2 x 102 kW maximum
Heat exchanger element	Cross-flow aluminium plate heat exchanger			
Effective plate surface	395 m ²	approx. 285 m ²	approx. 231 m ²	approx. 350 m ²
Latent efficiency	67.4 %	72.3 %	71.3 %	63.9
Thermal conductivity	215W/(m ² x K)			

¹ depending on the type of the piping to the house and from the injection nozzle

² depending on the house and outside temperature

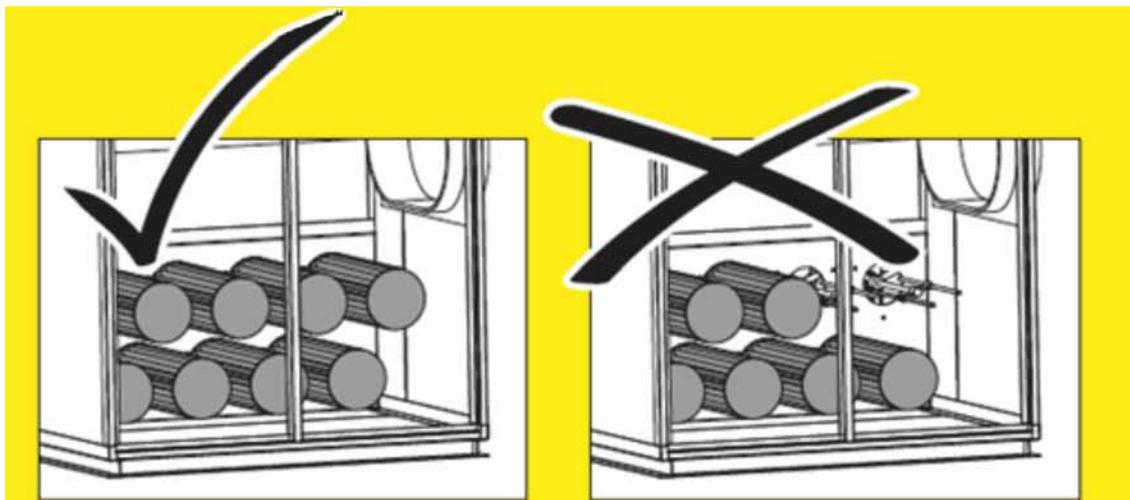
Heat exchanger	Earny type 40,000	Earny type 30,000	Earny type 20,000	Double Earny
Compressor	350/10/2/50D	350/10/2/50D	350/10/2/50D	2 x 350/10/2/50D
Boiler capacity	50 litres			
Pressure	10 bar			
Air capacity	350 litres/minute			
Connection value	400 V			
Electrical power	1500 W			
Length	0.8 m			
Width	0.36 m			
Height	0.7 m			
Number of filters	8	6	4	2 x 6

4 Initial operation

Ensure the following before initial operation:

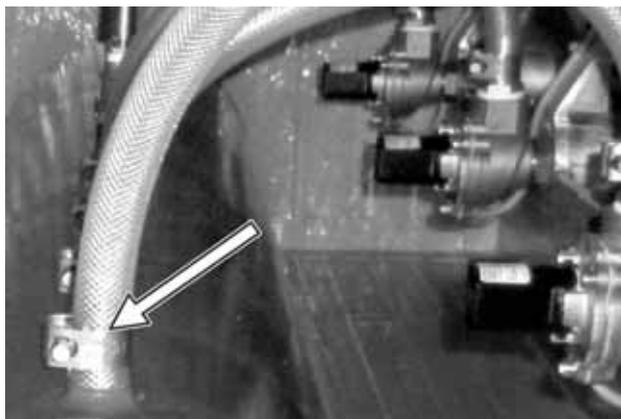
- No persons may be inside the heat exchanger sections!
- No objects or tools may be inside the area where the fans rotate!

	Total loss of the system.
CAUTION	<p>Dirt inside the exchanger bundle can lead to total loss of the system.</p> <ul style="list-style-type: none"> • Never operate the heat exchanger if filters are defective or missing.



4.1 Tightening the clamps

The clamps can work loose due to the transport and temperature differences. Tighten them before initial operation.



4.2 Setting the cleaning function

The control unit for the automatic cleaning function via compressed air is installed in the chamber behind the filters. Set the following values at the potentiometers:

- The potentiometer for "Pause" should be set to **50 seconds**.
- the potentiometer for "Impulse" should set to approx. **0.3 seconds**. The multiplier x3 (see sticker) multiplies the adjusted time with the factor 3 so that the real cleaning time will be approx. 1 second.

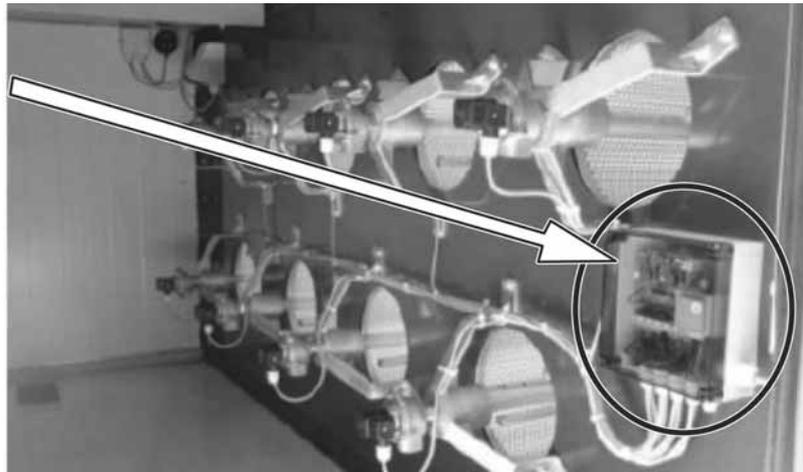
Run through the complete filter cleaning once and test it.



0 s Break 50 s



0.1 s Impulse 1 s
(0.3 - 3 s)



4.3 Condensation drain

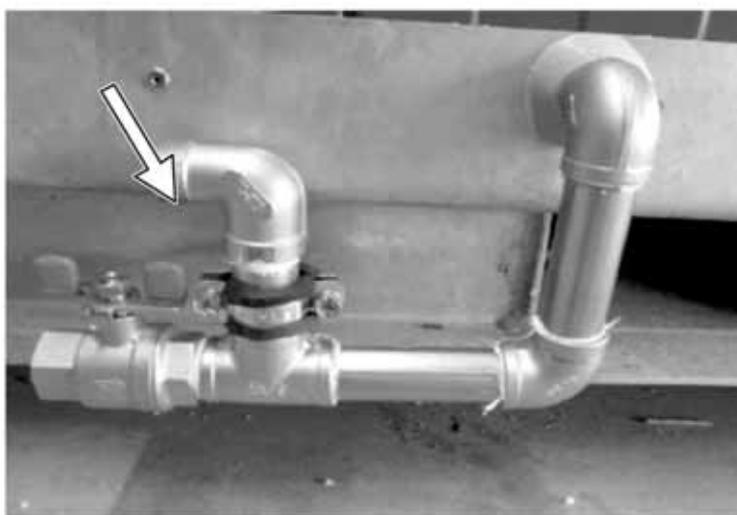
The daily amount of condensation can be up to 200 litres, depending on the outside and house temperature, respectively the humidity.

The ball valve serves for draining the remaining condensation or cleaning water after the batch.



Close the ball valve before initial operation.

The ball valve must remain closed during the batch in order not to impact the siphon effect negatively.

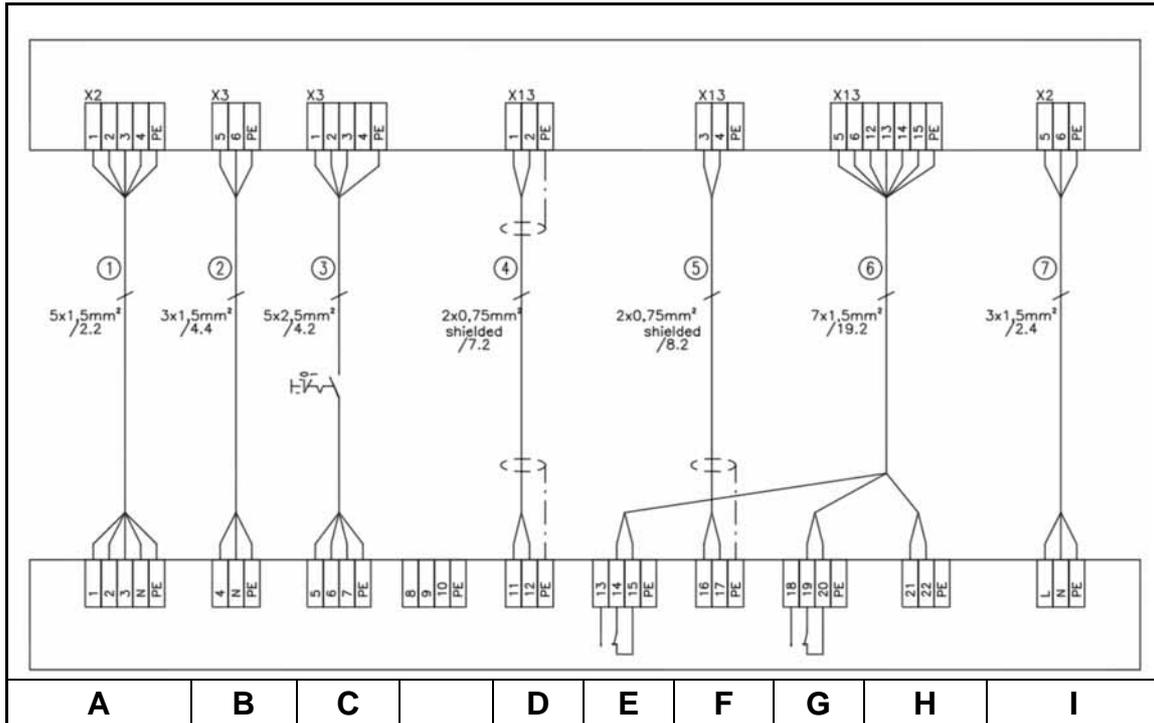


4.4 Alarm systems

Alarm contacts

The alarm contacts of the fans 13-14-15 as well as 18-19-20 are to be switched in a way that a fault is signalled to the installed alarm system. Ideally, the break contact should be used for this (wire breakage).

Alarm systems and their accessories are part of the obligatory equipment in all houses!



Pos.	Description
A	Compressor
B	Pulse activation
C	Fresh air / exhaust air
D	0 - 10 V fresh air
E	Fault fresh air
F	0 - 10 V exhaust air
G	Fault exhaust air
H	Pressure regulator
I	Service socket

5 Operation

The following chapter describes how to operate the heat exchanger via the *Viper Touch* computer.

Icons can be selected and arranged in the menu Service -> Start page for the daily user. The following arrangement of the icons is recommended for monitoring of the heat exchanger.

Inlet temperature. The heat exchanger heats the fresh air to this temperature.	Temperature efficiency in %	Use of the heat exchanger (ventilation level of the fans)
↑	↑	↑
		
↓	↓	
Outside temperature	Heat recovery performance in kW	

5.1 Heat exchanger in the Climate menu

	Heat recovery unit	32.3 %	→ ventilation level of the heat exchanger
	Activate heat recovery unit	Yes	→ heat exchanger activated yes/no
	Progressive dehumidification	Yes	→ see a) Progressive dehumidification
	Heat recovery unit efficiency	83 %	→ temperature efficiency of the heat exchanger

a) Progressive dehumidification

Progressive dehumidification aligns the speed of the fresh air and exhaust air fan in a way that the air entering the house is as warm and dry as possible. This function is particularly useful on very humid days during the transitional seasons.

b) Lower temperature limit

	Low outside temperature limit enable	Yes
	Outside temperature	-11.1 °C
	Disable heat recovery unit at outside temperature below	-22 °C

If the *lower temperature limit* is enabled and the outside temperature drops below the set limit, the heat exchanger turns off entirely.

Recommended setting: -22°C

In this case, the normal ventilation system of the house is responsible for the ventilation.

The status is indicated in the heat exchanger menu point:



c) **Upper temperature limit**

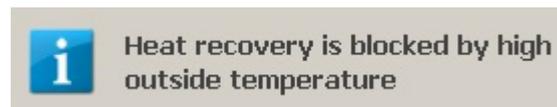
	High outside temperature limit enable	Yes
	Heat recovery unit disabled at outside temperature above	24 °C
	Disable heat recovery unit below set point	8 °C

The *upper temperature limit* is not an absolute temperature, but a relative one.

The set point of 8°C indicates that the heat exchanger is switched off if the outside temperature exceeds the value "Set point in the house - 8°C". For example, if the set temperature inside the house is 32°C, the heat exchanger would be deactivated at an outside temperature above 24°C. This value is indicated in the menu.

Recommended setting: 8°C

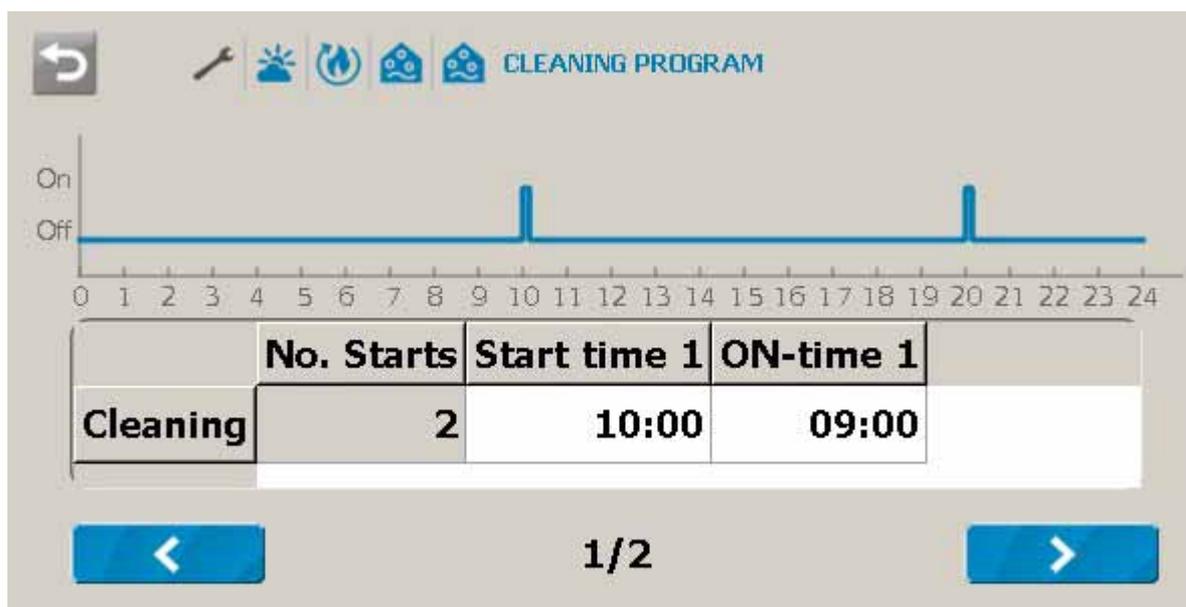
The deactivation is indicated in the heat exchanger menu point:

d) **Anti-icing**

	Anti-ice	Active
	Anti-icing	Inlet closed
	Anti ice active at outside temperature below	-17 °C

Anti-ice indicates that the heat exchanger is trying to prevent freezing of the heat exchanger element below a certain temperature. The fresh air flow is reduced for this purpose. The fresh air fan is activated for a certain time (e.g. 3 minutes) while the exhaust air fan continues working.

Recommended setting: -17 °C

e) **Cleaning**

Up to 3 start times can be activated for cleaning the filters of the heat exchanger under *Cleaning*.

The ventilation system of the house controls ventilation during cleaning.

6 Maintenance

Observe the following maintenance and service instructions to ensure optimum operation of the heat exchanger.

Please refer to chapters 1 "Basic instructions" and 2 "Safety instructions".

6.1 Maintenance intervals

Every month

Heat exchanger:

- Drain the condensation from the heat exchanger:
 - Open the outlet for the condensation at the side (see figure) and drain the remaining condensation. This is especially important during the winter months because the condensation drain might freeze otherwise.
 - Close the ball valve no later than before taking the heat exchanger into operation again.

The ball valve must be closed during operation so no cold air is drawn in (possible performance losses).

Figure 6-1 shows the open ball valve ready to drain condensation. Close the ball valve again after all water has been drained.

- Check whether the plug for the wash water drain in the filter chambers has been inserted.

Figure 6-1: Ball valve open



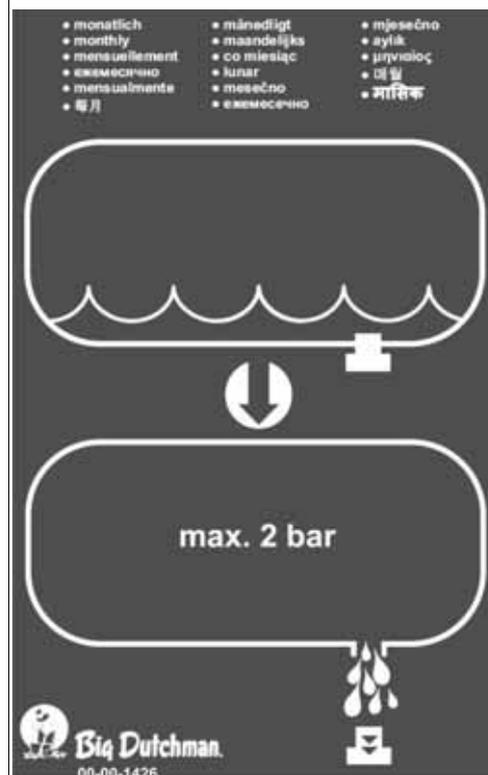
Every month

Compressor:

- Clean the intake filter.
- Check the tension of the belts.
- Check the oil level.
- Drain the condensation in the lower part of the tank via the compressor's drain valve.

Proceed as follows:

1. Turn the compressor off and pull the main plug to disconnect the compressor from its power supply.
2. Activate the manual filter cleaning for no less than 2 minutes at the control cabinet to release the pressure in the pressure accumulator and the compressor.
3. Open the ball valve at the pressure accumulator and the drain screw at the compressor to drain the condensation.
4. Close the ball valve and the drain screw at the compressor.
5. Re-connect the compressor to the power supply. **Caution!**
The compressor resumes operation immediately after being switched on.



- Check whether the plug for the condensation drain has been inserted.

Twice per year (before and after the winter months)**Filter cleaning:**

- Check the hoses of the filter cleaning system for leakages.
- Check the hose clamps for tightness.
- Check whether the condensation drain is clear from obstructions.
- Check the filter cartridges for damage.
- Check the gaskets at the back of the filter.
- Activate the filter cleaning manually at the control cabinet and check the following points:
 - Are the solenoid valves opening and closing correctly?
 - Are the rotary nozzles turning freely?
 - Does the cleaning process run correctly?
 - Does the compressor work correctly?

Doors:

- Check whether the doors close correctly.
- Check the hinges for damage.
- Check whether the gaskets seal tightly.
- Check whether the fastener easily hooks into the eye of the door (protection against wind).

Fans (fresh air and exhaust air):

- Check whether the fans function correctly.

Flaps (fresh air and exhaust air):

- Check whether the flaps open and close correctly.

Maintenance switch:

- Actuate the maintenance switch while the heat exchanger is running and check whether the fans switch off.

6.2 Electrical connections

The heat exchanger is equipped with a terminal box with all electrical connections. Please find further details in the attached wiring diagram.

  WARNING	Risk of injury and danger to life
	<p>Works on electric systems can lead to severe injuries or to death!</p> <ul style="list-style-type: none"> Always disconnect the power supply before carrying out any works at the electrical installation. <p>Actuate the main switch at the switch cabinet in order to switch off the system.</p> <ul style="list-style-type: none"> Installations and works on electric components/building units may only be carried out by qualified persons according to electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).

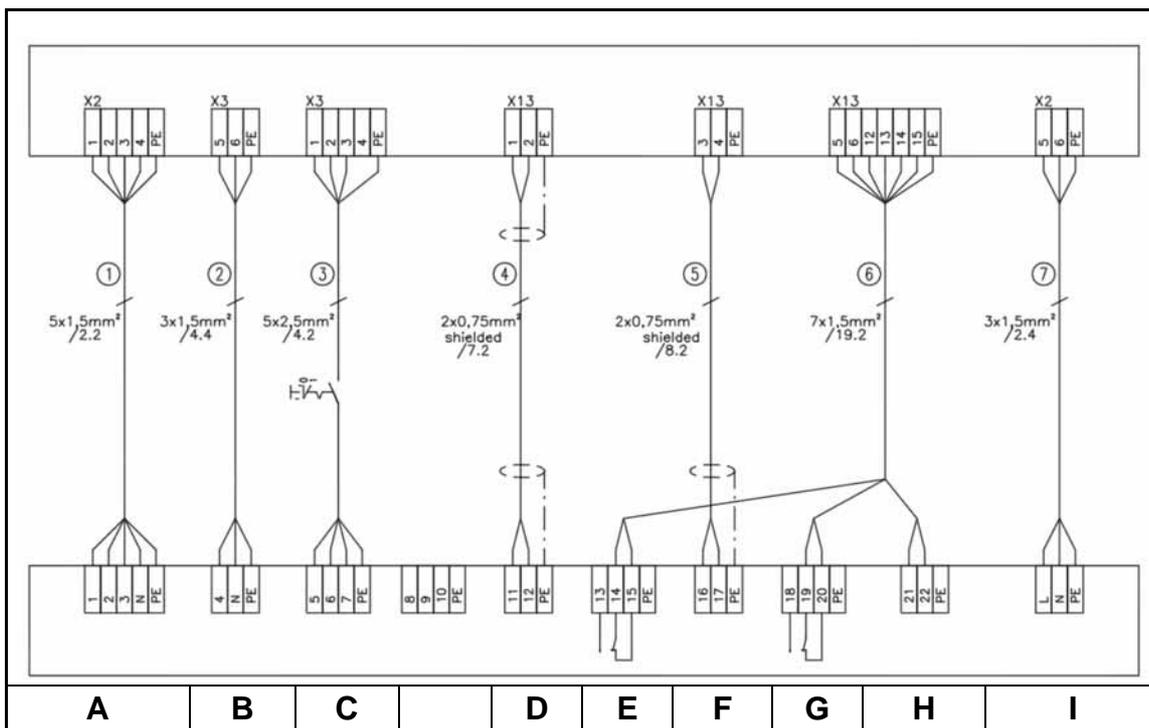
Actuate the maintenance switch when working on the fan. This ensures that the fans are disconnected from voltage to prevent them from starting.

Ensure zero potential of all terminals when exchanging or checking the fans! The alarm contacts might still be supplied with power as they are supplied by the corresponding alarm system.

Alarm contacts

The alarm contacts of the fans 13-14-15 as well as 18-19-20 are to be switched in a way that a fault is signalled to the installed alarm system. Ideally, the break contact should be used for this (wire breakage).

Alarm systems and their accessories are part of the obligatory equipment in all houses!



Pos.	Description
A	Compressor
B	Pulse activation
C	Fresh air / exhaust air
D	0 - 10 V fresh air
E	Fault fresh air
F	0 - 10 V exhaust air
G	Fault exhaust air
H	Pressure regulator
I	Service socket

6.3 Cleaning

Open the large filter door of the heat exchanger and hook in the fastener to prevent the wind from slamming the door.



WARNING

Risk of injury

The cleaning nozzles in the filter move and can cause injuries.

- Make sure that the heat exchanger is switched off before each cleaning. Switch the main switch to OFF and deactivate the filter cleaning at the control cabinet.



6.3.1 Filter cartridges

The filter cartridges must be cleaned after every batch, approx. every 40 days. The filters can be dedusted with compressed air to remove the coarse dust even while mounted.

Use a **plastic** shovel to remove the dust from the floor.

The filter chamber as well as the filters can be rinsed with water. Keep a minimum distance of 1 metre to the filter material when using a high-pressure cleaner to prevent damage to the filters.



If the temperatures are very low, remove the filters by loosening the star knobs. Blow the filters clean using compressed air or clean them with water.

Let the filters dry before installing them again and check whether the gaskets are positioned correctly at the filter wall.

Heavily soiled filters may affect the performance of the heat exchanger negatively as less house air enters the filters, thus warming the fresh air less.



6.3.2 Cleaning the filter for leaves [as needed, but at least once per year]

1. Actuate the maintenance switch of the heat exchanger (deactivation).
2. Loosen the screws of the weather protection grille.
3. Loosen the locking mechanism of the filters and remove it.
4. Clean the filter with compressed air.

Alternatively, clean the filters with soap in a water basin.

5. Let the filters dry well before installing them again.
6. Screw the weather protection grille back on.
7. Actuate the maintenance switch of the heat exchanger (activation).

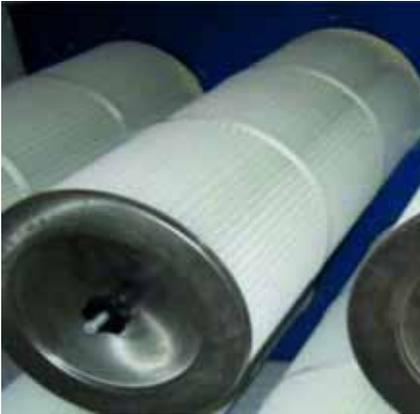


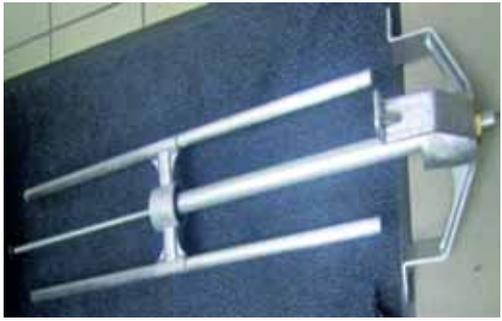
7 Spare parts

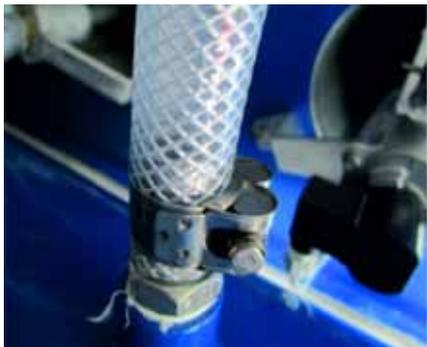
Code no.	
60-53-5056	
Name	
Star knob M12 black for heat exchanger Earny	

Code no.	
60-53-5057	
Name	
Gasket with glue for filter of heat exchanger Earny	

Code no.	
60-53-5055	
Name	
Hinge for heat exchanger Earny (from June 2012)	

Code no.	
60-53-5020	
Name	
Filter cartridge for heat exchanger Earny Earny type 40,000: 8 cartridges Earny type 30,000: 6 cartridges Earny type 20,000: 4 cartridges Double Earny = 2 x 6 cartridges	

Code no.	
60-53-5038	
Name	
Rotary nozzle for heat exchanger Earny	

Code no.	
60-53-5035	
Name	
T-bolt hose clamp 25-27 mm SST	

Code no.	
60-53-5034	
Name	
Bag filter large 592 x 592 x 360 mm	
Code no.	
60-53-5048	
Name	
Bag filter small 287 x 592 x 360 mm	

Code no.	
60-53-5033	
Name	
Solenoid valve	

8 Fault clearance

Fault	Cause	Remedy
Doors do not close correctly.	Hinges are defective.	Exchange the hinges.
	Gaskets do not seal correctly.	Replace the gaskets.
Door does not hook in correctly.	Fastener or hook for fastener defective.	Exchange the fastener or the hook for fastener.
Air escapes from the compressed air system.	Hose clamps defective.	Replace the defective hose clamps.
	Hose clamps not tight enough.	Tighten the hose clamps.
	Hoses defective.	Exchange the hoses: Hoses are wear parts. Exchange them every 3 years!
	Gaskets defective.	Exchange the gaskets: Gaskets are wear parts. Exchange them every 3 years!
Condensation does not drain.	Condensation drain clogged.	Clean the condensation drain.
Fresh/exhaust air flaps do not open/close correctly.	Flaps defective.	Call a technician. Never repair or replace flaps yourself!
Cold air enters incorrectly via the wash water drain or the condensation drain.	Plug not inserted.	All plugs must be inserted during operation of the heat exchanger to prevent excess air from entering.

Fault	Cause	Remedy
Compressor does not work.	Intake filter clogged.	Clean the intake filter every month.
	Tension of the belts not correct.	Re-tension the belts.
	Oil level not high enough.	Refill oil.
	Compressor performance low due to excessive condensation.	Drain condensation via the compressor's drain valve.
Filter cleaning does not work.	Solenoid valves defective.	Exchange the defective solenoid valves.
	Rotary nozzle defective.	Exchange the defective rotary nozzle.
	Filter cartridges defective.	Exchange the filter cartridge: Filter cartridges are wear parts. Exchange them every 3 years!
	Gaskets at the back of the filters defective.	Gaskets must seal tightly. Replace defective gaskets immediately. Do not operate the heat exchanger if gaskets are defective => this can lead to total loss of the heat exchanger.
Fans do not switch off independently when actuating the maintenance switch.	Maintenance switch defective.	Call a technician. Never repair or exchange a maintenance switch yourself!

9 Glossary

Absolute temperature:

is a temperature scale which refers to an absolute zero. In case of a Celsius scale, for example, zero refers to the freezing point of water (= 0°C).

Designated use:

is the correct use of product in accordance with its intended purpose.

Efficiency:

measures the efficiency of a machine and indicates the ratio between the received and supplied energy. Theoretically, values can range from 0 to 100 %. Machines cannot reach the highest value (a 100 % efficiency) because energy is always transformed into thermal energy due to heat or friction.

Incorrect use:

is improper use of a product, not in accordance with its intended purpose.

Latency:

is the existence of a (still, at the moment, possibly always) invisible thing.

Relative temperature:

indicates how far the current temperature is away from a maximum temperature.

Separation rate (for example dust):

is the capacity of a filter (e. g. for a dedusting process) within a certain time.

State of the art:

represents the technical possibilities at a certain point in time, based on validated scientific and technical knowledge.

Supervisor:

is a reliable person who is familiar with the work and authorized to issue instructions. He ensures that the work is performed safely. He must have sufficient technical knowledge.

Surface filtration:

The particle-charged gas (untreated gas) normally flows through the filter hoses from the outside inwards. This forms a dust layer (filter cake) on the surface of the filter medium which works as highly effective filter with increasing thickness.

Thermal conductivity

describes temperature-dependent substance properties and these are determined by the spatial and temporal distribution of the temperature in a body. The higher the value, the better the heat will be dissipated.

Thermic:

(from Greek "thermos" = warm) designates figures, procedures, materials, processes, theories, etc. which are connected with the noticeable exchange of heat or its effect influence or which significantly influence temperature differences, isolation, hot gases and the corresponding calculations or modelling.