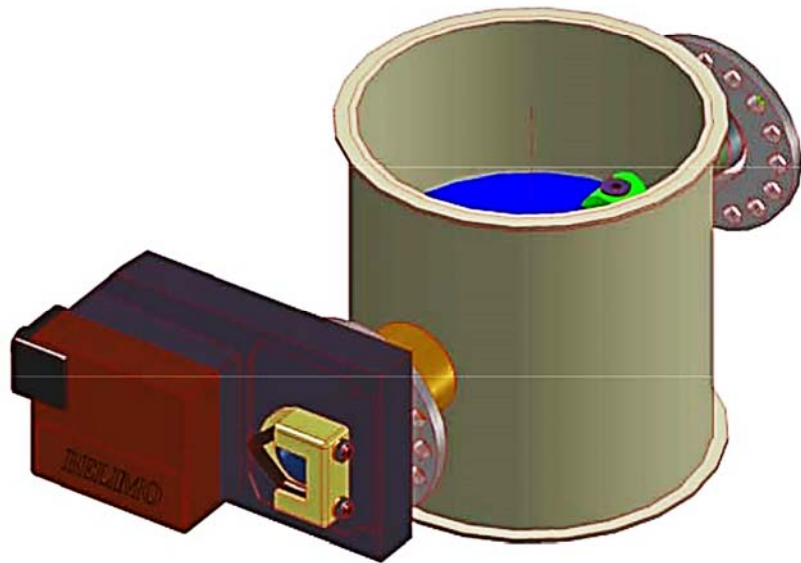
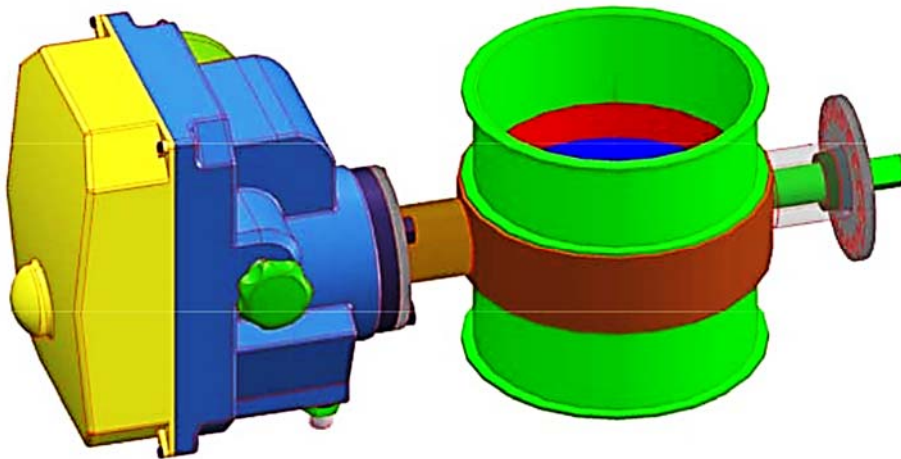




**Formula Air**  
Supporting your performance



## *ELECTRIC THROTTLE VALVES*

Maintenance manual

## TABLE OF CONTENTS

1. Important notes .....	2
2. Safety instructions .....	2
2.1. Qualification and training of personnel .....	2
2.2. Hazards associated with disregard of the safety instructions .....	2
2.3. Safety-conscious working .....	3
2.4. Safety instructions for the operating company and for the operator .....	3
2.5. Safety instructions for maintenance, inspection and assembly work .....	3
2.5.1. General safety instructions for assembly, inspection and maintenance work .....	3
3. Transport .....	4
4. Storage .....	4
5. Intended use .....	5
6. Structure of the throttle valve .....	5
6.1. Description of the assembly .....	5
6.2. Assembly functions .....	6
6.3. Method of operation of the throttle valve .....	6
7. Operating and maintenance manual .....	7
7.1. Installation and assembly .....	7
7.2. Commissioning .....	7
7.3. Inspection and maintenance .....	7
8. Operational errors .....	8
8.1. Malfunction of throttle valve .....	8
9. Technical description of components .....	8
10. Spare parts .....	10
11. Terminal diagram .....	11
12. Dismantling and recycling .....	11
13. Contact .....	12

## 1. Important notes

- *Adherence to the operating manual is a prerequisite for trouble-free operation and for the acceptance of warranty claims.*
- *Therefore, read the operating manual first before putting the throttle valve into operation.*
- *The operating manual contains important notes regarding service. Therefore, keep it with your documents.*
- *Pay attention to the notes in the individual chapters of the operating manual.*

## 2. Safety instructions

### 2.1. Qualification and training of personnel

*The operating, maintenance and inspection personnel must have the appropriate qualifications for the respective type of work.*

*The operating company must ensure that the contents of the operating manual are fully understood by the personnel.*

*If necessary the requisite knowledge is to be imparted by training. This can be done by the manufacturer/supplier on behalf of the operating company if desired.*

*The area of responsibility, competence and supervision of the personnel must be precisely defined by the operating company. Young persons may only be employed under the supervision of an expert.*

**NOTE** : *Depending upon conditions and equipment, the following accident prevention regulations and standards are to be observed by the operating company.*

#### Regulations of the German Employer's Liability Insurance Association

- *BGV C 12 Accident prevention regulations for silos and bunkers Available: from the responsible accident insurer*

#### Regional regulations for safety and accident prevention Standards

- *DIN EN 12100-1, DIN EN 12100-2 Safety of machinery*
- *DIN EN 13857 Safety distances to prevent danger zones being reached by the upper limbs*
- *EN 60204 – 1 Electrical equipment of machines*
- *Regionally applicable standards*

### 2.2. Hazards associated with disregard of the safety instructions

*Disregarding the safety instructions can lead to the endangerment of personnel, the environment and the machine.*

*Disregarding the safety instructions can lead to the loss of all claims for compensation for damages. Disregard can result in the following hazards, for example:*

- *failure of important functions of the diverter or the system*
- *failure of prescribed methods of service or maintenance*
- *endangerment of persons due to electrical, mechanical, chemical and biochemical influences*
- *endangerment of the environment due to the leakage of hazardous substances.*

## 2.3. Safety-conscious working

The following knowledge is a prerequisite for safety-conscious working:

- knowledge of the safety instructions listed in the manual
- knowledge of the existing national accident prevention regulations
- knowledge of the local and the operating company's own internal work, factory and safety regulations.

## 2.4. Safety instructions for the operating company and for the operating personnel

- A contact protection protects against moving parts only as long as it is in its intended location.
- Never remove protection devices as long as the components are moving or even just switched on.
- Personal protective equipment is to be worn for the protection of health.
- Wash your hands thoroughly before eating and drinking due to the risk of infection.
- Consult a doctor immediately in the case of injuries, accidents or skin irritations.

## 2.5. Safety instructions for maintenance, inspection and assembly work

*All maintenance, inspection and assembly work is to be carried out by authorized and qualified technical personnel only.*

*Note: Work may only be carried out on the diverter when it is at a standstill. Stopping the throttle valve:*

- *Switch off the main switch.*
- *Secure the main switch against being switched on again.*
- *Interrupt the supply of product to the stop valve.*

**Note:** *Wear the appropriate protective equipment. Clean the interior of the throttle valve before working on it. Check the functions after the work is concluded.*

### 2.5.1. General safety instructions for assembly, inspection and maintenance work

- Do not switch the throttle valve on again immediately if it has stopped for inexplicable reasons. Someone could have stopped the plant for a manual intervention and forgotten to secure it against being restarted. Unexpected restarting can lead to injuries to persons.
- When carrying out maintenance work in the interior of the throttle valve, all connection openings should be covered such that they are safe to step on. This avoids injuries to persons and also prevents foreign bodies falling into the pipeline.
- No protection devices may be modified, removed or their function impaired.
- Original spare parts and accessories authorized by the manufacturer ensure safety. The use of other parts can lead to injuries to persons and damage to property.
- Converting or modifying the throttle valve is permitted only after consulting the manufacturer. Correspondence regarding this must be exclusively in writing.

- The electrical controller of the *throttle valve* is provided by the operating company. The controller should therefore conform to the standards and regulations. Furthermore, sections **1.2.4.3 to 1.3 of the Machinery Directive 2006/42/EC** are to be taken into account in the design of the controller.

### 3. Transport

Examine the delivery immediately upon receipt for any transport damages. The manufacturer or the transport company is to be informed immediately of any such damage. You may not be able to put a damaged *throttle valve* into operation. Depending upon the number of items, the *throttle valve* are supplied loose or in a packing carton. In-house transport to the storage place or to the final installation place can take place using a fork-lift truck, a pallet truck or manually.

### 4. Storage

In the case of long-term storage, please check whether the housing shows any signs of damage and that all moving parts fulfil their functions. Please observe the storage conditions specified in the following table in the case of long-term storage.

#### Storage conditions:

<u>Climatic zone</u>	<u>Packaging 1)</u>	<u>Storage place</u>	<u>Storage period</u>
Moderate (Europe, USA, Canada, China and Russia with the exception of tropical regions)	Packed in container with desiccant and humidity indicator, sealed in foil.	Roofed over, protected against rain and snow, free of vibrations	Max. 3 years with regular examination of packaging and humidity indicator (relative humidity < 50%)
	Open	Roofed over and closed at constant temperature and air humidity (5 °C to 60 °C, < 50% relative humidity). No sudden fluctuations in temperature. No aggressive vapors and no vibrations.	2 years and longer with regular inspection. Check for cleanliness and mechanical damage when inspecting. Check the integrity of the anti-corrosion coating.
Tropical (Asia, Africa, Central and South America, Australia and New Zealand, with the exception of the moderate regions)	Packed in container with desiccant and humidity indicator, sealed in foil	Roofed over, protected against rain, free of vibrations.	Max. 3 years with regular examination of packaging and humidity indicator (relative humidity < 50 %)
	Open	Roofed over and closed at constant temperature and air humidity (5 °C to 60 °C, < 50% relative humidity). No sudden fluctuations in temperature. No aggressive vapors and no vibrations. Protection against insect damage.	2 years and longer with regular inspection. Check for cleanliness and mechanical damage when inspecting. Check the integrity of the anti-corrosion coating.

1) The packing must be performed by an experienced company using packaging material expressly qualified for the application.

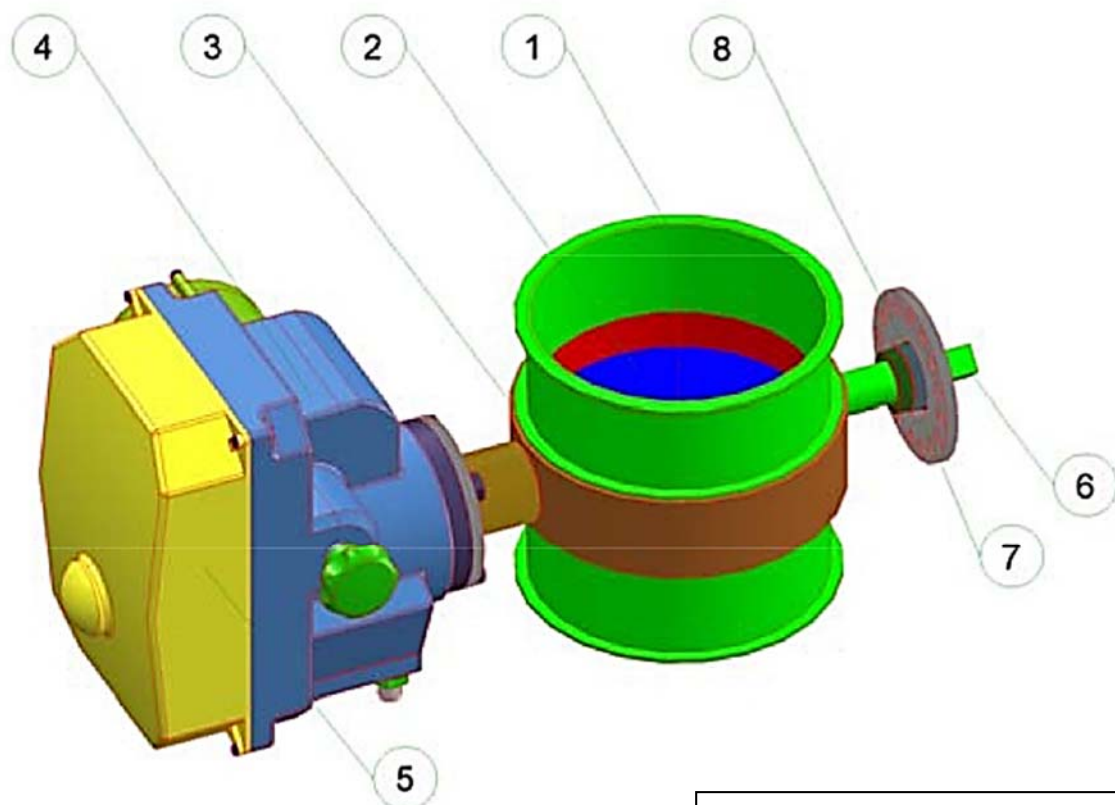
## 5. Intended use

The throttle valve is intended for the shutting off or regulation of volumetric flows in air conditioning/ventilation systems with a positive pressure of up to 0.03 bar. A further intended use is the shutting off of the flow of bulk materials in a pipeline with a Kst value of up to 160 bar m/sec. The maximum permissible load on the valve is thereby 5 kg and conveying must take place in free fall. The component is considered to be safe if all connections in the system are made correctly.

throttle valves are only to be used in closed rooms.

## 6. Structure of the throttle valve

### 6.1. Description of the assembly



#### Body station

- 1 Housing
- 2 Flap
- 3 Seal (optional)

#### Drive station

- 4 Actuator or direct coupled motor
- 5 Limit position switch Installed in the housing box in the case of actuator.
- 6 Drive shaft
- 7 Shaft seal
- 8 Roller bearing

## 6.2. Assembly functions

*The flap is mounted inside the housing and opens or closes the cross section.*

*The silicone seal optionally mounted on the housing seals off the flap up to 0.03 bar (only in the case of throttle valves with seal).*

*The drive is attached to the housing. It swivels the flap to the desired position.*

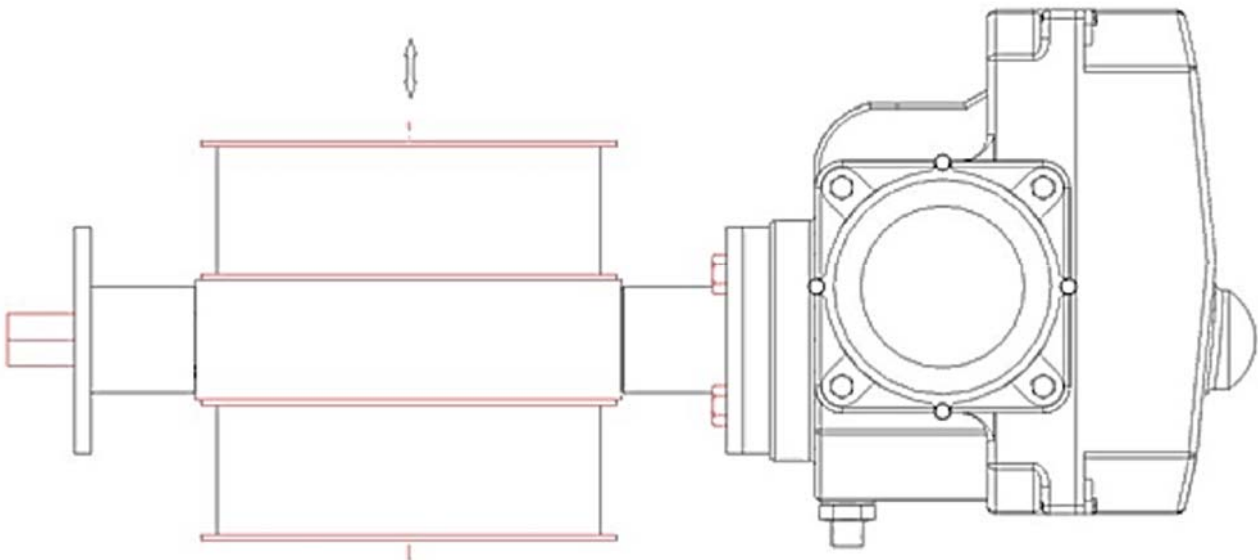
*The movement of the flap takes place by means of a change of rotational direction in the plant controller.*

*The drive shaft of the flap has a roller bearing and is sealed with a shaft seal. As a result, no dust can escape from the pipe and dust deposits in the area of the shaft bearing are prevented.*

*The flap position is detected via the two limit switches.*

## 6.3. Method of operation of the throttle valve

*The medium runs into the throttle valve. Its flow is either closed off or allowed through by the flap. An intermediate position is not possible with standard throttle valves.*



## 7. Operating and maintenance manual

### 7.1. Installation and assembly

The *throttle valve* may only be installed in closed rooms. An outdoor installation is only possible if the *throttle valve* is provided with a weatherproof protective coating.

All components must be adapted according to the requirements in the factory for operating temperatures below -15 °C or above 50 °C.

The following points are to be observed when installing:

- Ensure adequate suspension or support.
- The continuative piping must be installed and suspended without stress.
- Pay attention to the installation position. In the case of free fall conveying, the connections must be arranged vertically upwards or downwards. Any inclined position will affect the function of the stop valve. The installation position is arbitrary in the case of pneumatic conveying.

### 7.2. Commissioning

An appropriate controller must be present before commissioning. It is essential to observe the following instructions regarding the controller:

All necessary control cables are to be connected in accordance with the terminal diagram in the appendix. If necessary, readjust the limit position switches/limit switches during operation.

Ensure that sufficient operating voltage is available.

Following the installation and the electrical connection, a test run is to be performed with a function check.

### 7.3. Inspection and maintenance

The length of the service life of the diverter can be influenced by the following maintenance intervals:

Time interval	What needs to be done?
Every 1000 hours of machine operation, but at least every three months	<ul style="list-style-type: none"> <li>• Check the pneumatic system for leaks</li> <li>• Visual inspection of the seals for damage.</li> <li>• If existing, check the limit switches, readjust if necessary.</li> </ul>
Depending on operating conditions, but after 1 year at the latest	<ul style="list-style-type: none"> <li>• Check roller bearing and shaft seal.</li> <li>• Check the flap</li> </ul>
Varies (depending on external influences and on the characteristics of the conveying product)	<ul style="list-style-type: none"> <li>• Check interior of housing, clean if necessary.</li> <li>• Check product-guiding parts for wear</li> <li>• Repair or renew surface and anti-corrosion coatings</li> <li>• Exchange the cylinder seals</li> <li>• Exchange the roller bearing and shaft seal</li> </ul>



### **INSTRUCTION FOR ALL INSPECTION AND MAINTENANCE WORK:**

Interrupt the product supply to the *throttle valve*, switch off the drive of the machinery and secure it against unintentional restarting of the machinery.

## **8. Operational errors**

*If you should require the assistance of our customer service or our technical advice, we kindly ask you to supply the following data:*

- *Our order confirmation number*
- *Serial number*
- *Type and extent of the malfunction*
- *Time and attendant circumstances of the malfunction*
- *Suspected cause*

### **8.1. Malfunction of the diverter**

<b>Malfunction</b>	<b>Possible cause</b>	<b>Remedial action</b>
Flap cannot be changed over	A Product adhering to the flap B Bearings defective or shaft/flap seized up C Operating voltage disconnected D Drive defective E Product column in the throttle valve F Shaft broken off G Error in the controller	A Dismantle the throttle valve and clean it B Replace all bearings, align the shaft/flap C Check the operating voltage D Repair the drive E Remove the product column F Replace the shaft G Check the controller
Low flow rate or conveying interrupted	A throttle valve or pipes blocked	A Locate and eliminate the blockage
The <i>throttle valve</i> leaks	A Seal defective C Flap damaged D Conveying pressure too high	A Replace the seal B Replace the flap C Adjust the conveying pressure

## **9. Technical description of components**

### **Electric drive \*)**

Make : Belimo  
 Series : SM230A up to DN 300, GM230 from DN 350 onward  
 Rated voltage : AC 100...240 V, 50/60 Hz.  
 Power consumption : 5 Watts (in the operating condition)  
 Operating temperature : -30 °C to +50 °C  
 Running time : 150 seconds to swivel 90°

### Auxiliary switch \*)

Make : Belimo

Model : : S2A

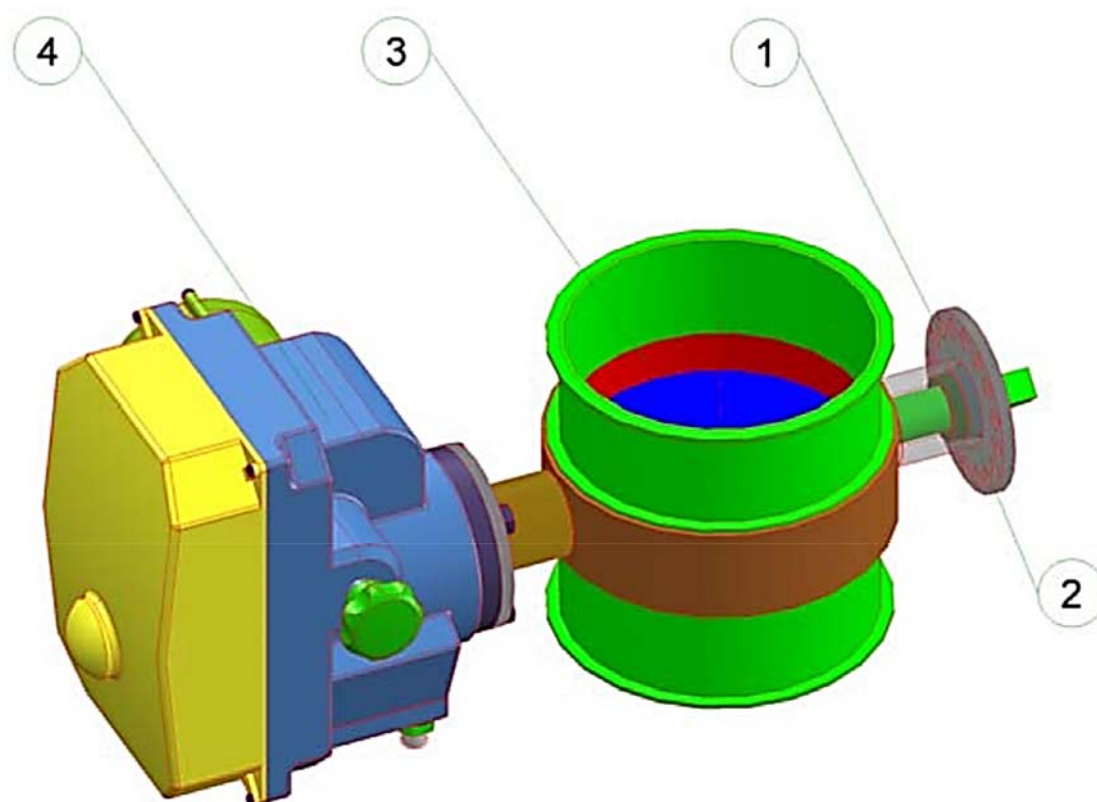
Operating voltage : 230 V, 50/60 Hz.

Protection class : IP 54

Operating temperature : -30 °C to +50 °C

\*) In the case of deviating attached parts, please refer to the technical data in the acceptance protocol and in the respective manufacturer's technical data sheets.

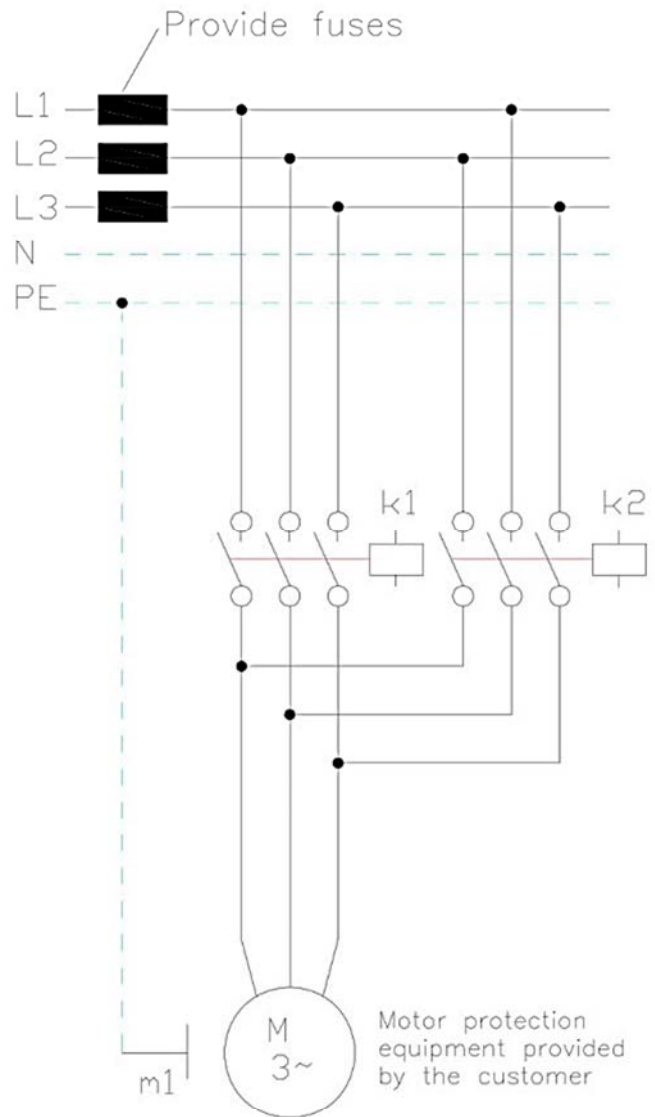
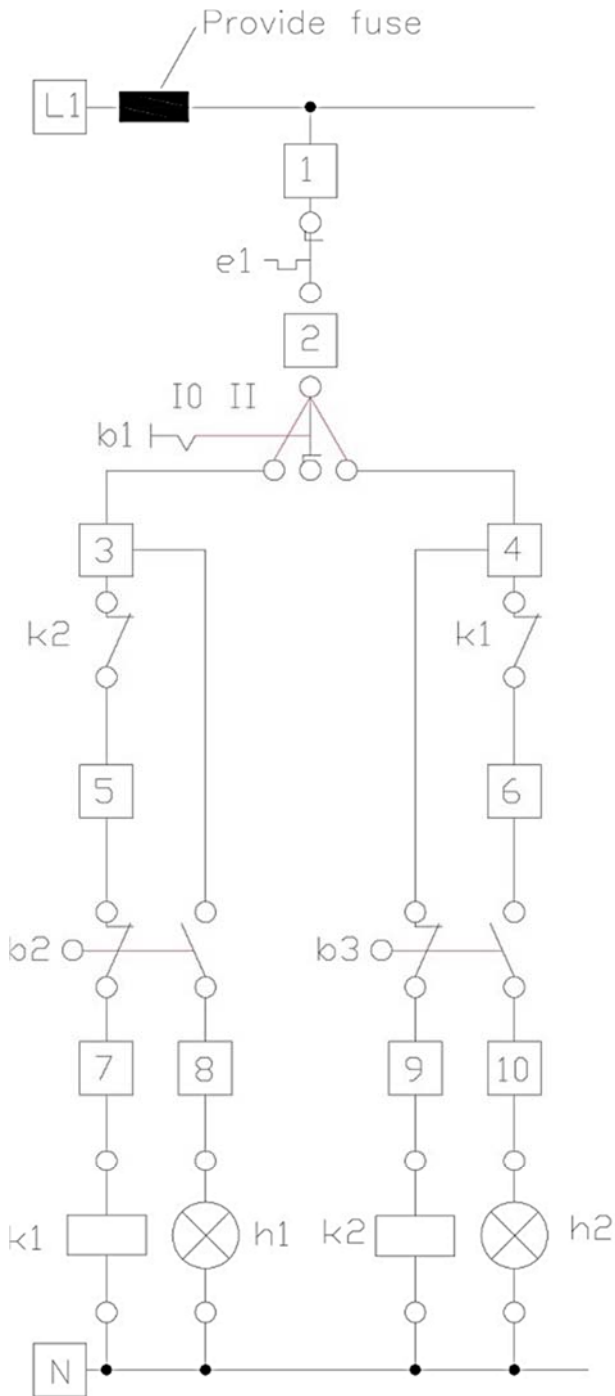
## 10. Spare parts



<i>Part Nr.</i>	<i>Denomination</i>	<i>Quantity</i>
1	Shaft seal	2
2	Roller bearing	2
3	Seal *	1
4	Drive	1

1\* dustproof stop valves only

### 11. Terminal Diagram



The limit switch settings must be checked by the customer.  
Be shure to connect PTC thermistor.

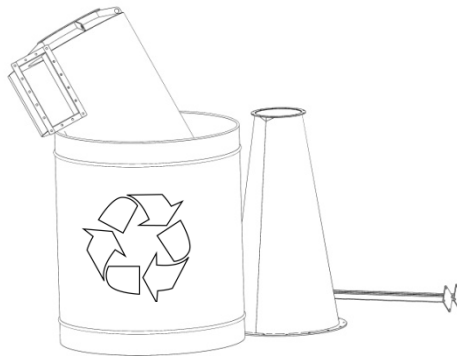
## 12. Dismantling and recycling

*When dismantling a unit, be sure to keep in mind the following important information :  
As the unit is dismantled, set aside all still functioning parts in order to re-use them on another unit.  
You should always separate the different materials depending on their type : iron, rubber, oils, greases, etc...*

*Recyclable parts must be disposed of in the appropriate containers or brought to a local recycling company.*

*The rubbish must be collected in special containers with appropriate labels and disposed of in compliance with the national laws and/or local legislations in force.*

**CAUTION!** *It is strictly forbidden to dispose of toxic wastes in municipal sewerage and drain systems. This concerns all oils, greases, and other toxic materials in liquid or solid form.*



## 13. Contact

*For spare parts please contact Formula Air Group.*

### **Formula Air The Netherlands**

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