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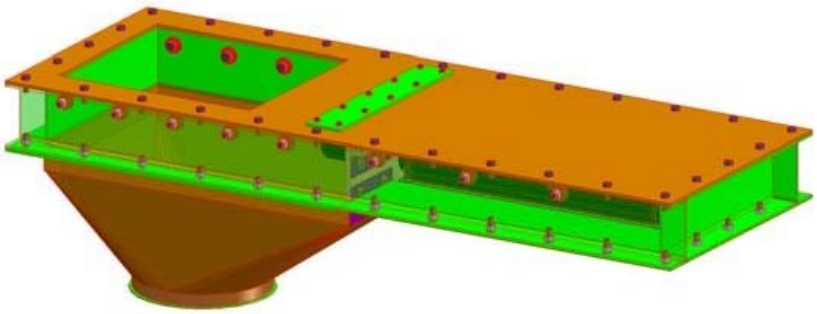

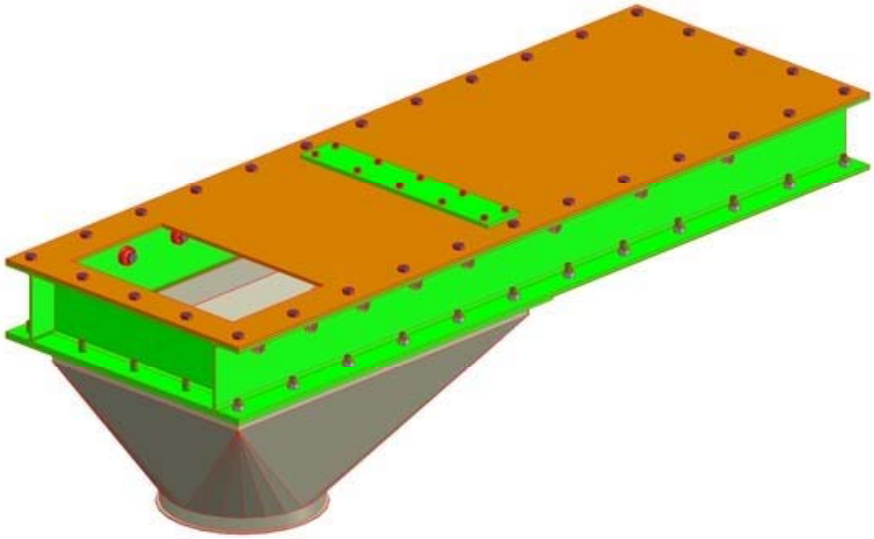

PNEUMATIC REDLER PIPE GATES

Maintenance manual

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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 pipe gate 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 pipe gate when it is at a standstill. Stopping the pipe gate:

- *Interrupt the supply of product to the diverter.*
- *Switch off the operating pressure*
- *Secure the main switch against being switched on again.*

***Note**: Wear the appropriate protective equipment. Clean the interior of the diverter 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 gate 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 gate, 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 authorised by the manufacturer ensure safety. The use of other parts can lead to injuries to persons and damage to property.
- Converting or modifying the gate is permitted only after consulting the manufacturer. Correspondence regarding this must be exclusively in writing.

- The electrical controller of the gate 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 gate into operation. Depending upon the number of items, the gate 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:

Climatic zone	Packaging 1)	Storage place	Storage period
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.

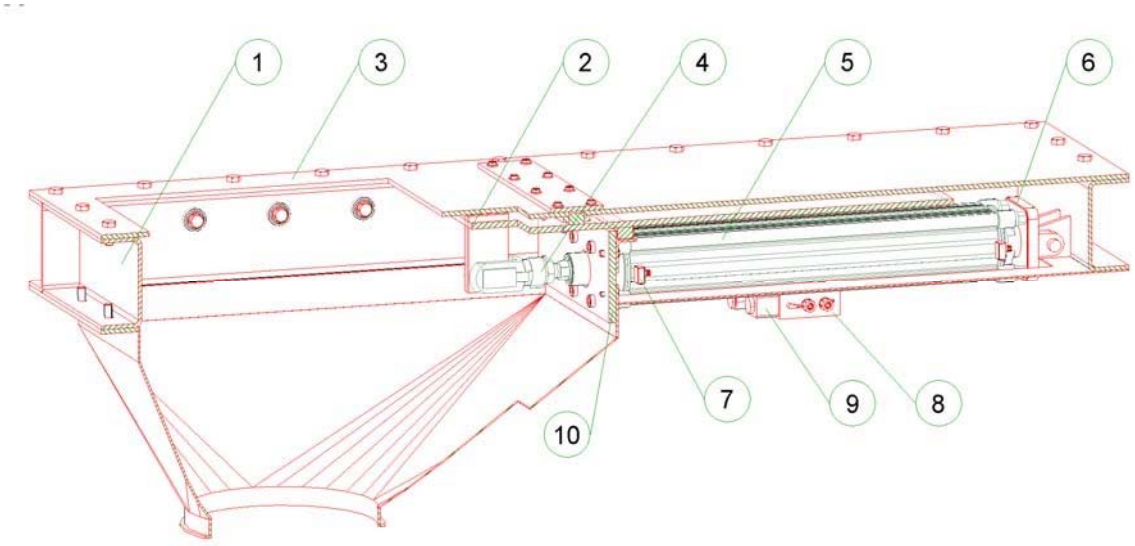
5. Intended use

The gate is intended to shut off the flow of bulk materials in granular or powder form with a residual humidity of 15%. These consist of non-conductive dusts in a conveying pipe with a Kst value up to 160 bar m/sec.

The pneumatic pipe gates are not suitable for pneumatic conveying or for the conveying of seeds. There must be neither vacuum nor positive pressure in the conveying pipe. They are to be used only in closed rooms and only in the installation position illustrated in the Noro catalogue. The component is considered to be safe if all connections in the system are made correctly.

6. Structure of the pipe gate

6.1. Description of the assembly



Shut-off station
1 Frame
2 Sliding plate
3 Frame plate

Drive station
4 Clevis
5 Piston cylinder
6 Reed contacts
7 5/2-way solenoid valve
8 Coil
9 Cylinder mounting

6.2. Assembly functions

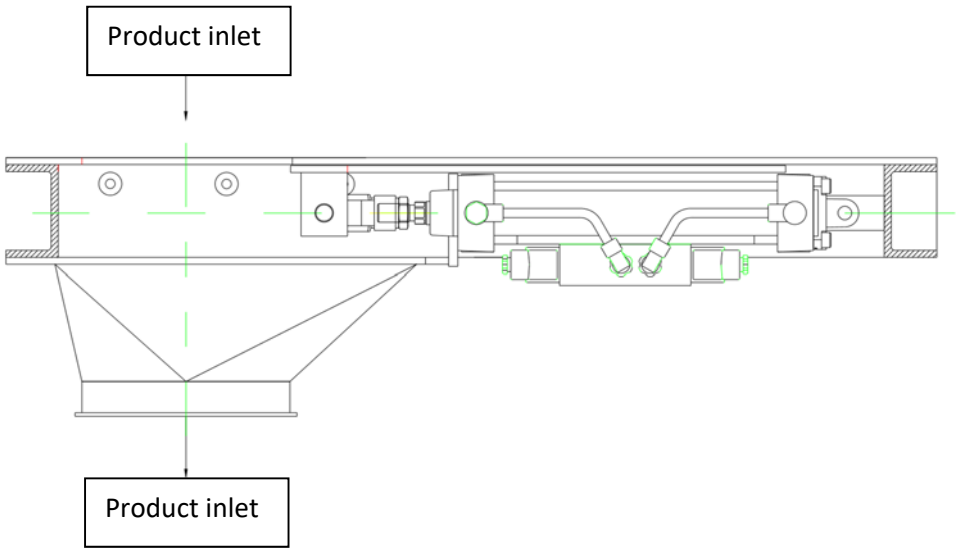
The sliding plate is situated inside the steel frame.

The drive unit is mounted on the steel frame and moves the sliding plate forwards and backwards via a piston.

The positions of the sliding plate are detected by the two non-contact limit switches.

6.3. Method of operation of the pipe gate

The bulk material runs in free fall vertically into the gate. Its flow is shut off via the sliding plate..



7. Operating and maintenance manual

7.1. Installation and assembly

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

All electrical attached parts 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:

- Install the gate only in the intended installation position.
- Ensure adequate suspension or support.
- The continuative piping must be installed and suspended without stress.

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.

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 gate can be influenced by the following maintenance intervals:

Time interval	What needs to be done?
Every 1000 hours of machine operation, but at least ever y three months	• Visually inspect the seals for damage. • Check the limit switches, readjust if necessary.
Depending on operating conditions, but after 1 year at the latest	• Check all rollers. • Check the rack and pinion
Varies (depending on external influences and on the characteristics of the conveying product)	• Check interior of housing, clean if necessary. • Check product-guiding parts for wear • Repair or renew surface and anti-corrosion coatings • Check the gearbox oil, top up or change as necessary. • Check the rollers, replace if necessary.

INSTRUCTION FOR ALL INSPECTION AND MAINTENANCE WORK:

Stop the supply of product to the gate, switch off the gate drive, secure against unintentional restarting.

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

Malfunction	Possible cause	Remedial action
Sliding plate cannot be moved.	A Product adhering to the sliding plate.*1 B Rollers defective C Operating pressure interrupted. D Cylinder unit defective. E Error in the controller.	A Dismantle and clean the gate. B Replace the rollers C Check the operating pressure D Service the cylinder unit, replace if necessary. E Check the controller.
Low flow rate	A Product column in the gate or pipelines blocked.	A Locate and eliminate the blockage.
The gate leaks	A Wrong installation position (driving side directed downward). B Product deposits on the sealing surfaces C Seals defective.	A Correct the installation position. B Dismantle and clean the gate. C Replace the seals

**1) 1 Due to the high humidity or the formation of condensed water in the system, the product can adhere to the sliding plate and strongly affect its mobility.*

9. Technical description of components

Pneumatic cylinder *)

Make : Aventics
Series : PRA
Version : double-acting, with adjustable end position cushioning and magnetic piston, non-contact signal delivery
Standar d: ISO 6431, VDMA 24562, NFE 49-003-1
Permitted medium : compressed air, oiled or oil-free
Operating pressure: Pmax. 10 bar
Operating temperature : -20 °C to +80 °C

5/2-way solenoid valve *)

Make : Aventics
Model : Diaphragm poppet valve
Operating voltage : 220/230 V, 50/60 Hz or 24 V DC
Protection class : IP 65 according to DIN VDE 0470
Part number : 230 V AC: 572 741 5280; 24 V DC: 572 741 0220
Operating temperature: -15 °C to +50 °C

Magnetic field switch *)

Make : Aventics
Type of contact : Reed
Operating voltage : 12 - 240 V AC or 12 - 60 V DC
Max. switching current : AC/DC 0.13 A
Part number : 0830 100 606 or 0830 100 612
Operating temperature : -20 °C to +80 °C

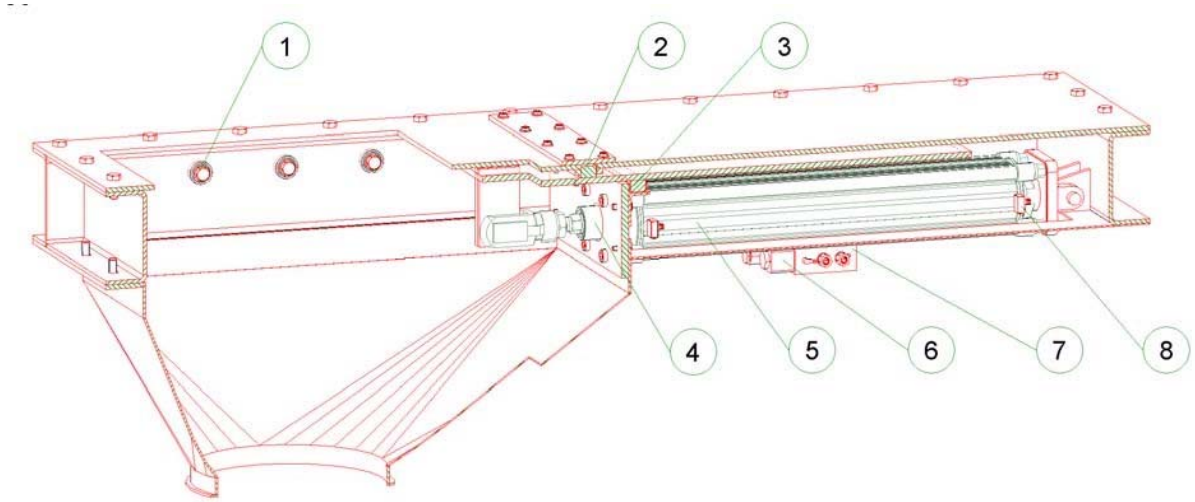
Coil *)

Make : Aventics
Series : C01, Form A
Electrical connection : EN 175301-803, plug
Operating voltage : 230 V AC or
24 V DC
Power consumption : 6 W at 230 V AC
2.1 W at 24 V DC
Protection class : IP 65
Operating temperature : -15 °C to +50 °C
Part number : 220/230 V, 50/60 Hz : 542 845 7082
24 V DC : 542 050 7022

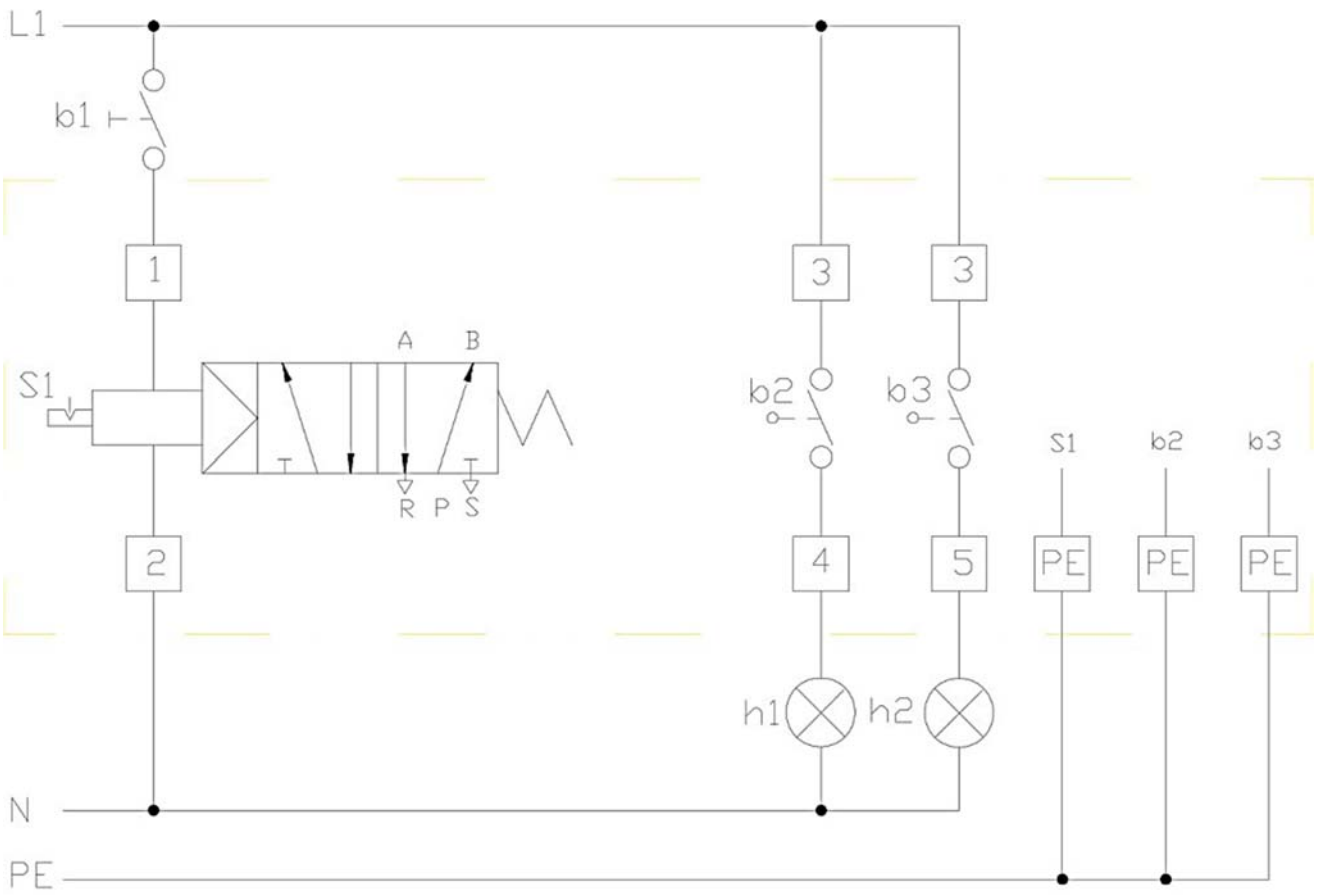
*) In the case of deviating attached parts, please refer to the technical data in the acceptance protocol and in the respective manufacturer's technical data sheets.

10. Spare parts

Part Nr.	*Denomination*	*Quantity*
1	Rollers	Variable
2	Upper seal	*1*
3	Lower seal	*1*
4	Seal for cylinder	*1*
5	Piston cylinder	1
6	Coil	1
7	5/2 way solenoid valve	1
8	Limit switch	2



11. Terminal diagram



* b1= Off switch
b2= non-contact limit switch, gate closed signal
b3= non-contact limit switch, gate open signal

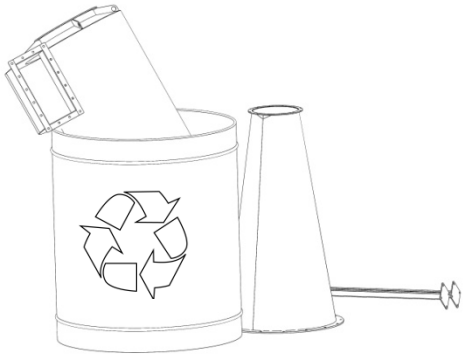
S1= 5/2-way solenoid valve
*h1= indicator lamp, gate closed
*h2= indicator lamp, gate open

*= not located on the device, belongs to the switchbox

The limit switch settings must be checked by the customer.

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.

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NOTE : All drawings and references contained within this manual are non-contractual and are subject to change without prior notice at the discretion of the Formula Air group and its partners.