Operating Instructions for

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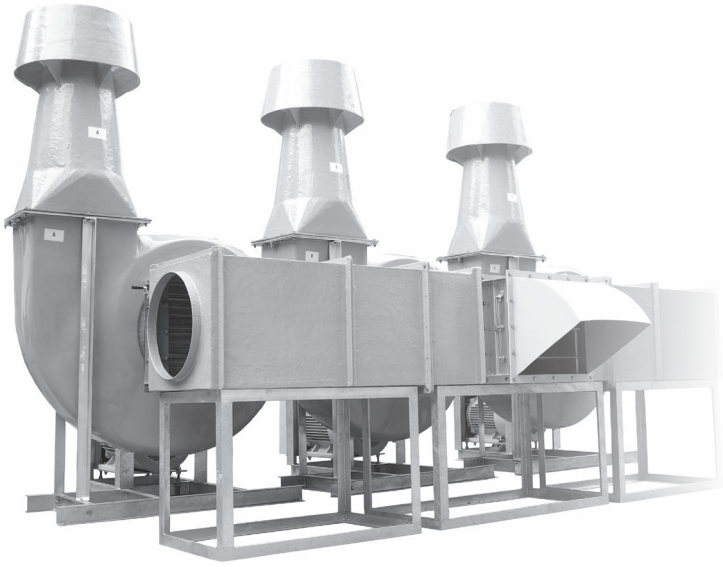
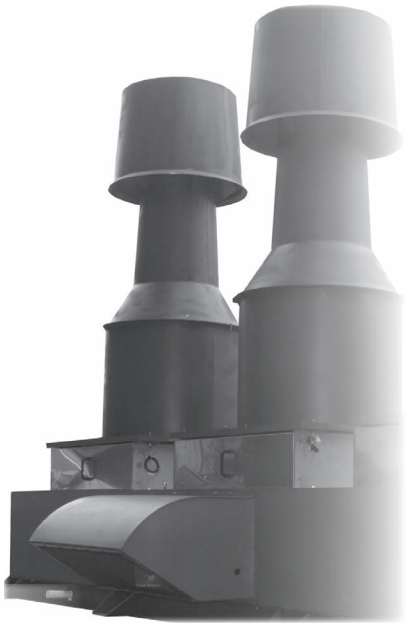
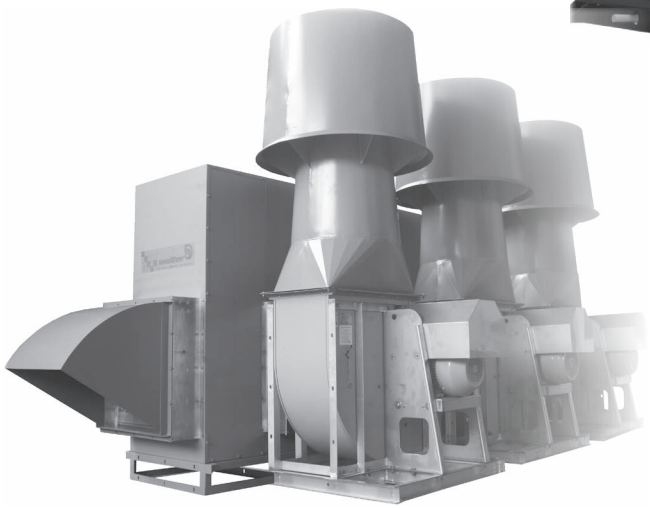
High Plume Jet Fans: CHEM, HYEB, PF-WMX







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1 Preface

This is an operating and maintenance manual, not a system design guide. During installation of fans a large number of factors that arise beyond the limitations of this manual must be taken into consideration. We must refer to the relevant standards, guidelines, standard sheets, specifications, EU-Directives, technical literature and courses that are offered by universities and associations such as AMCA, BS, VDE, VDI and VDMA among others.

Additional measures must be taken with the help of regional or legal specifications, standards, guidelines or rules.

The complete operating and maintenance manual as well as the technical data sheet for the fan must always be kept safe in the vicinity of the fan. Before operating the fan, the operating manual must be read carefully and understood. For doubts if any, please contact our company. We are not liable for damages resulting from non-conformance to this operating and maintenance manual. The fan is exclusively for the application described in the technical data sheet. Any use outside the specified area of application is not in accordance with the regulations and can prove to be hazardous.

Modification or changes are not allowed without clear written permission from us. Using the state of art technology, with utmost care we have manufactured a solid and reliable fan just for you. However during operation, fans are often exposed to large-often unexpected-stresses. Improbable accidents must be avoided even in the event of simultaneous occurrence of multiple defects in the fan. In order to avoid damages and accidents fans must be regularly inspected and serviced by qualified technicians. Damaged bearing and high vibration levels in particular can lead to breakdowns and sub sequential damage.

Despite high safety standards and their normally long service life every bearing finally wears out. Since minor damages, e.g in the belt drives (if present), may quickly worsen, a regular inspection must be carried out giving the operating conditions due consideration. Destroyed bearings can lead to shaft failures and a total loss of the fan. Also V-belt drives and couplings for belt driven fans are equipped with wearable parts and must be regularly inspected.

Vibrations prove to be harmful for all the rotating machines, since they can give rise to unexpected vibrational failures. Minimizing the vibration energy is the best way of protection. At the time of delivery from our factory the fan has a high vibration quality. But due to bad inlet conditions, material build-up, wear, damages during transportation, fitting faults, bearing damage, over heating and other reasons, heavy vibrations can occur. Therefore along with the inspection of the bearings the vibrational quality must be checked regularly.

Fans should not be installed close to the working- and common areas. The fan must always be installed in such a way that no rotating parts can be touched. In case of free inlets or outlets protecting guards must be fitted. If ducts are connected to the fan, these must be provided on site with protecting guards. Parts that get separated from the impeller and contaminants must be securely retained by this.

Before starting any work on the fan, the electrical connections must be disconnected. The switching device must be marked and secured to avoid any unintended operation. The impeller must be mechanically blocked.

For work places close to the fan, if necessary, as per the occupational and environmental protection act, appropriate noise barrier measures for reducing the noise must be undertaken by the operator.

The following symbols are used in these operating instructions. These symbols are, above all, intended to draw the reader‘s attention to the text contained in the adjacent safety note.

Warning This symbol indicates that dangers exist which are hazardous to life and health

Mortal danger Electrical hazard. Serious and also fatal injury can result if these notes are disregarded.

Note Indicates user tips and other useful advice.

2 Handling & Transport

For lifting with cranes, attach hooks only to the lifting eyes provided for this purpose. Complete fans should be lifted only by sling or by means of the lifting eyes at the foundation as much as possible. While using fork-lifts, the fork is to be applied only under the base frame. Fans can also be hoisted with slings, as per Figure 1 to 3, placed around the fan housing. When a single hoist is used, a “spreader” will keep the sling from slipping on the housing. Lowering shall be done at the lowest possible speed onto a soft support. Shocks, shaking and dropping might lead to imbalances and deformations or even damage in particular to the bearings.

- Danger ! Do not step under hanging loads!
- Sharp, protruding edges can lead to injury through cuts. Suspended loads can fall, which then constitutes a fatal hazard - stand clear of suspended loads!

For every transport and each storage it must be ensured that no water (e.g. by rain) can get into the motor, the bearings or other sensitive components. During short open transports and temporary storage in the open, the fans should be stored if possible under a canvas cover. While using fork-lifts for transportation all the mobile construction or installation parts shall neither be touched nor damaged. The lowering must be done with the lowest possible speed. Shocks, shaking and dropping might lead to deformations.

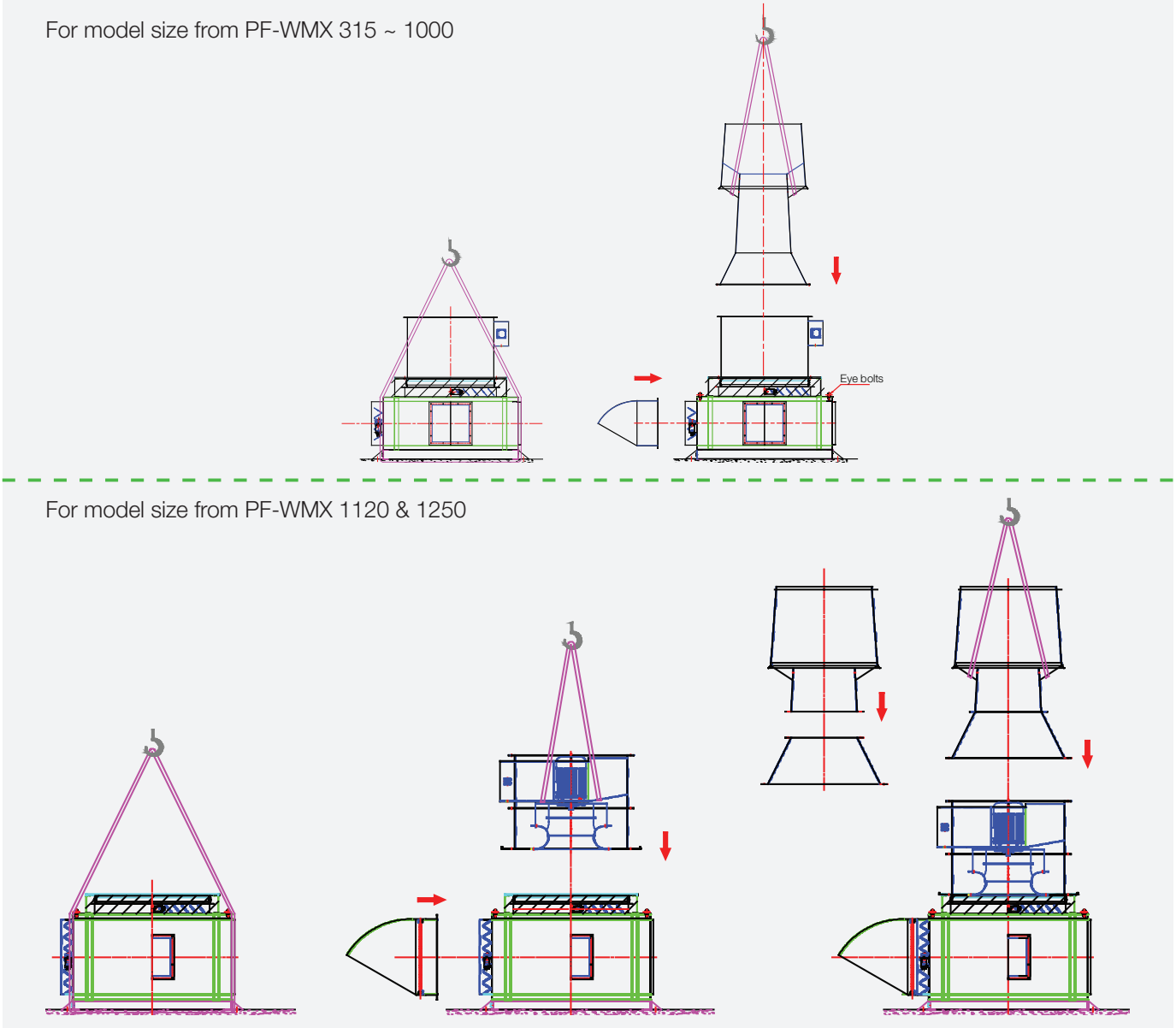

Figure 1) Lifting Using the Mounting Brackets - PF-WMX Series

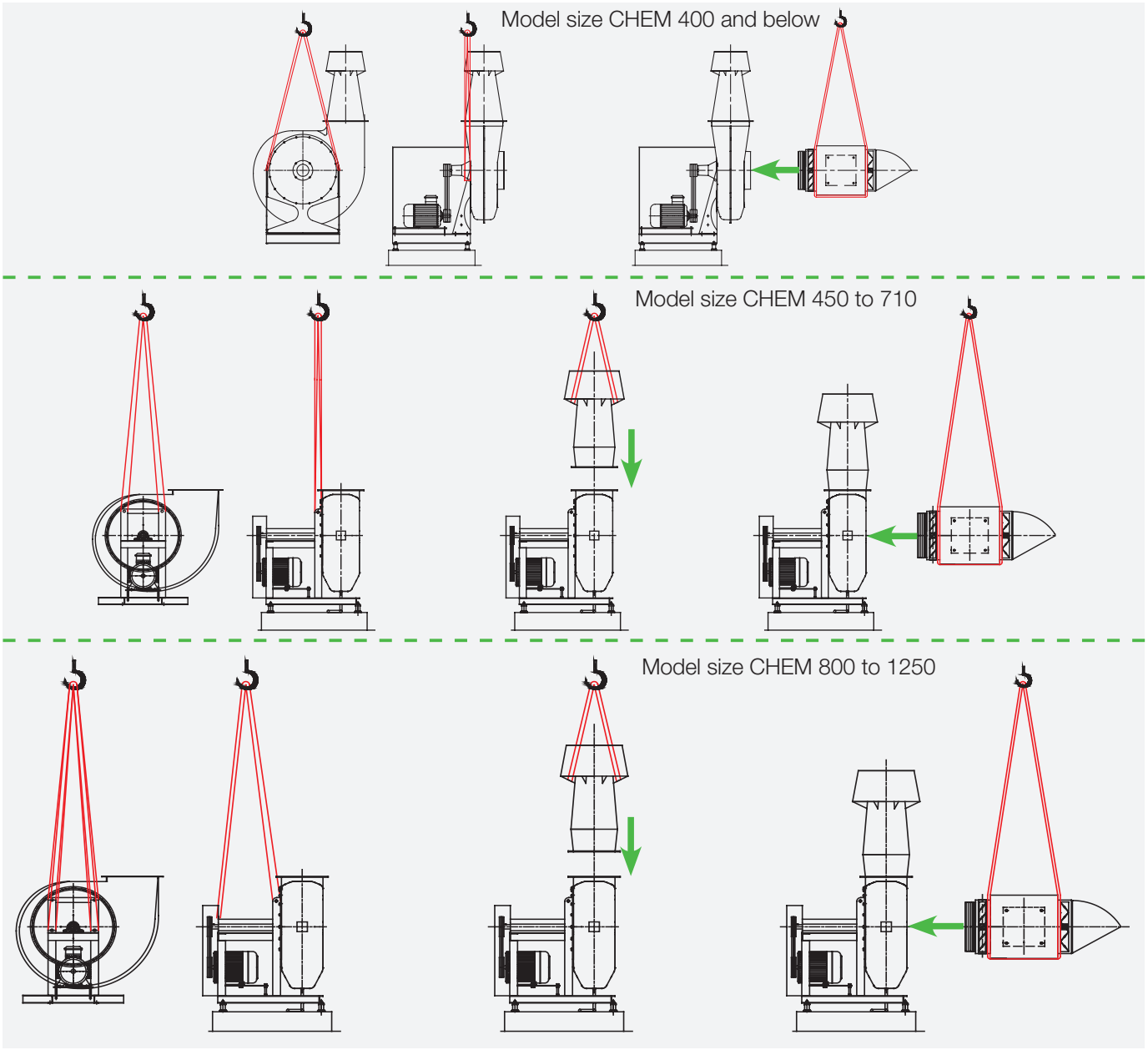

Figure 2) Lifting Using the Mounting Brackets - CHEM Series

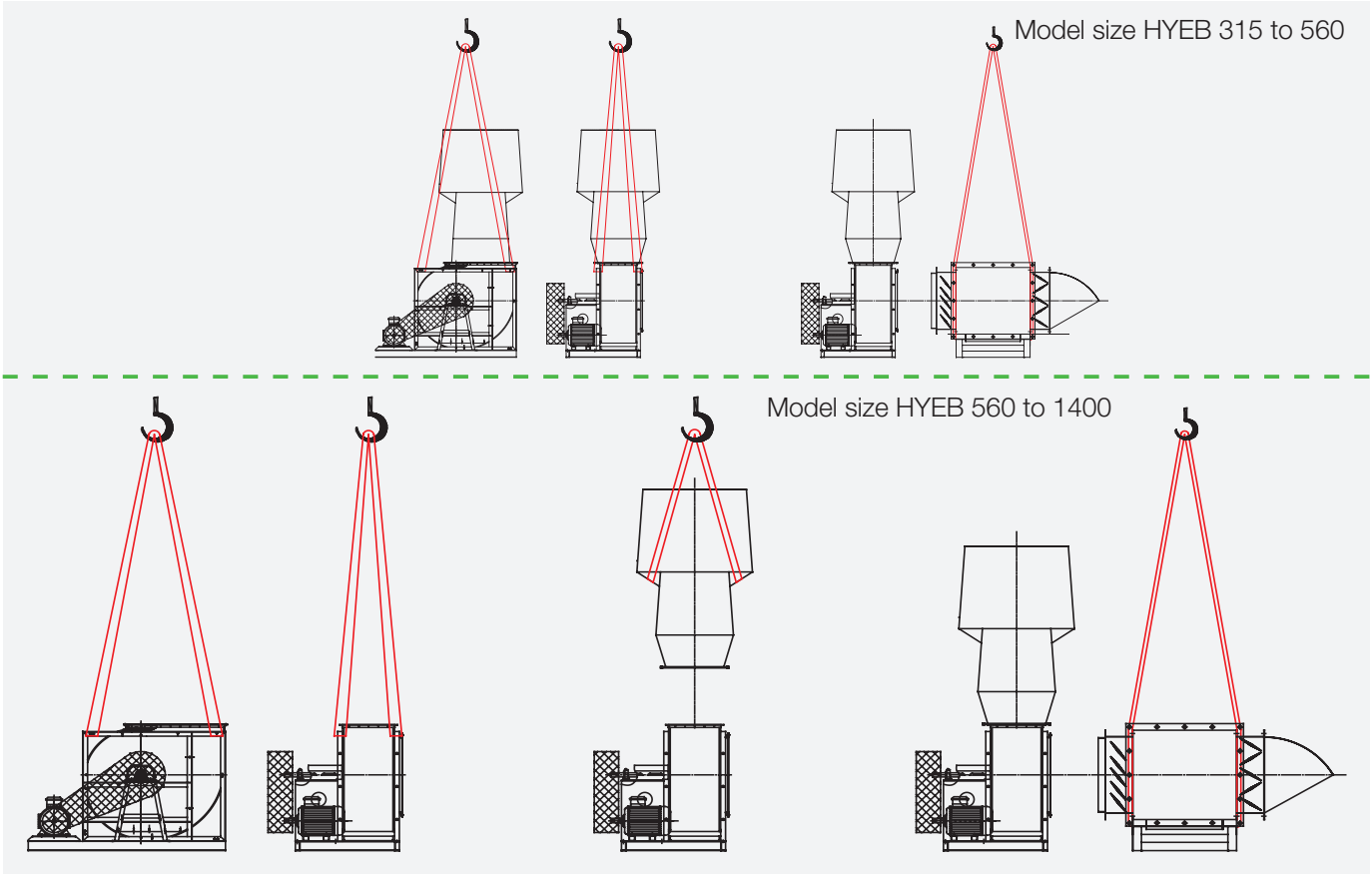

Figure 3) Lifting Using the Mounting Brackets - HYEB Series

3 Delivery / Installation

While delivering the fan please check for external damages and immediately notify the transport company in case you have any complaints. (Or else insurance coverage, if any, may be invalidated).

Fans are to be installed only in the mounting position for which they were ordered and supplied (horizontal/vertical). Equipment must be installed on a level foundation. Care must be taken that the fans are not mechanically deformed or subject to unwanted forces in order to prevent jamming or grinding of the impeller.

While using vibration dampers, they must be placed such that a uniform load (deflection) is obtained, and it may be necessary to insert shims. When the fans are installed the damper must not be canted, dragged over the floor or stressed on one side only; this could damage the rubber or the springs.

Flexible connections must be installed in such a way that they allow the fan to have free movement especially during the start-up. On the other hand they should not be too compressed or misaligned that they form folds that could impede the air flow. In case of high pressure and danger of abrasion, guide rings (ducts) must be provided.

The fan must be connected to the motor according to the connection diagram in the terminal box and according to the instructions of the manufacturer. All motors are to be protected with the help of motor protection devices. Only a licensed expert staff must undertake the work of connections in conformance with the protection and safety instructions.

Before commissioning, all the sensors and inspection devices must be connected and it must be ensured that the fan is disconnected during a given signal. In the construction planning and during the connection it must be ensured that a functional disturbance or cable disruption of a sensor is identified through a plant control and is interpreted as an alarm if required.

During the commissioning and the trial run, all the executed controls and tasks must be recorded.

Assembly and electrical work is only to be carried out by trained and instructed craftsmen and in accordance with the respectively applicable regulations!

The following points are to be observed when assembling the fan:

- Secure the fan to the assembly base plates
- The fans must not be deformed or twisted during fitting! Use spacing plates if the need arise
- The fitting position agreed in the lay-out is to be observed
- Only self-locking screws may be used for securing the outflow flange
- Make the electrical connection as per the enclosed terminal plan in the motor connection cabinet of terminal cabinet housing.

Attention: Make the electrical connection in accordance with the technical connection conditions and the relevant regulations!

- Feed in and seal the cable into the connection cabinet properly
- If available, connect the thermistor / thermo-contact for motor protection, otherwise the warranty lapses

Before checking the direction of travel:

- Remove foreign bodies from the fan area
- Assemble contact protector, protective screen (see accessories), or box in fan
- Turn the rotor through a few revolutions by hand in order to test its ease of movement
- Check the direction of travel in accordance with the arrow on the housing by switching on and off very quickly
- If necessary, alter the direction of travel for AC motors by swapping 2 phases. In the case of single-phase motors, reverse the direction of travel by swapping Z1 with Z2 (attention: the direction of current flow in the auxiliary winding also changes)

4 Commissioning

General safety instructions:

Before commissioning the fan, the casing and the duct pipes must be checked for contaminants. Loose parts can be carried away by the air flow and can lead to injuries. Care must be taken when installing the protection grills, belt protection and other safety features. No one should ever stand in the way of the air flow! The air pressure might be so strong that a human body and even heavy objects could be sucked into the fan or blown away.

› Read these operating instructions carefully before putting the fans into operation!

The safety instructions for electrical equipment and of the electricity supply company must be observed at all times.

› Assembly, electrical connection and maintenance may only be carried out by trained craftsmen!

The rotational direction of the fan is indicated by an arrow on the fan casing, fan protection or motor. This should be checked by briefly starting the motor and observing the rotating parts. If it is wrong, the electrical leads must be reconnected. The amperage must be measured and compared with the nominal current of the motor. Centrifugal fans must be throttled appropriately; otherwise the motor can be overloaded.

Before the rotation direction is reversed, the impeller must come to a complete standstill. The high moment of inertia can otherwise lead to damage.

4.1 Mechanical safety

To prevent any contact between moving parts, safety devices must be installed. If they are not supplied as an integral part of the fan, they must be installed on site. This especially is applicable for inlets, outlets and access doors which must be secured on site.

4.2 Fans with belt drive

The belts must be checked to ensure they run smoothly. The bearing temperature must be monitored. The temperature on the bearing housing will normally rise to 50-60°C (warm to the touch), rarely to 70°C or more. Be careful while touching! If the temperature rises to higher values, the system must be restarted after a cooling down period and subsequently the probable cause for the fault must be found and eliminated. The belts are to be tightly tied. It must be verified that the bearings are good but not excessively lubricated.

4.3 Maximum speed, different speeds and speed control

The fan should not be operated at higher speeds than those stated in the data sheet. A speed reduction is permissible only in consultation with Wolter

It must be ensured that the fan is not going to operate at a resonance frequency which can damage the fan or associated components. While controlling the speed it must be taken into account that individual frequencies of different components of fan are achieved in the range of minimum to the maximum speed.

At these corresponding speeds no permanent operation may occur. While starting the system the variable speed control must be programmed so that these resonance speeds are quickly bypassed.

4.4 Motor protection switch

Fans have a relatively high moment of inertia. In most cases for heavy start relays are necessary. While selecting and setting the relays the whole operating range must be considered. For example a fan motor will draw 16% more current when the feed medium going through the fan is at -20° C than at 20° C because of higher atmospheric density.

4.5 Frequency converter / speed regulation

The frequency converter must be set so that unnecessary high loads due to high acceleration or deceleration are avoided. In general, the start-up time for an impeller with diameter 1000 mm should be at least 30 seconds, between 1000 and 2000 mm at least 60 seconds and for larger diameters 120 seconds.

In order to avoid unnecessary loads during continuous accelerations and decelerations which can lead to material fatigue, the control should be made as slow as possible.

The accelerations coming from the process control should not be larger than **0.45 rad/s²** (corresponding to a speed change of **258 rpm per minute**, or **4.3 rpm per second**) except when passing through resonance frequencies.
Material fatigue in the impeller and other parts of the fan is reported to have occurred due to very frequent speed changes. The impeller should be replaced after, at the most, 0.5 million speed changes (corresponds to a life time of 2 years at 4000 operating hours/year and one speed change per minute.

If resonance frequencies are passed through often during speed changes (which must be blocked in frequency converter), an even lower life expectancy may result.

Warning: After disconnecting the power supply to the frequency converter, at least 10 minutes must pass before the cable or components of the converter can be touched since there is risk of serious injury from stored energy in the capacitors. Even control cards can lie at the potential of main power circuit. Always measure the voltage before touching and ground.

Before mounting and commissioning, the special instructions of the manufacturer of the frequency converter must be adhered to.

General instructions for mounting frequency converters

- The engine and converter should be placed as closely together as possible to minimize the electromagnetic interference and must be tuned to each other
- Cables must be encased and should not be longer than specified by the manufacturer
- Cables, cable shields, frequency converter and engine must be grounded
- Additional filters may be necessary to minimize radio interferences

4.6 Checks prior to initial start-up

Proceed with the fan‘s initial start-up in the following sequence:

- Check that the mechanical assembly has been carried out properly
- Remove foreign bodies located in the suction and outflow areas and in the fan space
- Check that the electrical installation has been completed in accordance with regulation
- Does the mains voltage match the motor voltage specified on the rating plate?
- Is the switchgear used suitable for the motor both with respect to the switching functions to be carried out and also to the switching conditions and switched output of the motor?
- Is the motor protection system set correctly with regard to the motor‘s nominal current? The setting must be carried out in accordance with the corresponding details contained on the motor output plate.
- Has the motor been connected correctly in accordance with the wiring diagram?
  The connection schematic supplied by the motor suppliers applies for the connection of the motor.
  The special connection regulations are to be observed for explosion-protected models.

4.7 Motor type and control

Please note that all wire connection must be in accordance to the motor diagram and thermostat (PTC) must be connected and in working condition

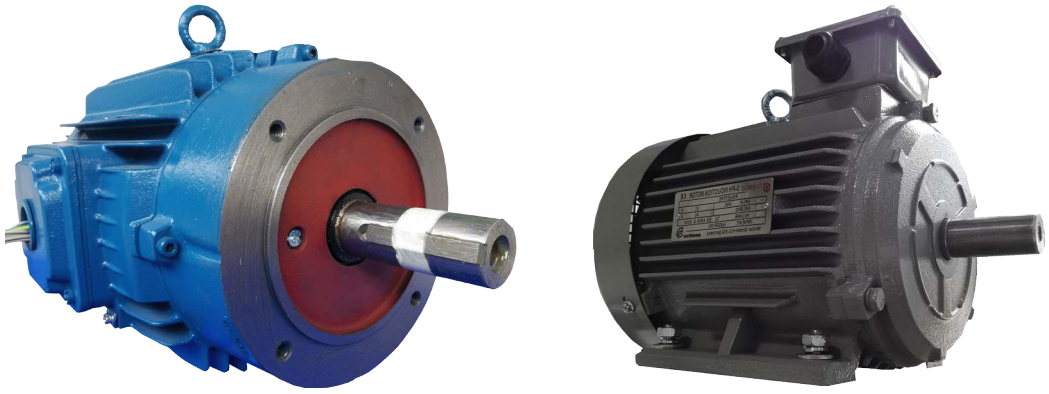

Figure 4) Motors

5 EC Declaration of Conformity

Declaration of Incorporation
According to the Machinery Directive / CE declaration as defined by the Machinery Directive 89/392/EEC annex IIB

Type of machinery

- Fume Jet Fan: CHEM, HYEB, PF-WMX

Motor type
Asynchronous external or internal rotor motor or D.C. or electronic committed external rotor motor.
The products are developed, designed and manufactured in accordance with the EC Machinery Directive 89/392/EEC in the responsibility of

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The following harmonized standards are used:

EN 60204-1:
Safety of machinery; electrical equipment of machines, Part 1: General requirements

EN 292:
Safety of machinery; basic concepts, general principles for design

EN 294:
Safety of machinery , Safety distances for the prevention of injures within danger zones

Note:
The compliance with EN 294 refers to the fitted contact safety device only, as it is part of the extent of delivery. The total compliance with EN 294 is the system manufacturer's or the contractor's responsibility.

The following international standards are followed:

DIN ISO 1940 / VDI 2060 Q2.5/ AMCA 204
The impellers with the shaft are statically and dynamically balanced on precision machines according to quality standard G 2.5.

ISO 13357-1 / ISO 13357-2 /AMCA 300
The ascertaining of the sound power level follows the reverberant room method.

EN ISO 5801 / AMCA 210 / AMCA 260
The performance curves provided in this catalogue were measured according to in an air test chamber.

EN 60034-1 / IEC 34-1
Rotating electrical machines: Part 1: Rating and performance

EN 60034-5
Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification

EN 60085-5
Electrical Insulation. Thermal evaluation and designation

An operator's manual is available

If the machine is a single component of a complete equipment/machinery, the conformity of this equipment/ machinery with the EC Machinery Directives has to be ensured before the initial operation.

Date: 25.05.2015

Nicholas Ang
Vice President

6 Maintenance

The safety instructions given under the sections “preface” and “commissioning” are valid for re-commissioning after maintenance activities. The frequency of maintenance depends largely on the operating conditions, environmental conditions and the required availability. The frequency must be set by the operator taking into consideration the plant layout and in compliance with the specifications given by us. Sufficient spare parts must be provided. A standard interval is for maximum of 6 months.

All impellers have been carefully balanced at the factory premises itself. Imbalance can occur due to dust, wear, abrasion and accumulation of material on the impeller leading to vibrations and damage of bearings. Therefore an operation free of vibrations must be ensured.

6.1 Surface protection

The surface protection of a component too must be regularly checked and if required maintained. Especially mechanical damage to the surface due to rockfall, dust or chemical impact must be looked out for. Even stainless steel can be subject to surface corrosion, e.g when it is subjected to a very moist salty environment or aggressive gases.

Therefore it must be ensured that surface corrosion does not affect the general properties of the fan and does not present a situation where maintenance activities are urgently required, but can be rectified and improved just by carrying out suitable maintenance tasks within the period of warranty. Corrosion can be prevented typically by cleaning the surface and by using a suitable surface conservation technique.

6.2 Monitoring vibrations

For safe operation, installation of vibration sensors are always recommended.
The increase of vibration level is always a dangerous signal.
The change of vibration can be monitored by measuring the mechanical vibration of the bearing and motor.
The continuous vibration value measured can be well monitored. Through long-term vibration monitoring, the change of fan operating conditions can be found at early stage and can be corrected if necessary. As such the equipment damage can be avoided and necessary maintenance work can be planned economically and effectively.
If there are any significant changes on the vibration value, the causes can be checked ie improper installation, dirt accumulation, wear on the impeller or other components etc.
The vibration may be caused by motor misalignment, rotor imbalance, bearing defects, greasing or lubrication problems, etc.
For fans, vibration can be due to unbalance, blade through frequency, turbulence, motor, belt drive, belt natural frequency, base mounting isolator etc.

NB: Vibration severity range limits (ISO 2372) and balance and vibration application categories (ISO 14694).

6.3 Impeller replacement procedure

Accessibility: At first the impeller must be made accessible. This includes removing fume nozzle at the outlet side of the fan.

Note: Measure the distance between the impeller back disc and inlet cone. Please see Table 1 for dimension while refitting. Variations in the distance lead to reduced performance!

The fan in general must be dismounted and placed on a level surface with the impeller pointing upwards.

CHEM Series

Model Size	Distance [mm]	Model Size	Distance [mm]
125	3.0	560	12.6
160	3.8	630	14.1
180	4.2	710	15.9
200	4.7	800	17.1
250	6.0	900	18.9
315	7.5	1000	21.4
400	8.4	1120	24.0
450	9.9	1250	27.0
500	11.2	-	-

HYEB and PF-WMX Series

Model Size	Distance [mm]	Model Size	Distance [mm]
315	5	710	10
355	6	800	12
400	7	900	14
450	7	1000	16
500	8	1120	16
560	8	1250	18
630	9		

Table 1) Distance between the impeller back disc and inlet cone

Functional description

The hub has a conical inner bore. A conical bush that is cylindrical inside is inserted. While tightening the fixing screws, the bush is tightened and clamped between the shaft and hub.

Dismantling of impeller

CHEM Series

Step 1 a) Install portable crane or hoist and position portable crane or hoist above the plenum box
b) Remove hose clamp used to secure flexible connector
c) Lift off the flexible connector, dampers, plenum box and bypass

Step 2 d) Reposition portable crane or hoist above fan and lower portable crane or hoist through center of fan
e) Reomove all bolts used to secure the fan casing
f) Lift off the fan casing and nozzle to ground level

Step 3 g) Dismount the taper bush (refer to Fighure 8)
h) Remove the fan impeller from the motor shaft (refer to Figure 5)

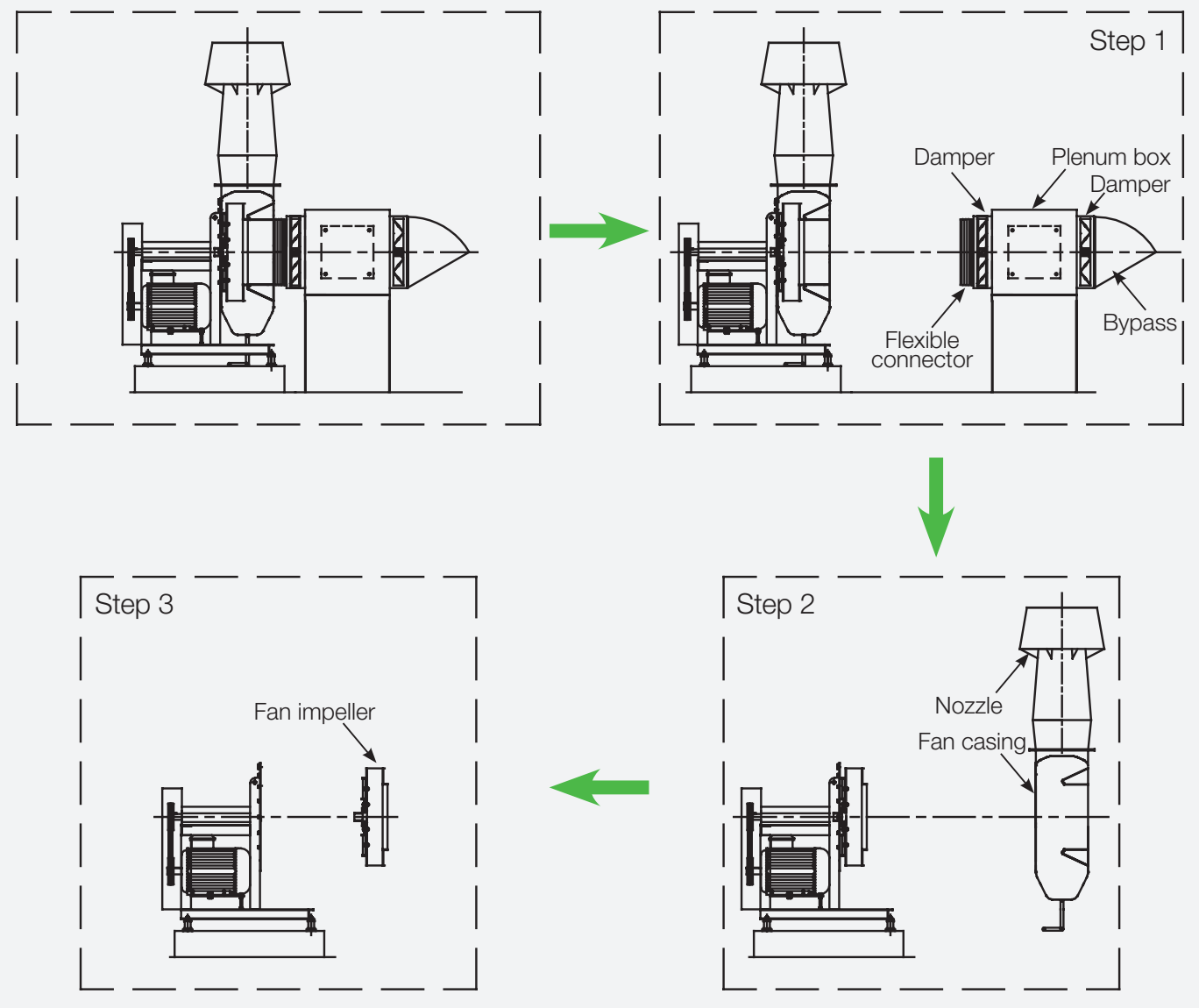


Figure 5) Removing Impeller - CHEM Series

PF-WMX Series

Step 1 a) Install portable crane or hoist and position portable crane or hoist above windband
b) Remove all bolts used to secure nozzle
c) Lift off windband and lower to rooftop

Step 2 d) Reposition portable crane or hoist above fan and lower portable crane or hoist through center of fan
e) Reomove all bolts used to secure the fan
f) Lift off the complete fan to ground level

Step 3 g) Dismount the inlet cone
h) Dismount the taper bush (refer to Figure 8) and remove the fan impeller from the motor shaft

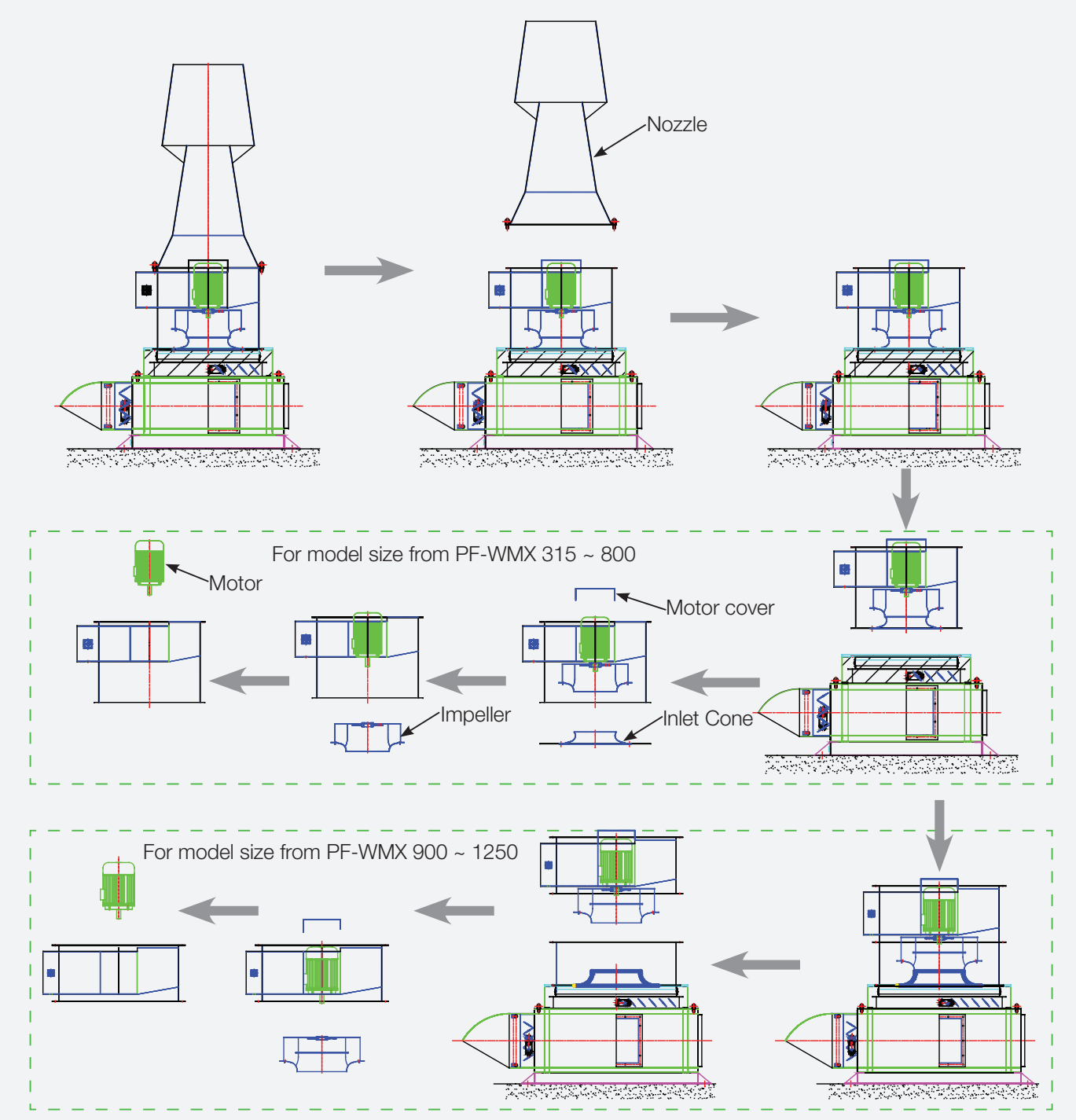


Figure 6) Removing Motor and Impeller - PF-WMX Series

HYEB Series

Step 1 a) Install portable crane or hoist and position portable crane or hoist above the plenum box
b) Remove hose clamp used to secure flexible connector
c) Lift off the flexible connector, dampers, plenum box and bypass

Step 2 d) Reomove all bolts used to secure the fan inlet flange and inlet cone
e) Dismount the taper bush (refer to Fighure 8)
f) Remove the fan impeller from the motor shaft (refer to Figure 7)

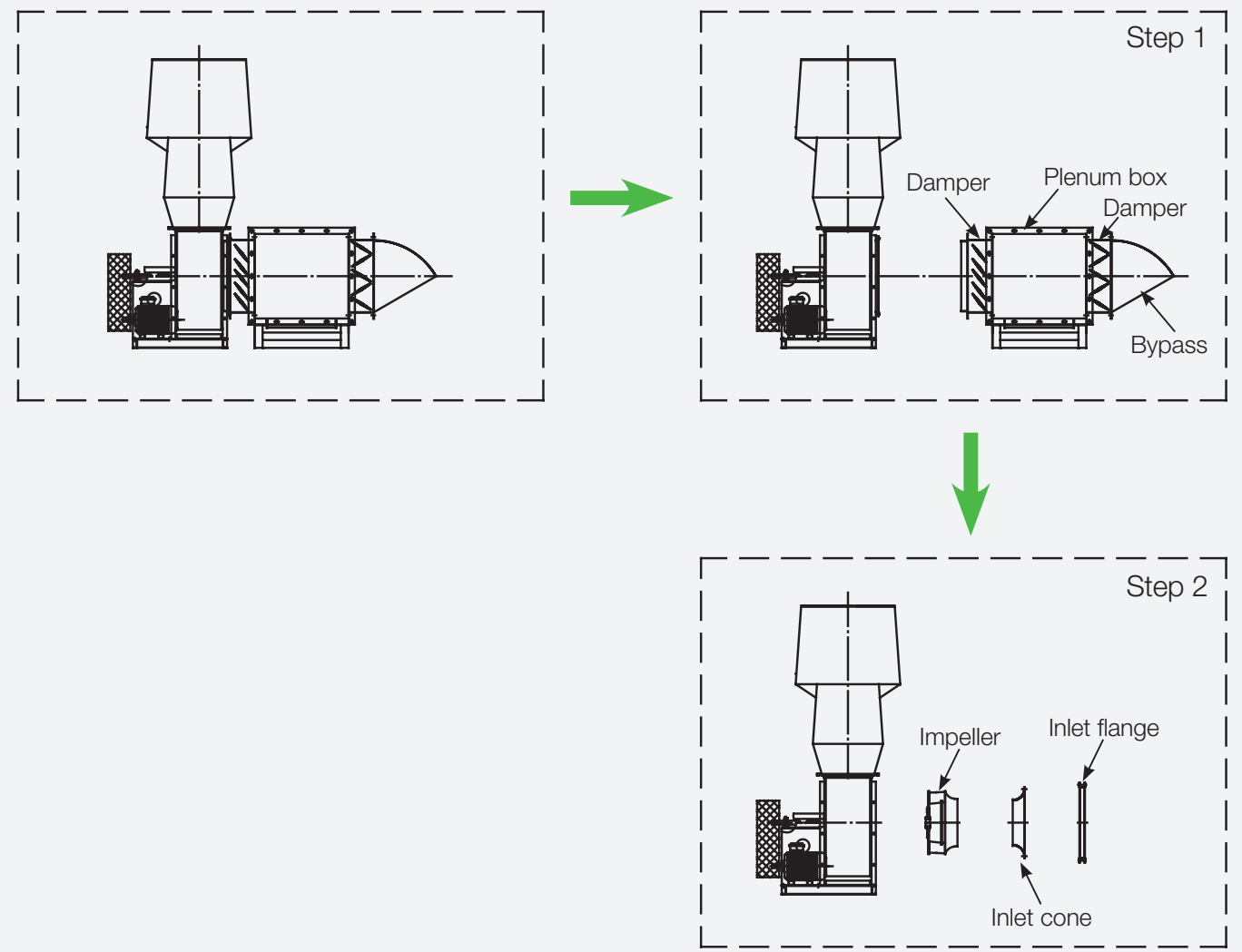
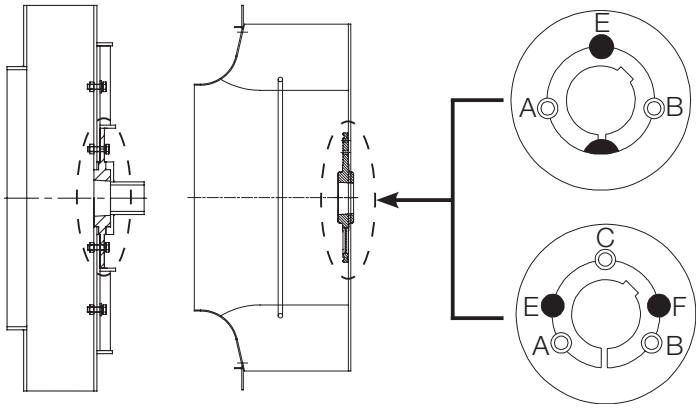


Figure 7) Removing Motor and Impeller - HYEB Series



Bolt-on-hub (Small):
- Remove A & B screws
- Place any of the A or B screw onto E
- Tighten to remove the impeller

● Pull off Bore

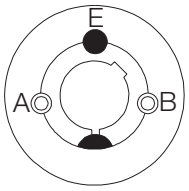
○ Fixing bore with fixing screws

Bolt-on-hub (Large):
- Remove A & B & C screws
- Place any two of the A or B or C screw onto E and F
- Tighten to remove the impeller

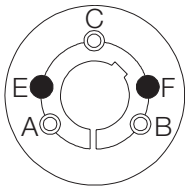
Figure 8) Removing Impeller from the shaft

Remounting of the impeller

- Clean and degrease all uncovered surfaces such as the bore and the conical surface of the taper lock bush as well as the conical bore of the hub. Insert the taper lock bush into the hub to coincide with all connection bores (half-thread bores must always have half-plain bores on the opposite side)
- Mildly lubricate and screw in threaded stud (bush size 1008-3030) and/or cylindrical screws (bush size 3535 - 5050). Do not tighten the screws
- Clean and grease the shaft. Push disc with taper lock bush onto the shaft till it sets into the desired position
- While using a slot key place it first into the slot of the shaft. There must be a small play between the adjustment key and bore slot
- Tighten thread studs and / or cylinder screws uniformly by using a screw driver, DIN 911, with the torques provided in the table 2
- After a short period of operation (1/2 to one hour) check torque of the screws and if necessary, correct it



Bolt-on-hub (Small):
- Place the A & B screw to tighten the impeller
- E must be free



Bolt-on-hub (Large):
- Place the A & B & C screw to tighten the impeller
- E & F must be free

Bush	Starting torque of the screws [NM]	Fixing screws No.	Fixing screws Size	Bush	Starting torque of the screws [NM]	Fixing screws No.	Fixing screws Size	Bush	Starting torque of the screws [NM]	Fixing screws No.	Fixing screws Size
1008 1108	5.6	2	1/4'' BSW	2012	31	2	7/16'' BSW	4040	170	3	5/8'' BSW
1310 1315	20	2	3/8'' BSW	2517	48	2	1/2'' BSW	4545	192	3	3/4'' BSW
1210 1215	20	2	3/8'' BSW	3020 3030	90	2	5/8'' BSW	5050	271	3	7/8'' BSW
1610 1615	20	2	3/8'' BSW	3535	112	3	1/2'' BSW				

Table 2) Starting torque of the screws

CHEM Series

Step 4 i) Re-install fan impeller onto fan shaft
j) Install all bolts to secure the fan casing and nozzle

Step 5 k) Assemble the flexible connector, damper, plenum box and bypass onto fan casing inlet.

PF-WMX Series

Step 4 i) Re -install fan impeller onto motor shaft
j) Install the inlet cone
Step 5 k) Lift up the fan and install onto the plenum box
Step 6 l) Install all bolts to secure the nozzle

HYEB Series

Step 3 i) Re -install fan impeller onto fan shaft
j) Install the inlet cone and inlet flange
Step 4 k) Assemble the flexible connector, damper, plenum box and bypass onto fan casing inlet.

6.4 Motor Replacement Procedure

This procedure assumes proper safety measures have taken and power locked out prior to working on fan / motor assembly. Read through these directions completely prior to starting this procedure. **Wolter** recommends consulting with your safety advisor and electrician prior to proceeding. Verify motor nameplate matches existing motor.

To remove the motor:

CHEM & HYEB Series

Step 1 m) Remove the belt guard, belts and motor pulley
Step 2 n) Unbolt to remove the motor by lifting the motor out of the fan stand (refer to Figure 9)

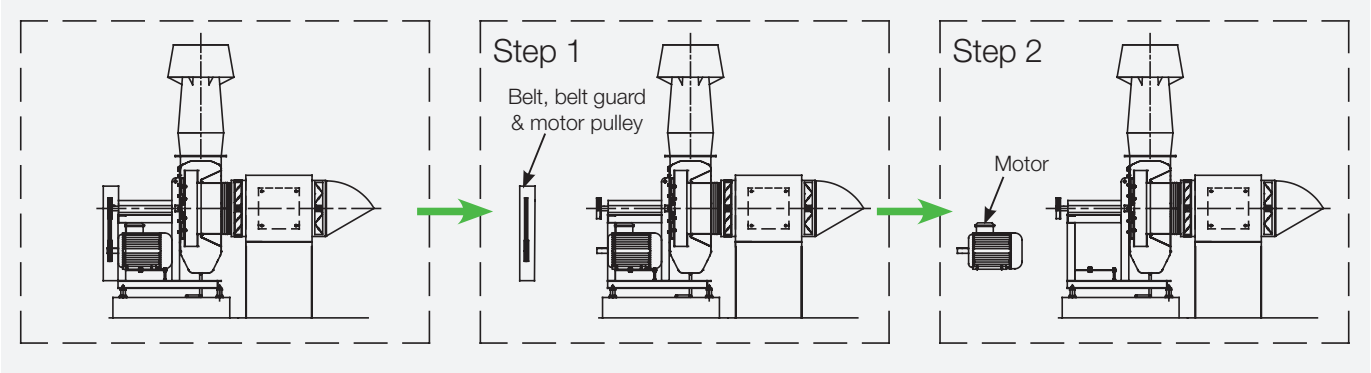


Figure 9) Removing Impeller from the shaft

PF-WMX Series

As per "Dismantling of impeller" from "Step 1" to "Step 3 h)"

Step 4 i) Remove the motor cover
j) Unbolt to remove the motor by lifting the motor out of the fan casing (refer to Figure 6)

To install the new motor:

CHEM & HYEB Series

Step 3 o) Lift the motor with the portable crane or hoist and position motor above fan stand and carefully lower to its intended mounting position
p) Ensure motor is positioned correctly so mounting bolts can be re-installed. Install all bolts to attach motor to mounting plate
Step 4 q) Re-install pulley onto motor shaft and belts
Step 5 r) Re-install the belt guard.

PF-WMX Series

Step 5 k) Lift the motor with the portable crane or hoist and position motor above fan body and carefully lower to its intended mounting position

l) Ensure motor is positioned correctly so mounting bolts can be re-installed. Install all bolts to attach motor to fan body mounting plate

Step 6 m) Re-install fan impeller onto motor shaft

n) Install the inlet cone and motor cover

Step 7 o) Lift up the fan and install onto the plenum box

Step 8 p) Install all bolts to secure nozzle

6.5 Motor Bearing Lubrication

All motor bearings are permanently lubricated type. However for motor frame size 225 and above or those motor with grease nipple available, bearing should be lubricated at the as below position A and B as per Figure 9. Service intervals for motor bearings as per Table 3.

Figure 9) Motor Bearing Lubrication

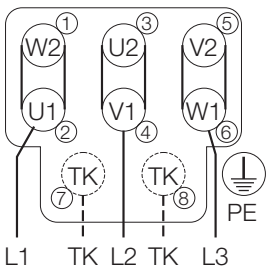
Motor	Service intervals operating hours for			Kind of Grease
size	3000 min^{-1}	1500 min^{-1}	1000 and 750 min^{-1}	Model
71	20000	20000	20000	**Mobil Polirex EM 103**
80	18000	20000	20000	
90	16000	20000	20000	
100	14000	20000	20000	
112	14000	20000	20000	
132	11000	20000	20000	
160	-	20000	20000	
180	-	20000	20000	
200	-	18000	20000	
225	-	18000	20000	
250	-	18000	20000	
280	-	18000	20000	

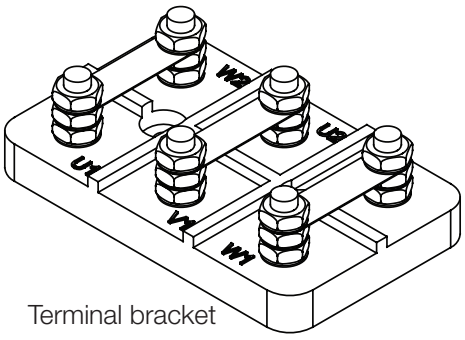
Table 3) Service intervals for motor bearings

6.6 Motor wiring connection

3 Phases motor (4kW and above) in Δ-connection with thermostat.

U1 = white
V1 = white
W1 = white
U2 = white
V2 = white
W2 = white
TK = black
PE = yellow-green





Terminal bracket

Figure 10) Terminal bracket

Model No	Bridge L * W * T [mm]	Material [-]	Max. Motor [kW]	Max. Current [A]
BKT 100	41 * 11 * 1.2	SS 202	0.37 ~ 5.5	11.9
BKT 150	59 * 14 * 1.5	SS 202	7.5 ~ 37	70
BKT 150	59 * 14 * 1.5 x 2	SS 202	45 ~ 75	140
BKT 150	59 * 14 * 1.5 x 3	SS 202	90 ~ 110	201

Table 4 Specification of terminal bracket

6.7 Nameplate

All fans have a name plate near the terminal box stating all important information such as the rated power of the electrical drive motor and also the rated current that enables the electrician to connect the fan to the switchboard with these two parameters.

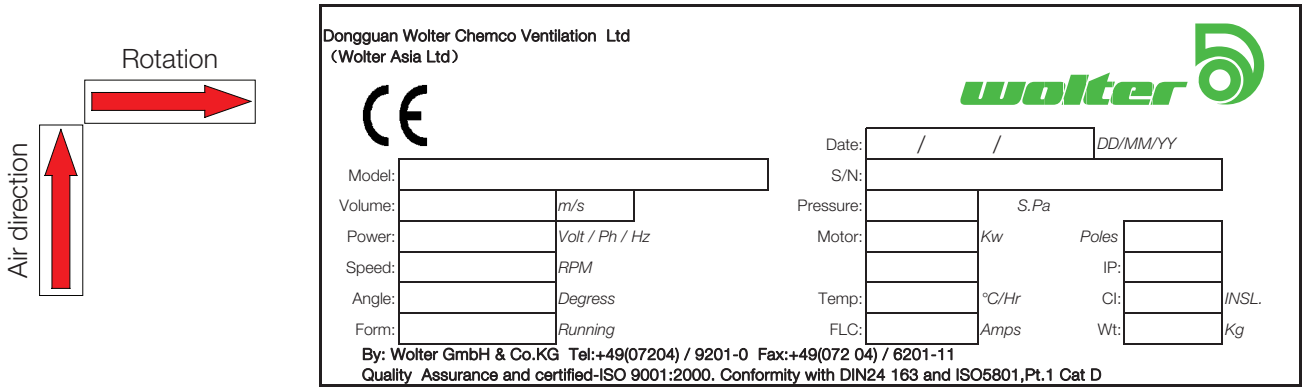


Figure 11) Fan Nameplate

6.8 Plenum Drainage Outlet

There is a location for a pipe outlet connection to each plenum box. Each drain may need to be connected to a drainage system to ensure proper disposal of any water or condensate that may occur.

i) Drain connections are dia. 50mm PVC

j) Installed piping to have a downward angle to allow for drainage

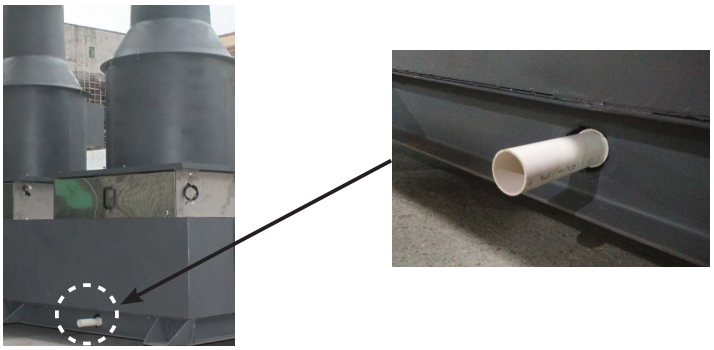


Figure 12) Plenum Drainage Outlet

N = Negative fan pressure (mm W.C.)
H = N - 13 mm minimum

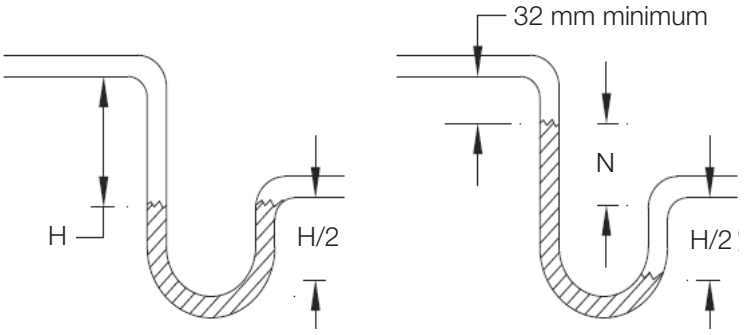


Figure 13) Negative Pressure Trap on Bypass Air Plenum

Check local codes for proper disposal of drain water which has been in contact with the exhaust air.

6.9 Damper & actuator replacement

CHEM & HYEB Series: Bypass Damper / Inelt Damper & Actuator can be achieved through the removal of the bypass hood, by removing the bolts (refer to Figure 14).

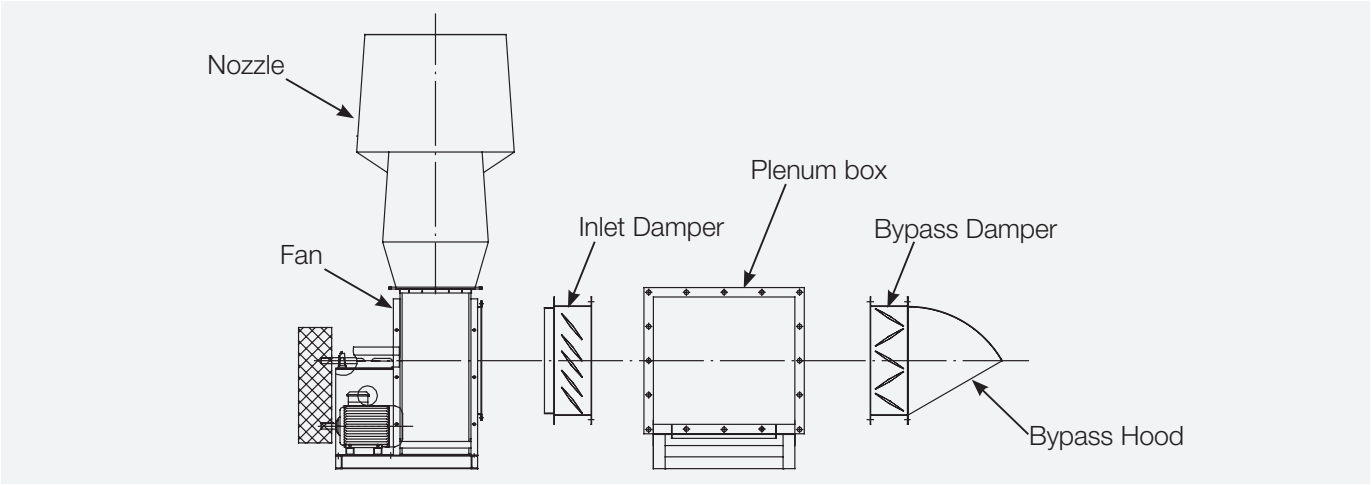


Figure 14) Damper & Actuator Replacement - CHEM Series

PF-WMX Series: Bypass Damper & Actuator can be achieved through the removal of the bypass hood, by removing the bolts; Isolation Damper & Actuator can be achieved by removing the nozzle & fan body (See Figure 15 as below); If only actuator needs to be removed, side panels can be opened by releasing the bolts.

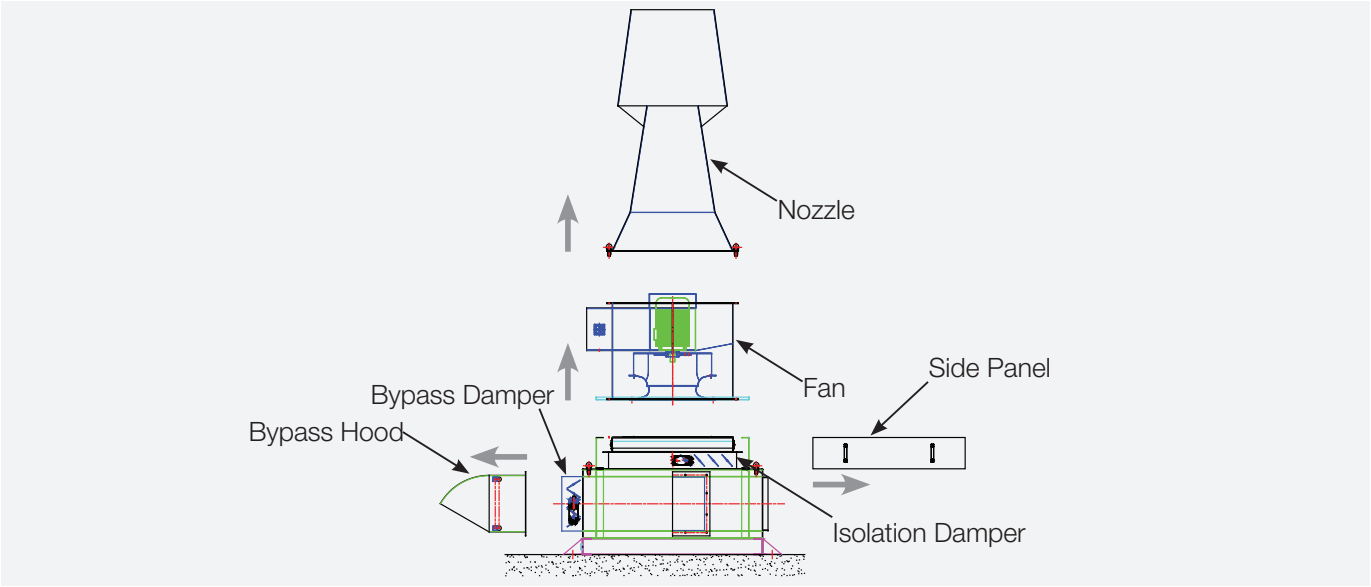


Figure 15) Damper & Actuator Replacement - PF-WMX Series

6.10 Touch-up paint repair

Failure to perform touch-ups may result in rust or corrosion and accelerate the fade in color and is not covered under warranty.
Touch-up paint repair kit contents

CHEM Series

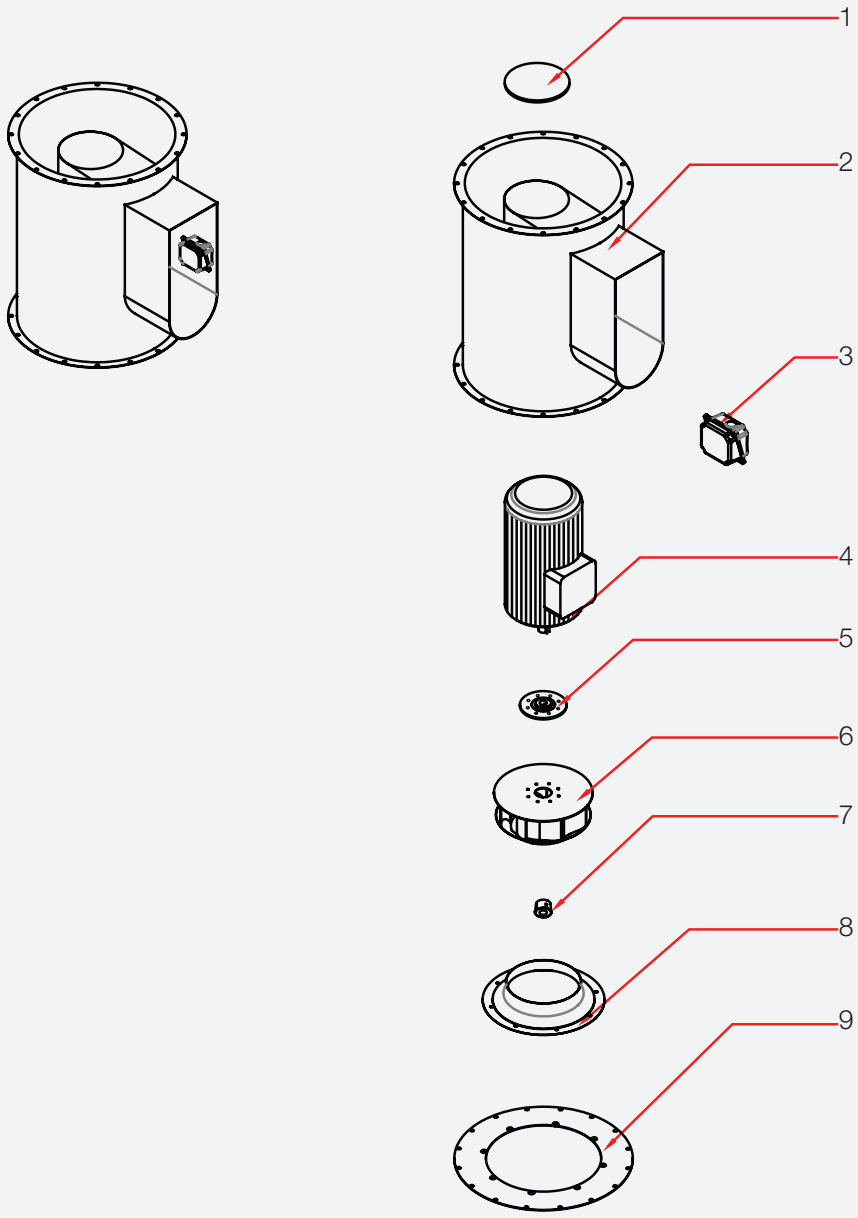
- One quart glass reinforced plastic
- One Scotch-Brite scratch pad
- Two 1-1/2 inch wide paint brushes
- Four pint-sized empty cans for mixing
- One quart-sized empty can for mixing

To order a coating repair kit, Please contact factory with your fan's serial number for colors other than our standard concrete grey RAL7012 for size 450 and above, RAL 7038 for size 400 and below.

HYEB & PF-WMX Series

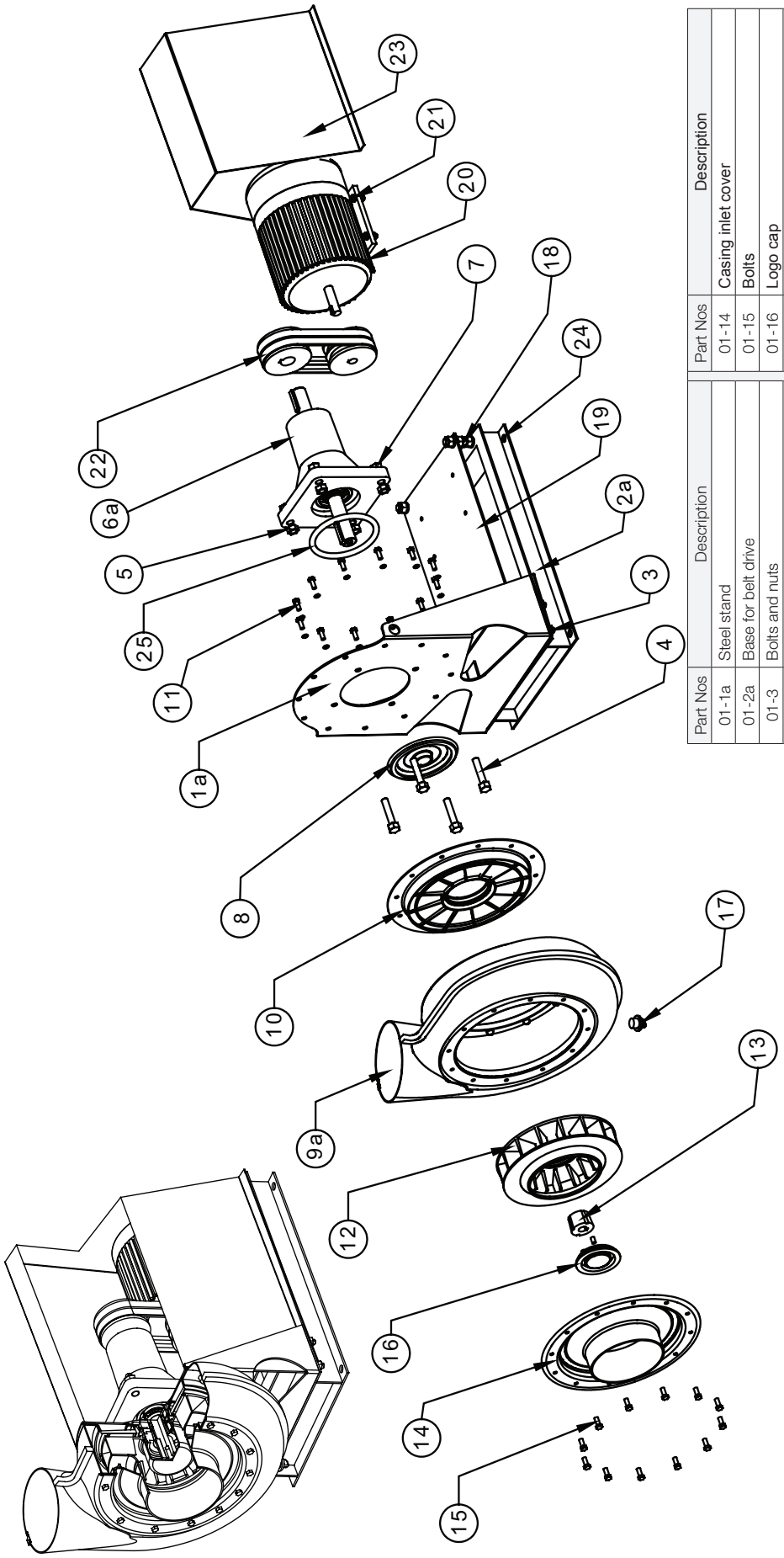
- One Zinc Clad Aerosol Can
- One pint (recoat epoxy primer grey) with one pint (recoat epoxy primer catalyst)
- One quart H.S. Polyurethane
- One Scotch-Brite scratch pad
- Two 1-1/2 inch wide paint brushes
- Four pint-sized empty cans for mixing
- One quart-sized empty can for mixing
- Zinc repair instructions
- MSDS sheets

To order a coating repair kit, Please contact factory with your fan's serial number for colors other than our standard concrete grey RAL7012.



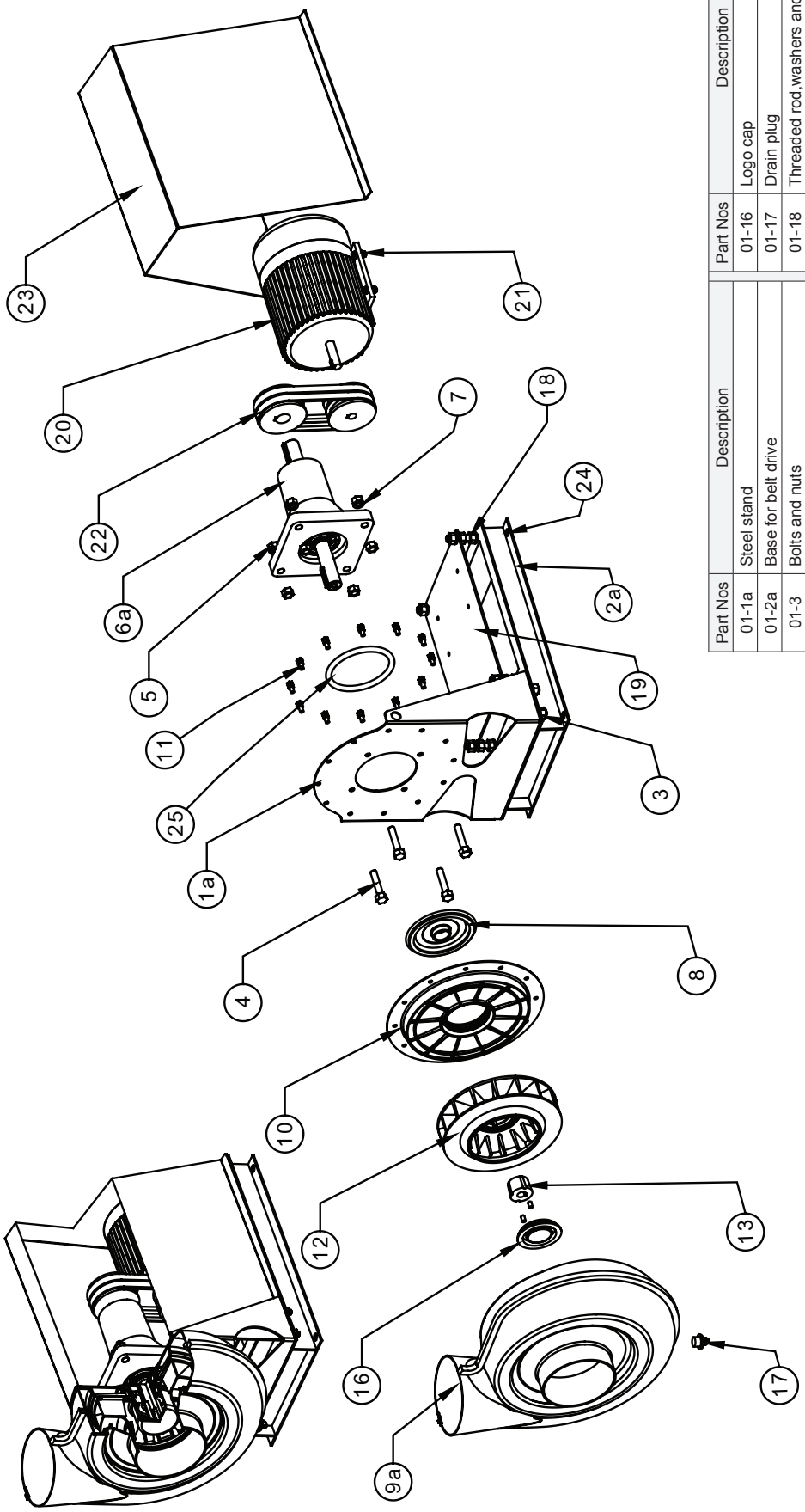
Item	Description
1	Motor Cover
2	Fan Casing
3	Terminal Box
4	Motor
5	Bolt-on-Hub
6	Impeller
7	Taper Bush
8	Inlet Cone
9	Inlet Front Cover

CHEM 125 to 200 BD



Part Nos	Description
01-1a	Steel stand
01-2a	Base for belt drive
01-3	Bolts and nuts
01-4	Hexagonal bolts
01-5	Hexagonal nuts
01-6a	Flange bearing
01-7	Spring washers and nuts
01-8	Rubber gasket
01-9a	Fan casing(PP type)
01-10	Casing back cover
01-11	Washers and bolts
01-12	Fan impeller
01-13	Taper-Bushes

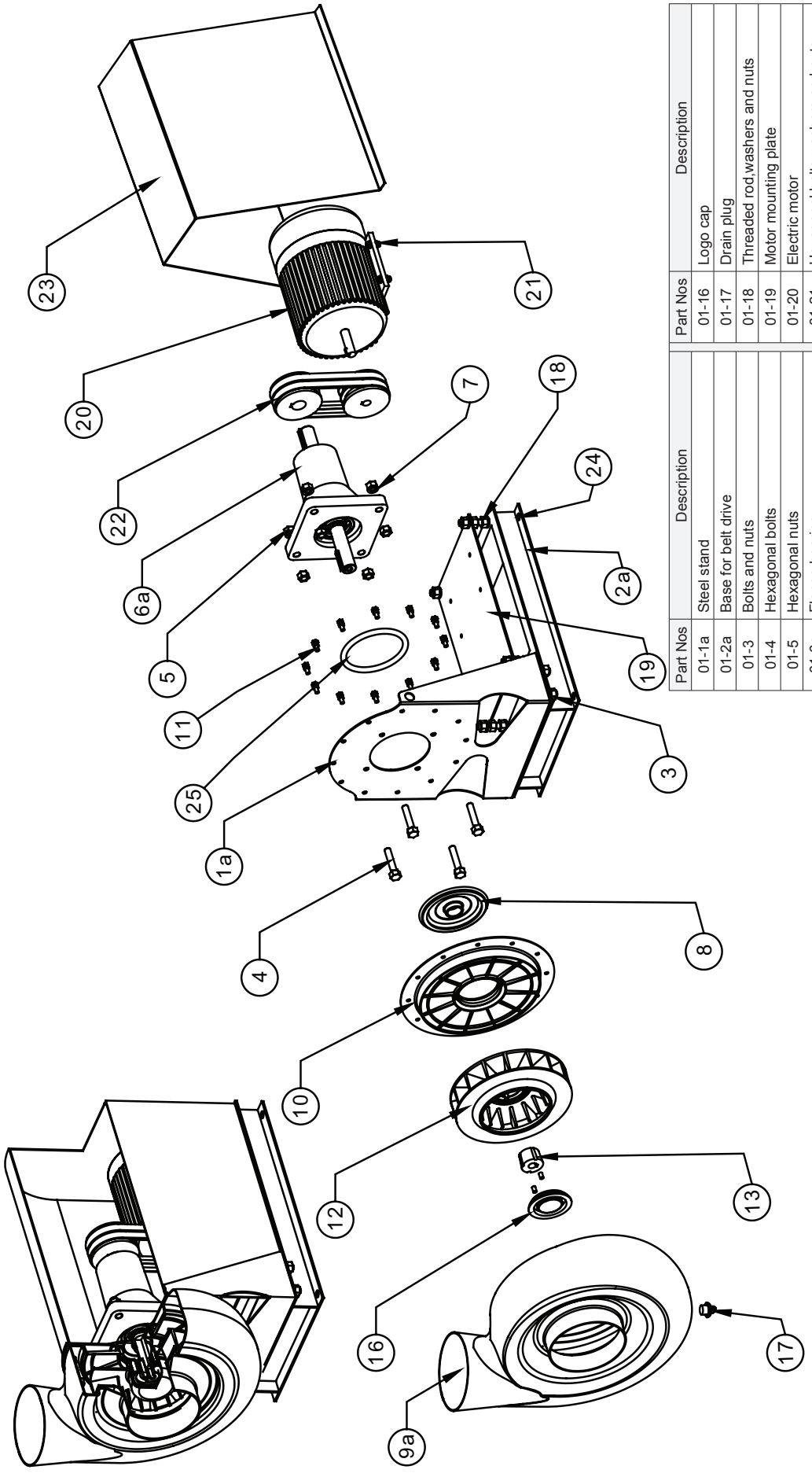
Part Nos	Description
01-14	Casing inlet cover
01-15	Bolts
01-16	Logo cap
01-17	Drain plug
01-18	Threaded rod,washers and nuts
01-19	Motor mounting plate
01-20	Electric motor
01-21	Hexagonal bolts,washers and nuts
01-22	Pulley and belts drive
01-23	Belts guard
01-24	Spring Isolator mounting position
01-25	Seal ring



Part Nos	Description
01-1a	Steel stand
01-2a	Base for belt drive
01-3	Bolts and nuts
01-4	Hexagonal bolts
01-5	Hexagonal nuts
01-6a	Flange bearing
01-7	Spring washers and nuts
01-8	Rubber gasket
01-9a	Fan casing (PP type)
01-10	Casing back cover
01-11	Washers and bolts
01-12	Fan impeller
01-13	Taper-Bushes

Part Nos	Description
01-16	Logo cap
01-17	Drain plug
01-18	Threaded rod,washers and nuts
01-19	Motor mounting plate
01-20	Electric motor
01-21	Hexagonal bolts,washers and nuts
01-22	Pulley and belts drive
01-23	Belts guard
01-24	Spring Isolator mounting position
01-25	Seal ring

CHEM 250 to 315 BD

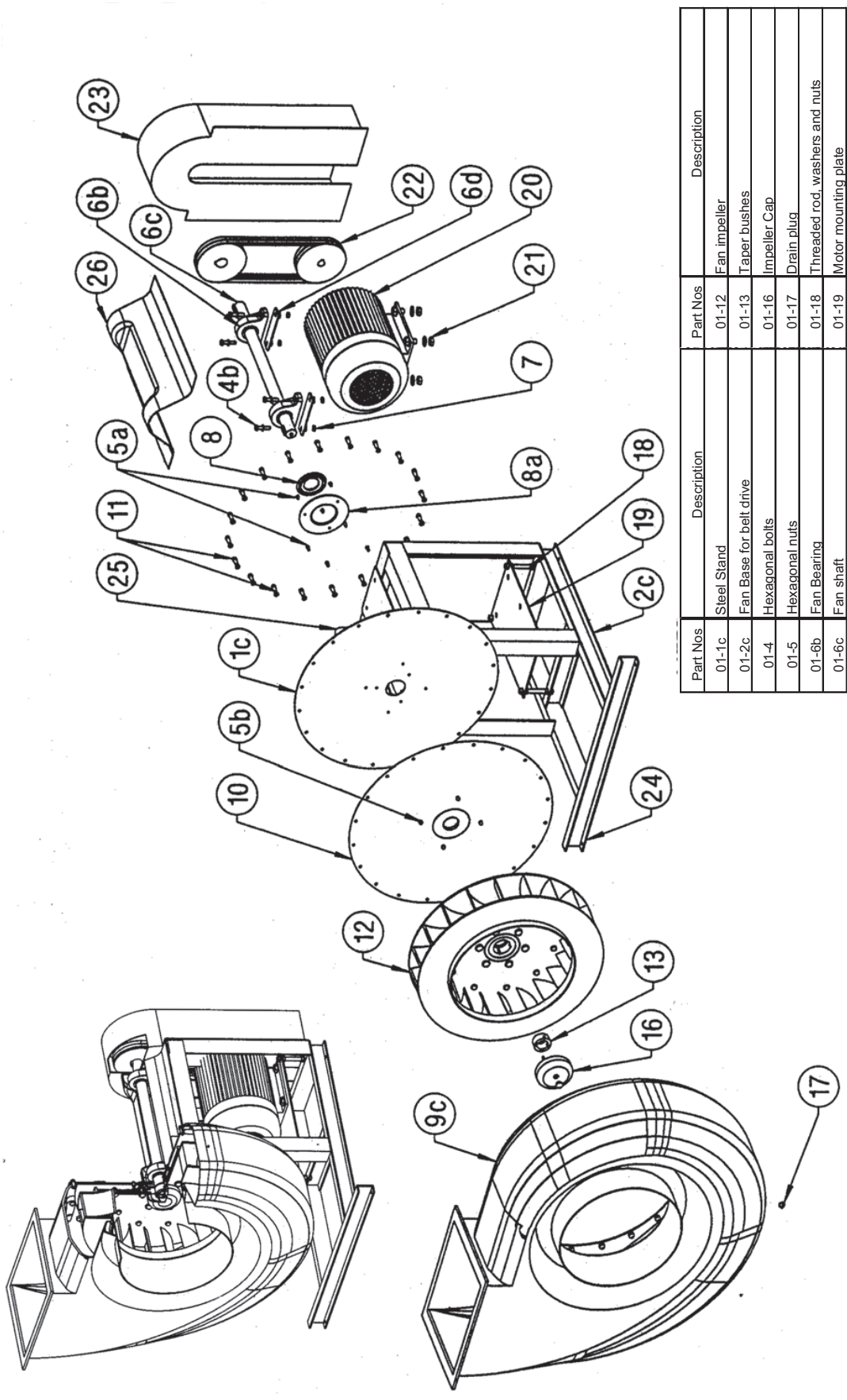


Part Nos	Description
01-1a	Steel stand
01-2a	Base for belt drive
01-3	Bolts and nuts
01-4	Hexagonal bolts
01-5	Hexagonal nuts
01-6a	Flange bearing
01-7	Spring washers and nuts
01-8	Rubber gasket
01-9a	Fan casing (PP type)
01-10	Casing back cover
01-11	Washers and bolts
01-12	Fan impeller
01-13	Taper-Bushes

Part Nos	Description
01-16	Logo cap
01-17	Drain plug
01-18	Threaded rod,washers and nuts
01-19	Motor mounting plate
01-20	Electric motor
01-21	Hexagonal bolts,washers and nuts
01-22	Pulley and belts drive
01-23	Belts guard
01-24	Spring Isolator mounting position
01-25	Seal ring

CHEM 400 BD

CHEM 450 to 710 BD



Part Nos	Description
01-1c	Steel Stand
01-2c	Fan Base for belt drive
01-4	Hexagonal bolts
01-5	Hexagonal nuts
01-6b	Fan Bearing
01-6c	Fan shaft
01-6d	Bearing shim
01-7	Spring washers and nuts
01-8	Rubber gasket
01-8a	Rubber gasket holder
01-9c	Fan casing (GRP type)
01-10	Casing back cover
01-11	Washers and nuts

Part Nos	Description
01-12	Fan impeller
01-13	Taper bushes
01-16	Impeller Cap
01-17	Drain plug
01-18	Threaded rod, washers and nuts
01-19	Motor mounting plate
01-20	Electric motor
01-21	Hexagonal bolts, washers and nuts
01-22	Pulley and Belts drive
01-23	Belts guard
01-24	Spring Isolator mounting position
01-25	Hoisting holes
01-26	Bearing Cover

Operational Checklist

Project Name: _____ Fan Designation: _____

Fan Model: _____ Date of Start-up: _____

Electrical

Voltage / Cycle / Phase: _____

Motor power (kW): _____

Motor nameplate nominal current (A): _____

☐ Check Max. Supply Amperage

Main Supply Voltage:	
L1-L2	
L1-L3	
L2-L3	

Motor Ampere:	
L1-L2	
L1-L3	
L2-L3	

Operation Check List

Verify that proper safety precautions have been followed:

☐ Electrical power must be locked off.

Check fan mechanism components:

☐ Duct system complete, connections checked
☐ Check for debris in & around fan
☐ Check for free movement of fan
☐ Bearings are properly lubricated
☐ Fan has been leveled
☐ Check fan / impeller overlap
☐ Discharge stack (Fume Nozzle) installed & secured

Check system accessories (if supplied):

☐ Plenum fastened to roof curb/support
☐ Check plenum drain for plug
☐ Check attachment of control actuators to dampers
☐ Fan isolators fastened to fan rails
☐ Isolation/bypass dampers in place & secured
☐ Check vibration isolators spring tension & clearance
☐ Check plenum maintenance doors can be opened & also properly secured.

Trial "Run"

☐ Turn on power just long enough to start assembly rotating
☐ Check drive alignment & tension
☐ Run unit up to speed
☐ Check rotation of the wheel, make sure it is the same as indicated by the arrow marked Rotation
☐ Correct any problems which may have been found. Perform check list again until operating properly

Check hardware:

☐ Setscrews attaching wheel hub to shaft (checked for tightness)
☐ Bolts in taper-lock bushings (checked for tightness)
☐ Nuts & bolts holding the motor (checked for tightness)
☐ Nuts on the inlet sleeve/cone (checked for tightness)

Operational checks:

☐ Check for excessive vibration
☐ Check for unusual noise
☐ Check vibration isolator movement during operation
☐ Check for bearing noise
☐ Check if damper actuators / damper blades open & close

Note: if a problem is discovered, immediately shut the fan off. Lock out all electrical power and check for the cause of the trouble.

Check sequence of operation (if applicable):

☐ Cycling of fans (on / off)
☐ Check pressure maintenance

Comments (if any): _____

Authorised Signature: _____ Date: _____

Name & Designation: _____

Maintenance Checklist

Name of Project / Machine Number:	Maintenance No.	
WORKING STEPS	**EXAMINER**	**DATE**
Maintenance (at least every 6 months)		
- Motor bearing status checked / re-greasing (motor frame size 225 above or motor c/w grease nipple)		
- Flexible connections checked for leakage		
- Vane controller- movement of blades checked		
- Vibration values of motor B-bearing measured acc. to ISO 14694/ ISO 10816-3 horizontal / vertical / axial .....mm/s mm/s mm/s		
- Vibration values of casing measured acc. to ISO 14694/ ISO 10816-3 horizontal / vertical / axial .....mm/s mm/s mm/s		
- Sound pressure level measured (3 m / 45° removed from suction) .....dB(A)		
- Electrical values measured voltage / Frequency.....V / ..... Hz Current Phase U / V / W ..... A / ..... A / ..... A		
- Visual check for corrosion (possible rectification of paint damages) - Blower - Vibration damper - Impeller		
- Visual check for corrosion - Motor		
damages checked - Blower - Vibration damper - Impeller		
- Check all screw connections of suspension construction		
- Check catch device/ catch rope		
- Insulation measurement at wrm motor (Resistance winding –mass with 500 V DC voltage) ..... MegaOhm		
- In case stainless steel-blower / -silencer -> All deposits of corroded particles on the surface removed		
- Functioning of fluctuation observation checked Read-off values horizontal / vertical / axial ..... mm/s .....mm/s .....mm/s		
E-Kit of tear-off –safety checked		

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