ENG

OPERATING & MAINTENANCE

COMEFRI FANS

comefri®
fans of energy saving

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OPERATING & MAINTENANCE

SOM

SUMMARY

SOM_01

CONTACTS — CON_01

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RESIDUAL RISKS — RSC_01

- COMEFRI fans have been designed and developed in compliance with design criteria defined by standards UNI EN ISO 12100-1&2.

- Safety protections (guards) have been designed and developed in compliance with design criteria defined by standards UNI EN ISO 12100-1&2, in conformity with standards ISO 13857 requirements.

- The COMEFRI ISO 9001 certification guarantees the systematic application of all the procedures foreseen in the entire production process.

These conditions guarantee the absence of dangers of a mechanical nature.
However, some "residual risks" still exist (highlighted by the relative symbols in the various chapters of this manual) which, according to the "risk assessment" carried out, do not constitute a personal danger if the fan is approached:

- by specialized and qualified personnel.
- in compliance with the procedures indicated in this manual.
- wearing and using suitable PPE during each operation.

PREVENTION AND PROTECTION FROM RESIDUAL RISK	
RESIDUAL RISK	RISK REDUCTION
Sharp edges	Use of suitable PPE: gloves, goggles, helmet.
Moving parts (impeller and/or transmission devices)	Use of suitable PPE: gloves, goggles, shoes, overalls. Compliance with procedures.
Relevant sound emissions	Use of suitable PPE: earmuffs.
Possible high temperatures of components	Use of suitable PPE: gloves.
Possible projection of small "foreign bodies" or dust in treated fluid.	Use of suitable PPE: gloves, shoes, overalls, goggles, mask.
Presence of electrical voltage	Use of suitable PPE: compliance with procedures.
Possible leakage of hazardous gases/vapours	Use of suitable PPE: gloves, shoes, overalls, goggles, mask.

Premise

In order to grant Quality Comefri fans are produced conform to Standard BS EN ISO 9001; the Quality System is BSI certified since 1987 (certificate n° FM 01403).

Comefri fans are put onto the market conform to the requirements of Directive "ErP" 2009/125/CE and related Regulation N° 327/2011. Application of the Regulation in relation to the different characteristics of the product in terms of production and supply ; they have a suitable design and meet the requirements for the protection of health and safety (Machinery Directive 2006/42/CE).

Comefri defines with the term:

"Machine"

All fans and plenum fans equipped with motor and drive connected, equipped with all the necessary protections to meet the requirements of Machinery Directive 2006/42/CE.

"Partially completed machinery"

All the remaining fans and plenum fans not included in the previous definition.

Introduction

This User and Maintenance Manual (which can be downloaded on www.comefri.com), is an important reference for installation, use and maintenance of CoMeFri Centrifugal fans for the Airconditioning sector and where clean air treatment is provided for; in particular for the models: TZAF FF, VTZ, NTHZ, THLZ FF, MAZ, MHZ, TLZ, TLI, TZAF, THLZ, HLZ, TLE, THLE, TEAF, NTHE, THE, KHLE and for the ("plenum") series, NPL, NPA ,TE ,PEAF and NPE in the different constructive executions and configurations; the manual includes the executions of the fan and plenum in accordance with Standard EN 14986 in compliance with Directive "ATEX" 2014/34/UE. In the following chapters, some fan models could be mentioned that are no longer part of our production range, in particular, the supply of spare parts for the THLZ models, in sizes over 450, and for the models HLZ, PEAF, NPE is granted: see indications in this manual.

- it gives a description of the applications of fans and plenum fans according to national standards, Regulations and Directives, in order to avoid possible failures or damage caused by incorrect installation, handling and related activities;

- it has notes for the protection of our personal health and safety;

- it reports any risks that may occur during the application of the fan;

- it is a reference for consultation by the staff in charge of handling, installation, testing, operation and maintenance of the fan and/or plenum fan.

The above-mentioned handlings, carried out on moving and/or electrical parts, need the attention of specialized personnel, trained in security matters.

The compliance with the indications given in this Manual for Use and Maintenance, must be supplemented by the provisions of the laws and regulations in force in the Country where the activities related to the Comefri product are carried out.

Applications

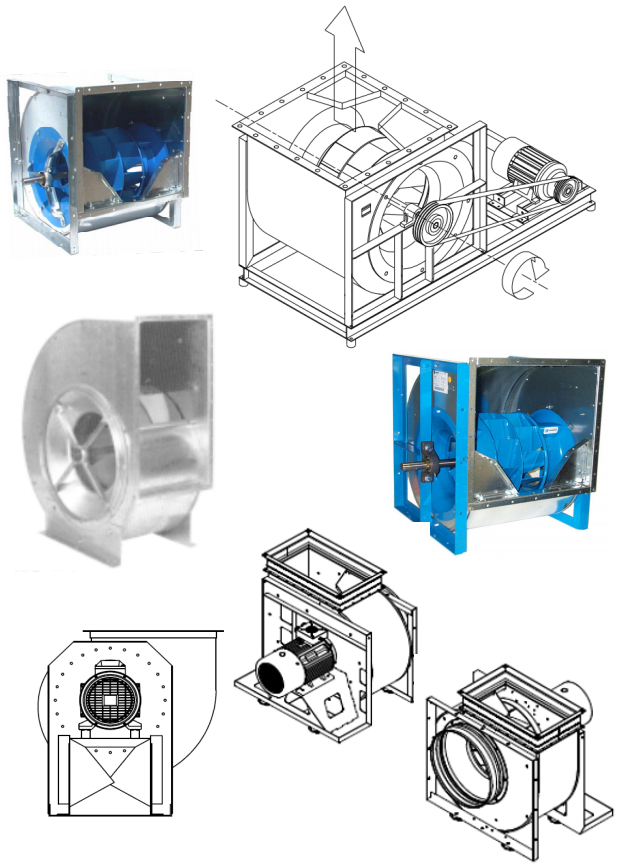
The fans indicated above are designed for the treatment of clean or slightly dusty air (Climate/Airconditioning). For installations where there are gas, fumes, aggressive vapours or dust, it is necessary to use a specifically sized product (Industrial Dept. CoMeFri); an improper use of the fan can cause failure, deterioration of components, corrosion, impeller unbalance and/or vibrations. The operating temperature range for all fans in standard execution in arrangement 3 is between -20 °C and +60 °C; the operating temperature range for the impellers of plenum fans (excluding the TE series) : is between -20 °C and +85 °C; for the TE impellers: from -20 °C to +60 °C. The maximum ambient temperature for the standard motor is + 40°C. Impellers with motor have an operating temperature range from –20°C to +40°C.

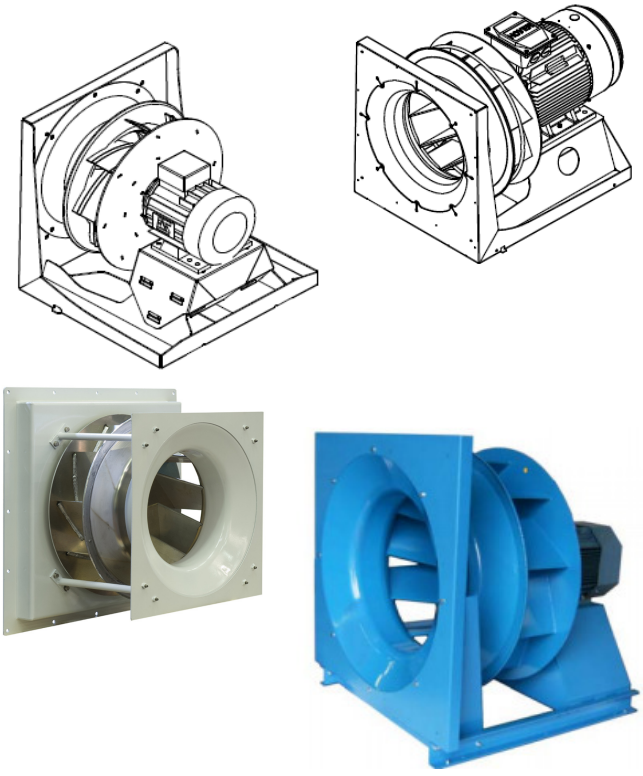
Technical data

The label on the fan allows a check of the data related to the planned operating point (where required), and the maximum limits for each model; they correspond to the values present in the specific technical catalogue. Compliance with and observance of not exceeding these values in order to prevent risks to the safety of people and any breakdowns is strongly recommended. In the technical catalogue, in some cases, a portion of the characteristic curve is represented by a dotted line, this means that the fan could be subject to operation instability (vibrations, plant problems, etc...). Noise data are measured according to ISO, DIN, UNI and ANSI-AMCA Standards, by means of a spectrum/frequency analyzer; sound-power levels, determined by DIN Standard 45635 Part38 / ISO Standard 5136 for the in-duct method and by the ANSI-AMCA 300 Standard for the reverberation chamber method are reported in the specific technical catalogue. We inform you that the measured values during use might be different from those measured during testing at CoMeFri's; this is due to the influence of specific environmental and structural factors of the installation itself. Executions not foreseen in the catalogue imply a specific feasibility analysis and a possible subsequent project by the Research and Development and Design Departments of Comefri.

Centrifugal fan

The centrifugal fan belongs to the category of fans in which the treated fluid flows axially to the impeller and is expelled radially to the casing (housing). The various types differ from each other for the different air transport capacities in terms of flow rate, pressure, temperature, etc... In the specific documentation for each product family/model (technical catalogue - www.comefri.com), the performances can be found in the diagrams showing the characteristic operation curves. The impellers, in the CoMeFri centrifugal fans have forward-curved blades (TLZ-TLE), backward-curved blades (NTHZ-NTHE...) and backward-curved airfoil blades (TZAF-TEAF...). The MAZ and MHZ models are characterized by a greater robustness than the TZAF FF and NTHZ series, which makes them more suitable for air treatment in harsh conditions and/or in naval-, Oil&Gas- or industrial applications, where reliability, solidity and speed in maintenance are requirements of fundamental importance. The TEAF, NTHE, THE fans are characterized by a single inlet: the NTHE impellers have welded backward-curved blades, the TEAF impellers have airfoil backward-curved continuously-welded blades; the THE impellers are made of polyamide reinforced with fiberglas and, on request, of welded and painted steel. The fans of the KHLE ("kompakt") series, meet the requirements of compactness, solidity and speed of installation and maintenance; widespread in the naval or industrial field. The casing module, which is completely welded, is nothing more than a "parallelepiped" containing the impeller; this model is made in arrangements 12, 4 or 5, with performances similar to those of the THLE model. The double- or single-inlet centrifugal Comefri fans can be equipped with a wide range of accessories depending on the type of installation.





"Plenum" fan

The Comefri "plenum" series has a centrifugal impeller with backward-curved blades in the absence of a casing (or housing), in which the air, coming in axially, is expelled radially. Constructively, the plenum fans NPL, NPL ALU, TE and NPE have a flat backward-curved blade, whereas the NPA, NPA ALU and PEAF series, use impellers with backward-curved airfoil-profile blades. One of the characteristics of the plenum fan is that they are very compact and that they have an optimal performance in conditions that require a middle-low volume at a middle-low pressure. For specific information about characteristic performance curves, dimension, constructive forms, weight, etc... see the specific technical catalogue for plenum fans (www.comefri.com). The "TE" series has an impeller in polyammide reinforced with fiberglass. The NPL ALU and NPA ALU impellers are made of aluminium; their reduced weight, with regard to impellers of steel, charges the bearings less (in favour of a longer bearing life and a significant reduction of vibrations). The used (non toxic) aluminium alloy grants a resistance against corrosion, and an easy cleaning. The impellers for Comefri plenum fans can be supplied as kit made up of an impeller and inlet cone. The standard constructive execution supplied by Comefri is in arrangement 4; where the shaft is horizontal. The shaft in a vertical position is possible with the plenum fan in arrangement "5V". The Comefri impellers can be equipped with a wide range of accessories, depending on their application and the installation requirements.

Acceptance

Upon receipt of the fan it is necessary to check if it matches the purchase order (execution, rotation, power and poles of the installed motor, fittings, the accessories if there are any etc...); accurate controls and testing are done by skilled personnel before each CoMeFri fan is shipped, moreover, 100% of the fans equipped with electric motor undergo a run-test before they are packed and shipped. After the installation returns of non-compliant products cannot be accepted anymore; check further that there is no damage caused by transport (in particular with regard to the rotating and electrical parts). In case of any damage the extent of it must be reported on the freight bill and the freight forwarder must be informed.
The transport driver is required to countersign the document in order to start the insurance practices.
Comefri is relieved of any responsibility for any damage caused by transport and/or handling of the product at the customer's premises.

Handling - Lifting

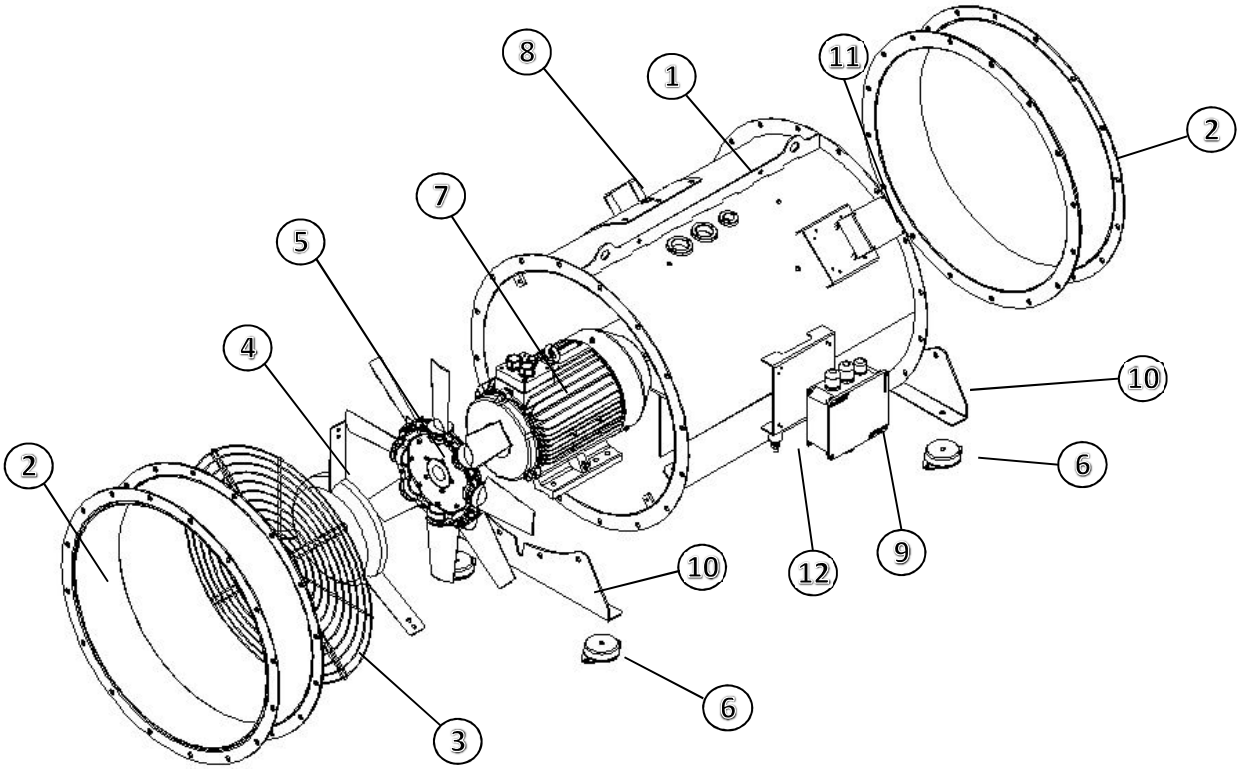
When fans and plenum fans are moved adequate lifting means are required. (see Directive 2006/42/CE and subsequent modifications related to weight and packing of the product); particular attention must be paid to the indication of the lifting points (eyebolts, frame holes or baseframe points/holes). The fans can be lifted up from the common motor-fan baseframe, from the T-frame or through lifting eyebolts available on the fan structure, if provided for in the supply. Before liting up the product, be sure that the lifting belts or chains comply with the safety regulations and the expected load limits, and in the same way, once the fan is put down to the floor, be sure that the lifting belts or chains have been loosened or permanently removed. The lifting points of the fans for the hooking or harnessing of the product are the following: A) the holes in the T-frame, B) the holes in the baseframe of the structure (plenum), C) the eyebolts available on the fan structure or on the common motor-fan baseframe.
Do not overlap the fans for any reason. When handling the fans, pay particular attention to the protection of the impeller; any shocks, even the smallest one could cause unbalance.
Be careful not to scratch or damage the painted surfaces or the coating of the product; this kind of damage could cause faults or anomalies, even after a while, in the functioning of the fan.
Damage caused by transport or an incorrect handling of the product are not to be considered subject to compensation under warranty by CoMeFri Spa.
The weight of each fan is reported in the technical catalogue for the specific product and in its enclosed transport papers.

Storage

Store the fan correctly in a place without dust and humidity or aggressive atmospheres; the use of a protective cloth is recommended for medium-long storage periods. Avoid condensation on product surfaces (especially in a warm and humid environment). The optimal storage temperature range is between -20°C and +45°C. Fans designed for operation at low temperatures, can be stored, differently, at a minimum temperature upto -50 °C; before starting these fans up they must be gradually warmed up to the operating temperature.
If the storage period of the fan exceeds 6 months, it is necessary:
- *to loosen the tension of the transmission belts (or take them off completely).*
- *to rotate the impeller periodically by hand in order to allow a better distribution of the grease inside the bearings.*
- *to use a piece of cloth for protection against dust, humidity or foreign bodies.*
- *to check that there is no condensation on the surfaces of the fan.*

EXPLODED VIEW - AXIAL FAN - ARRANGEMENT 4

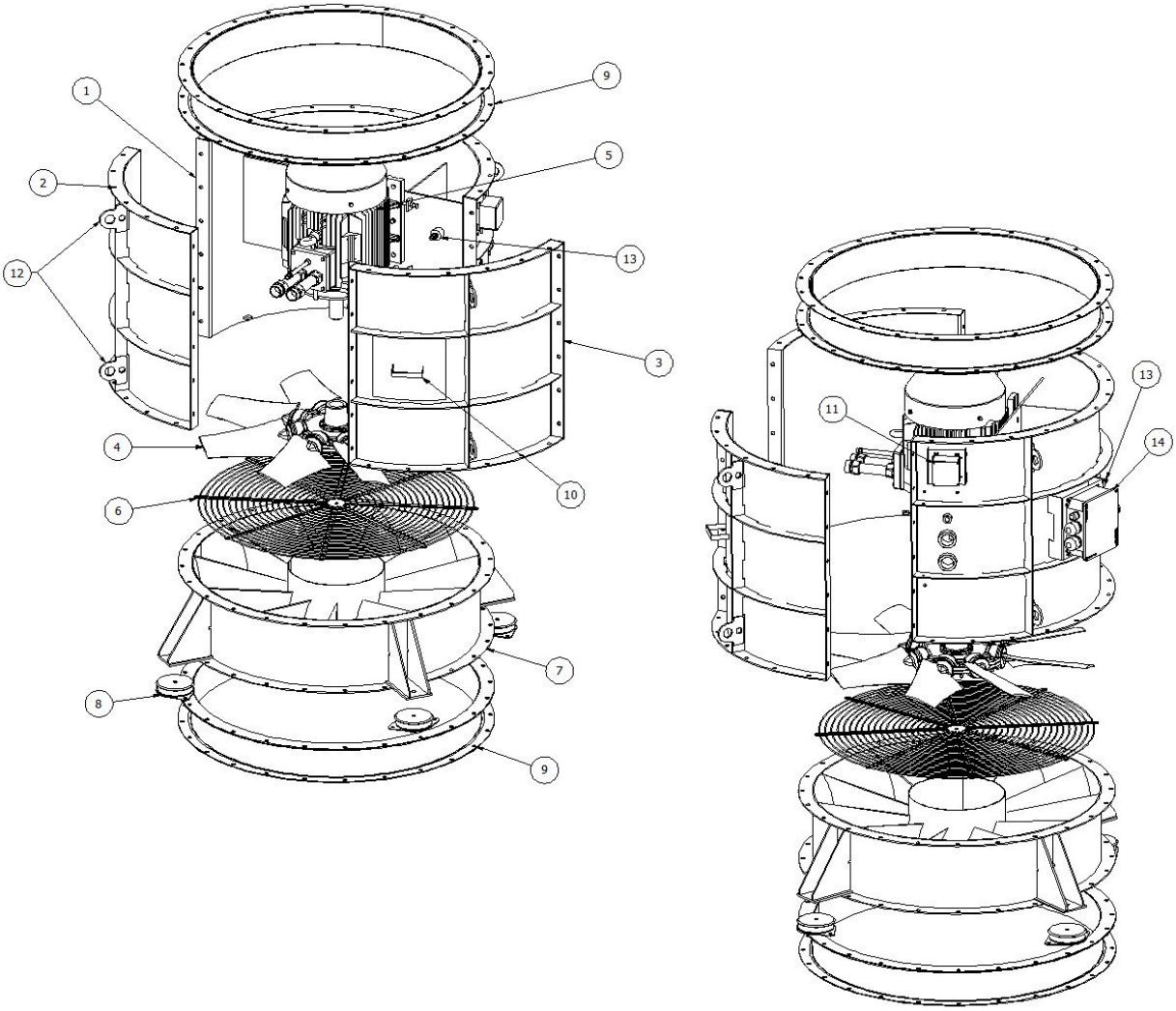
EVA_01



Ref.	Components / Accessories	Abbr.
1	Fan housing	GE
2	Inlet / outlet flexible connection	ZEL
3	Inlet / outlet guard	ZS
4	Ogive	-
5	Impeller	LF
6	Anti-vibration mounts (rubber)	DAG
7	Motor (B3)	M
8	Inspection door	I
9	Electrical connection box	-
10	Base supports (Feet)	F
11	Sensor connection box (vibro switch)	-
12	Ground connection pin	GND

EXPLODED VIEW - VERTICAL AXIAL FAN - ARRANGEMENT 4

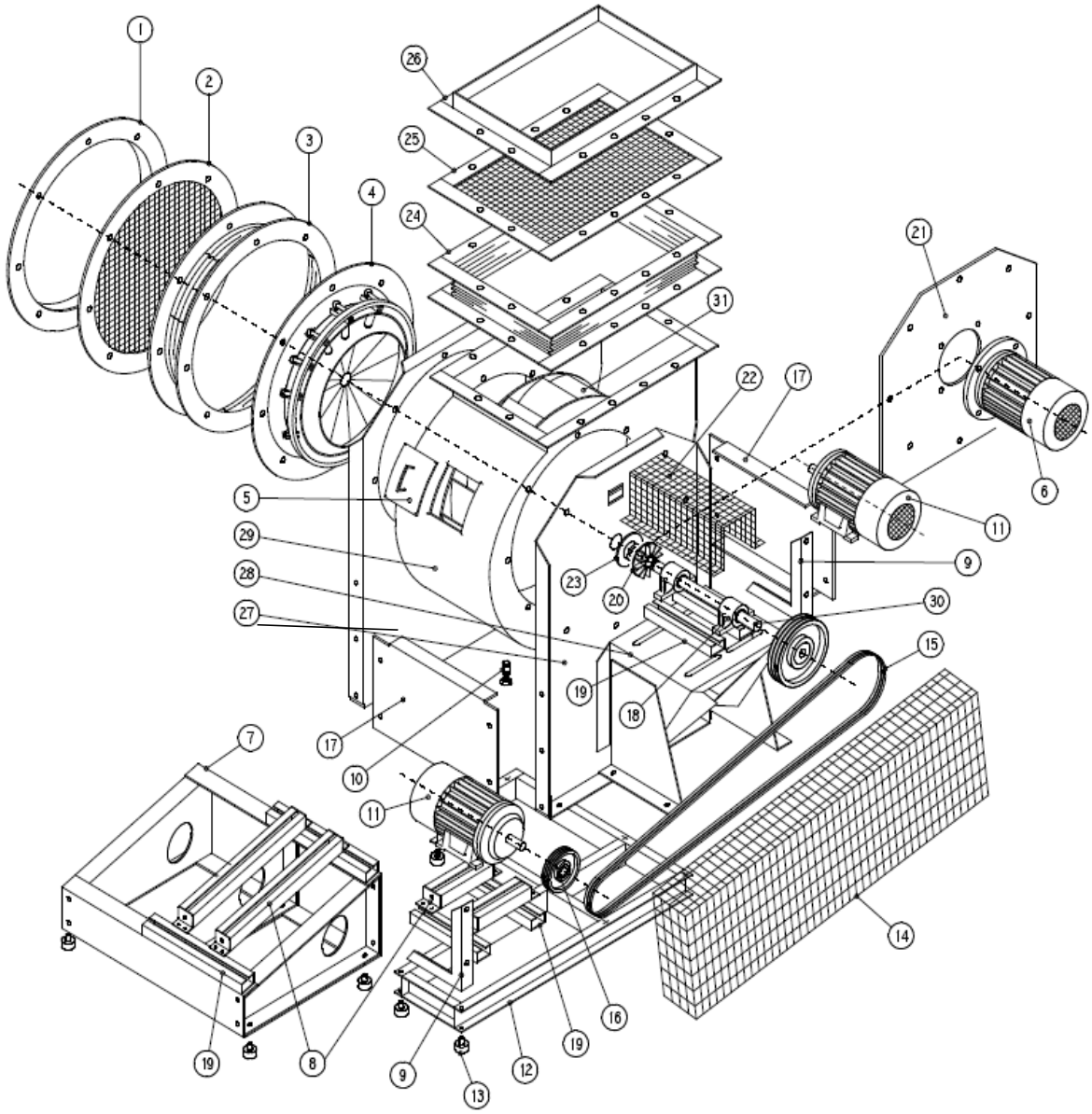
EVA_02



Ref.	Components / Accessories	Abbr.
1	Half-casing (motor)	SCM
2	Half-casing (lifting)	SCS
3	Half-casing (inspection door)	SCI
4	Impeller	LF
5	Motor B3	MB3
6	safety net	ZS
7	Base with outlet guide vane	BRF
8	Anti-vibration mounts (rubber)	DAG
9	Flexible connection	ZEL
10	Inspection door	I
11	Sensor connection box (vibro-switch box)	-
12	Lifting points	-
13	Ground connection pin	GND
14	Electrical connection box (Junction box)	-

EXPLODED VIEW - CENTRIFUGAL FAN - SINGLE INLET

EVS_01



Ref.	Components / Accessories	Abbr.	Ref.	Components / Accessories	Abbr.
1	Inlet flange / Inlet counterflange	Z / Z2	17	Panel (ant. / post.)	-
2	Inlet guard	ZS	18	Bearing block	LA
3	Inlet flexible connection	ZEL	19	Bearing / Motor support rails	-
4	Inlet vane contorl	DRC	20	Cooling wheel	KU
5	Inspection door	I	21	Motor plate (B5)	-
6	Motor (B5)	M	22	Shaft guard	WES
7	Motor support	BSM	23	Shaft seal	-
8	Motor rails	SH / SY	24	Outlet flexible connection	AEL
9	Mounting support	-	25	Outlet guard	AS
10	Drain plug	K	26	Outlet flange / Outlet counterflange	A / A2
11	Motor (B3)	M	27	Transmission / Inlet side plate	-
12	Common base frame	GR	28	Bearing / Motor support	BSS/BSM
13	Anti-vibration mounts (spring or rubber)	DAG/DAM	29	Fan housing	GE
14	Belt guard	RIS	30	Shaft	WE
15	Belts	KE	31	Impeller	LF
16	Motor pulley / Fan pulley	PUL			

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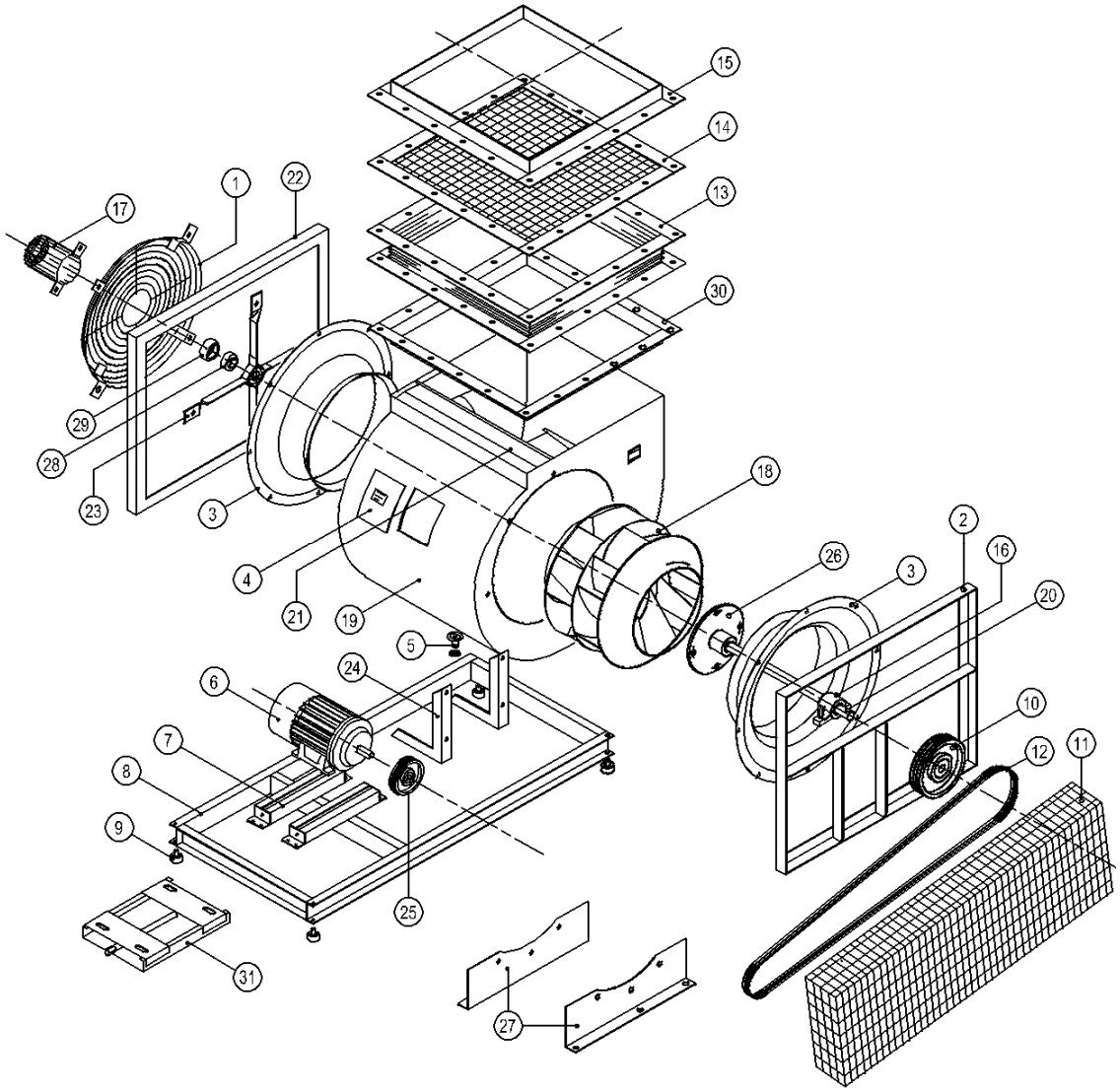
EVD

EXPLODED VIEW - CENTRIFUGAL FAN - DOUBLE INLET

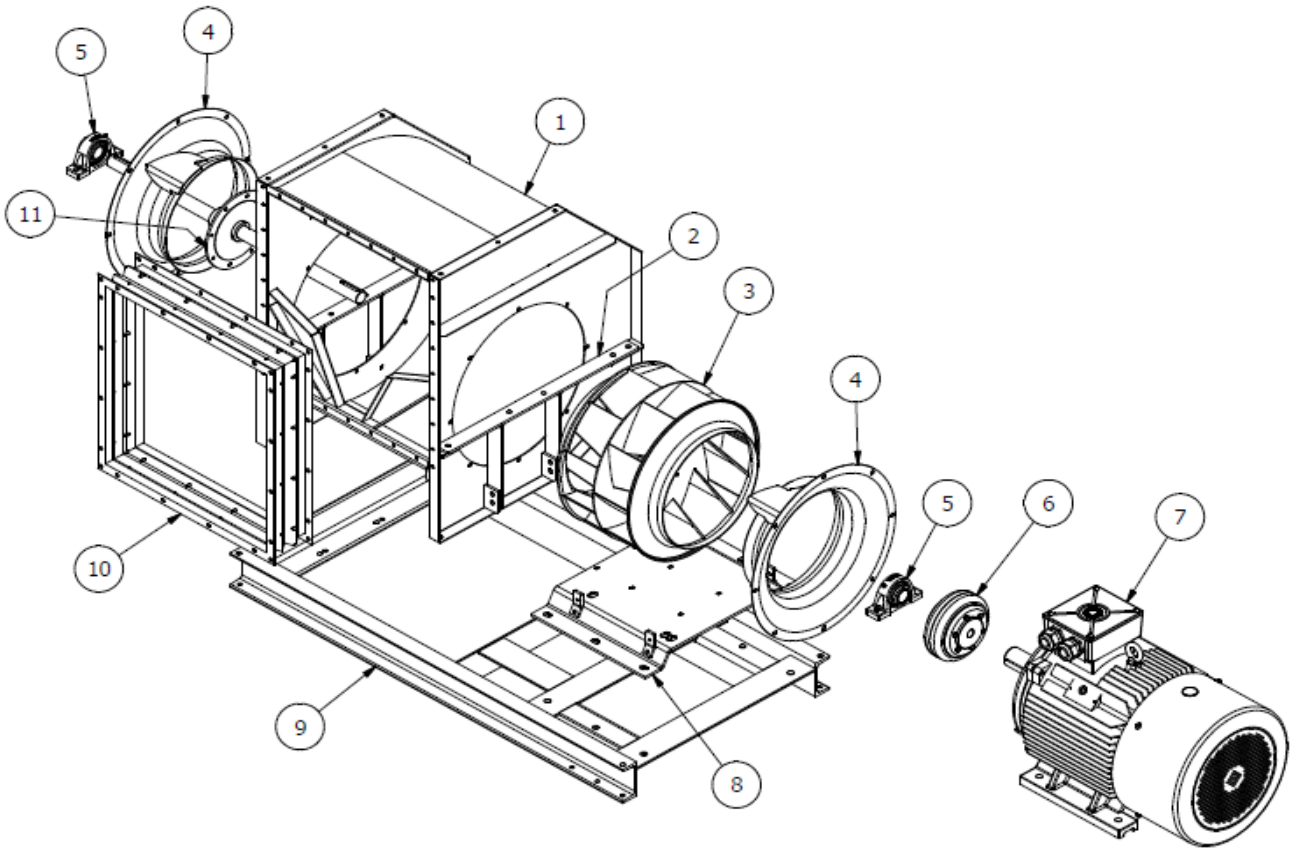
EVD_01



Ref.	Components / Accessories	Abbr.	Ref.	Components / Accessories	Abbr.
1	Inlet guard	ZS	19	Fan housing	GE
2	"T" Frame	T	20	Shaft	WE
3	Inlet cone	EI	21	Cut-off	LE
4	Inspection door	I	22	"R" Frame	R
5	Drain plug	K	23	Bearing bracket	-
6	Motor (B3)	M	24	Mounting support	-
7	Motor rails	SH	25	Motor pulley	PUL
8	Common base frame	GR	26	Aluminium / Steel Hub	NA
9	Anti-vibration mounts (spring or rubber)	DAG/DAM	27	Base supports - Feet	F1/F2
10	Fan pulley	PUL	28	Bearing	LA
11	Belt guard	RIS	29	Rubber interliner	-
12	Belts	KE	30	Outlet flange	A
13	Outlet flexible connection	AEL	31	Motor base plate	SY
14	Outlet guard	AS			
15	Outlet counterflange	A2			
16	Bearing block	LA			
17	Shaft guard	WES			
18	Impeller	LF/PLV			

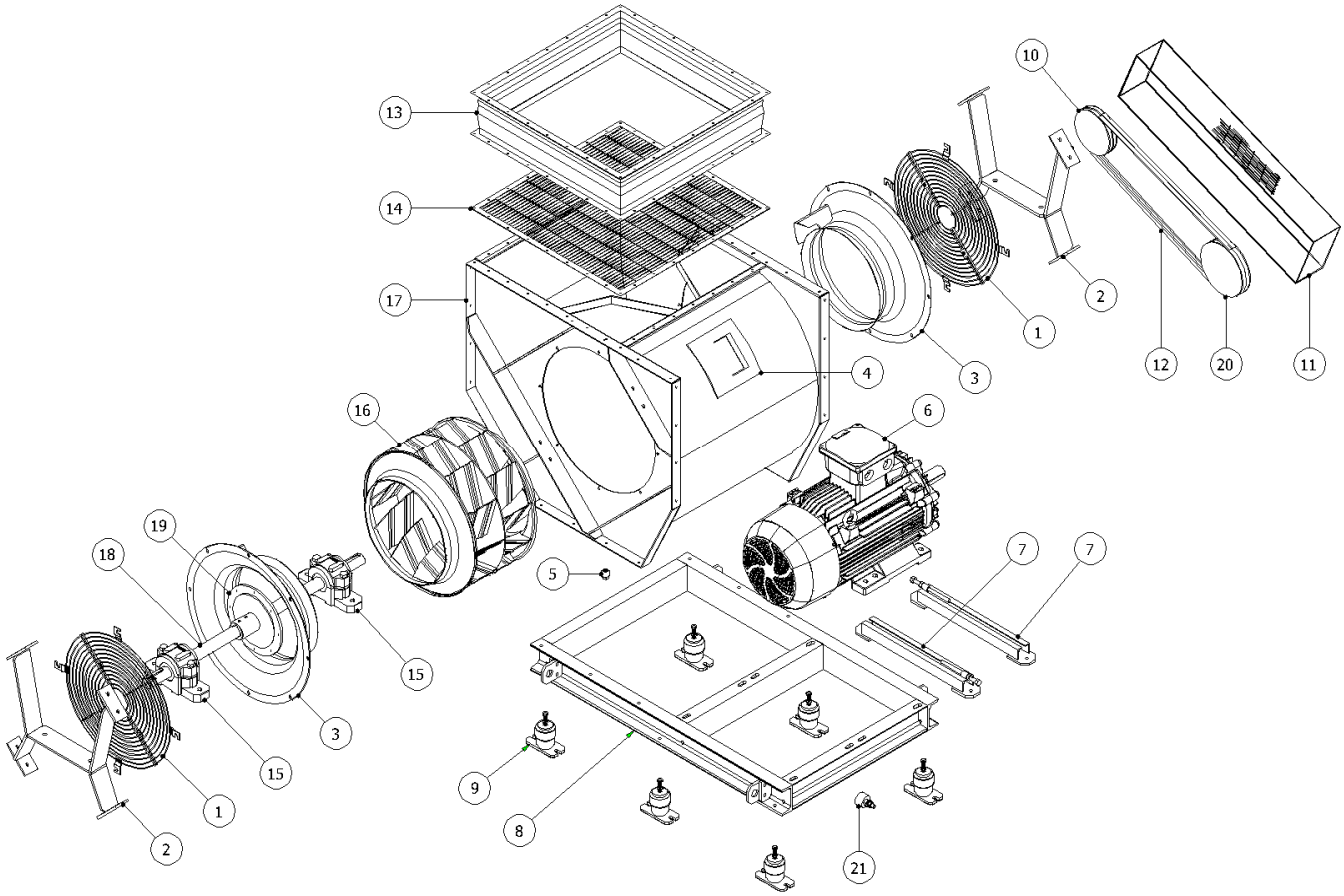
EXPLODED VIEW - CENTRIFUGAL FAN - DOUBLE INLET MAZ 7D

EVM_01



Ref.	Components / Accessories	Abbr.
1	Fan housing	GE
2	"T" Frame	T
3	Impeller	LF
4	Inlet cone	EI
5	Bearing block	LA
6	Coupling joint	-
7	Motor (B3)	M
8	Motor support	BSM
9	Common base frame	GR
10	Outlet flexible connection	AEL
11	Shaft + steel hub	WE+NA

EXPLODED VIEW - CENTRIFUGAL FAN - DOUBLE INLET MAZ S11 | EVM_02



Ref.	Components / Accessories	Abbr.	Ref.	Components / Accessories	Abbr.
1	Inlet guard	ZS	12	Belts	KE
2	"T" Frame	T	13	Outlet flexible connection	AEL
3	Inlet cone	EI	14	Outlet guard	AS
4	Inspection door	I	15	Bearing block	LA
5	Drain plug	K	16	Impeller	LF
6	Motor (B3)	M	17	Fan housing	GE
7	Motor rails	SH	18	Shaft	WE
8	Common base frame	GR	19	Steel Hub	NA
9	Anti-vibration mounts (spring or rubber)	DAG/DAM	20	Motor pulley	PUL
10	Fan pulley	PUL	21	Ground connection pin	GND
11	Belt guard	RIS			

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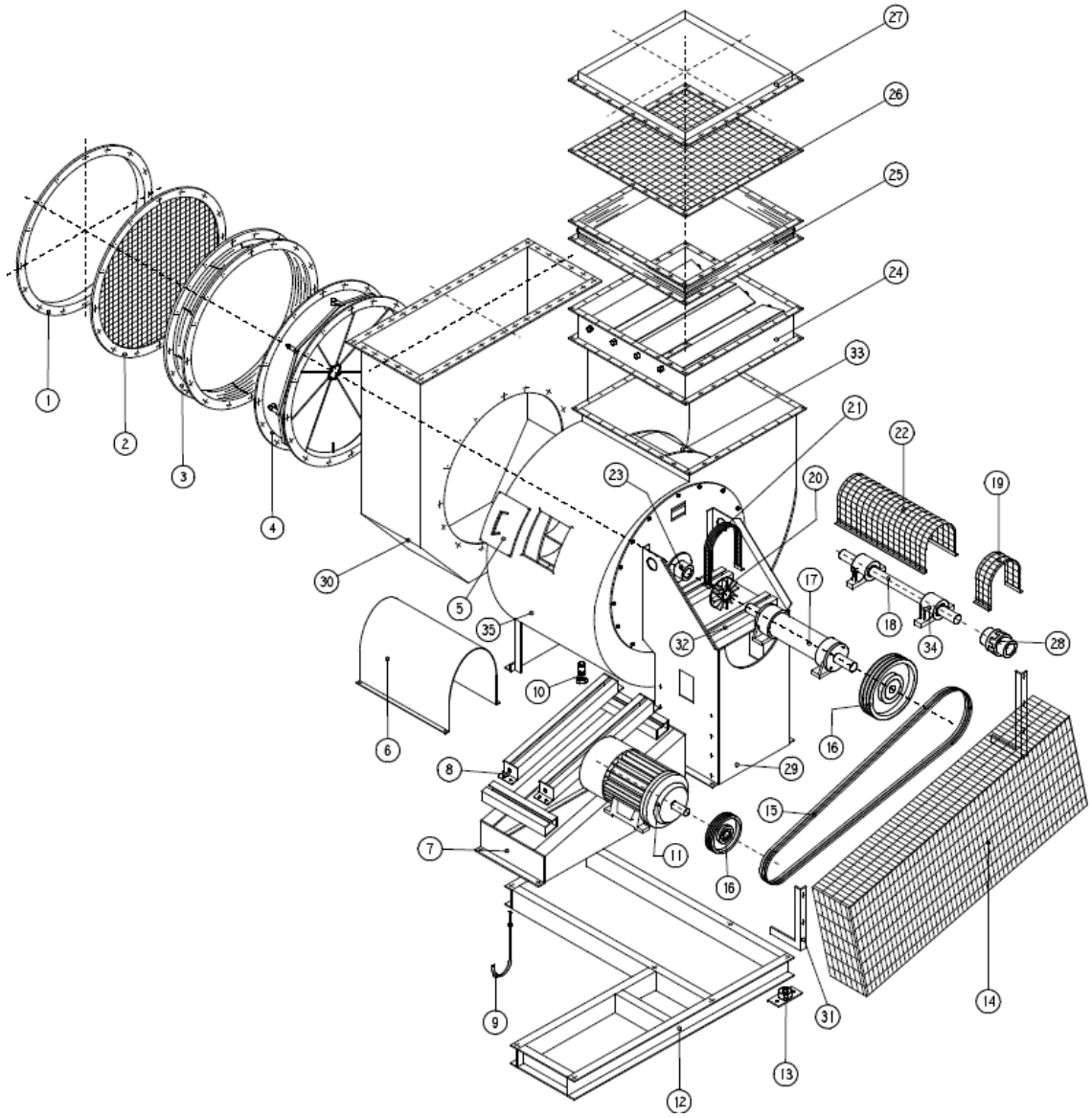
EVI

EXPLODED VIEW - INDUSTRIAL CENTRIFUGAL FAN - SINGLE INLET

EVI_01



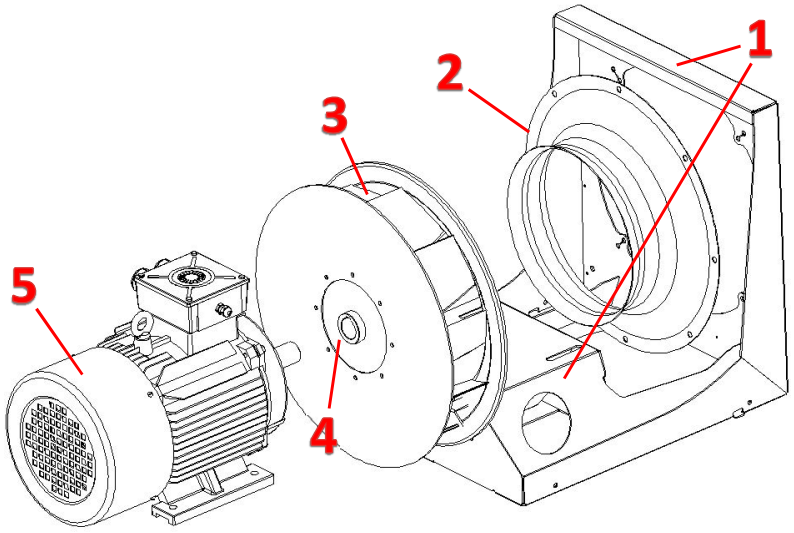
Ref.	Components / Accessories	Abbr.	Ref.	Components / Accessories	Abbr.
1	Inlet flange / Inlet counterflange	Z / Z2	19	Elastic coupling guard	-
2	Inlet guard	ZS	20	Cooling wheel	KU
3	Inlet flexible connection	ZEL	21	Cooling wheel guard	-
4	Inlet vane contorl	DRC	22	Shaft guard	WES
5	Inspection door	I	23	Shaft seal	-
6	Motor rain protection	-	24	Outlet dumper	SE
7	Motor support	BSM	25	Outlet flexible connection	AEL
8	Motor rails	SH/SY	26	Outlet guard	AS
9	Anchoring bolt	-	27	Outlet flange / Outlet counterflange	A / A2
10	Drain plug	K	28	Elastic coupling joint	-
11	Motor (B3)	M	29	Bearing / Motor support	BSS/BSM
12	Common base frame	GR	30	Inlet plenum	-
13	Anti-vibration mounts (spring or rubber)	DAG/DAM	31	Mounting support	-
14	Belt guard	RIS	32	Bearing / Motor support rails	-
15	Belts	KE	33	Impeller	LF
16	Motor pulley / Fan pulley	PUL	34	Bearing block	LA
17	Bearing block	-	35	Fan housing	GE
18	Shaft	WE	(36)	Rigid inlet joint	ZU

EXPLODED VIEW - CENTRIFUGAL FAN - PLENUM NPA - NPL

EVP_01

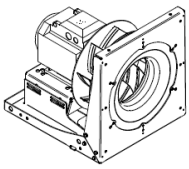
PLENUM FANS NPL - NPA ("LIGHT" structure)

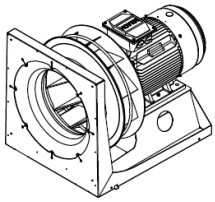
- **1** - **Structure** : in galvanized or painted steel.
- **2** - **Inlet cone:** in aluminum or galvanized or black painted deep drawn steel sheet; in copper for ATEX execution.
- **3** - **Impeller:** in painted steel from size 250 to size 630; in aluminum from size 200 to size 710.
- **4** - **Hub:** in aluminum, cast iron (taperlock), or painted welded steel.
- **5** - **Electric Motor:** in B3 execution from size 71 to size 160



Finishes and materials provided for the components of the standard product	Galvanized	Epoxy painted	Bent over	Welded	Aluminium (Al)	Steel (Fe)	Copper (Cu)
"Light" Structure	yes	yes	yes			yes	
Front panel ("heavy" structure)		yes	yes	yes		yes	
Motor Support ("heavy" structure)		yes	yes	yes		yes	
Crossbar ("heavy" structure)		yes	yes	yes		yes	
Inlet cone	yes	yes			yes	yes	yes
Impeller		yes	yes	yes	yes	yes	
Hub		yes		yes	yes	yes	
Copper - ATEX execution							

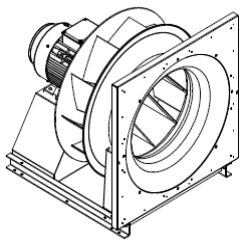
"Plenum" fan characterized by a **"light"** structure made up of two parts in bent, galvanized or painted sheet steel (motor base and semi-structure). Engines: from size 63 to size 160

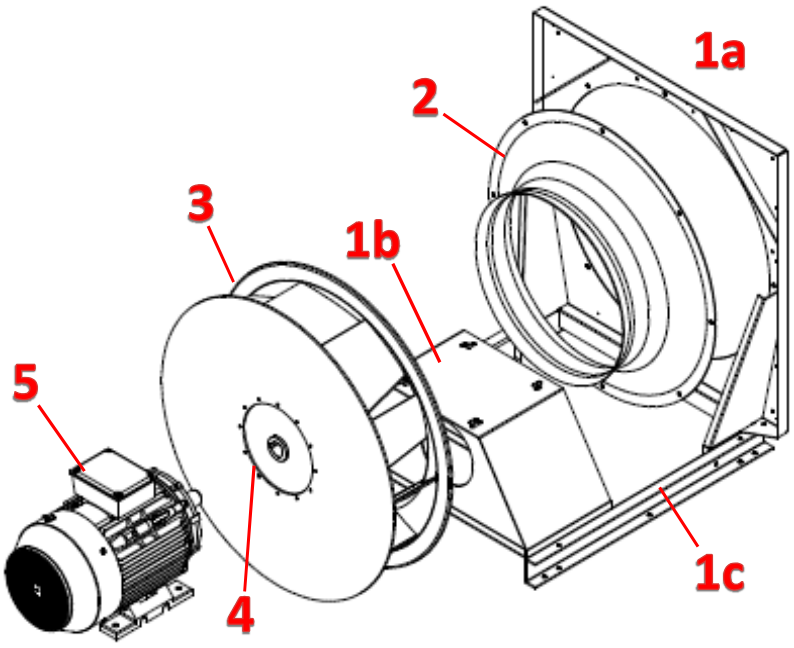




"Intermediate" size "plenum" fans (from 560 to 630), with a single piece structure in folded, welded and painted steel. For motors from size 132 to size 200

"Heavy" structure consisting of front panel, motor support base and connecting crossbars in sheet metal and welded and painted steel section. For motors from size 132 to size 315





PLENUM FANS NPL - NPA ("HEAVY" structure)

- **1a** - **Front panel (structure):** in welded and painted steel.
- **1b** - **Motor Support** (structure): in painted steel.
- **1c** - **Crossbars:** in painted steel.
- **2** - **Inlet cone:** in aluminum or galvanized or black painted deep drawn steel sheet; in copper for ATEX execution.
- **3** - **Impeller:** in painted steel from size 710 to size 1600.
- **4** - **Hub:** in cast iron (taperlock), or welded painted steel.
- **5** - **Electric Motor:** in B3 execution from size 132 to size 315

- **1** - ***Structure*** : *in galvanized or painted steel.*

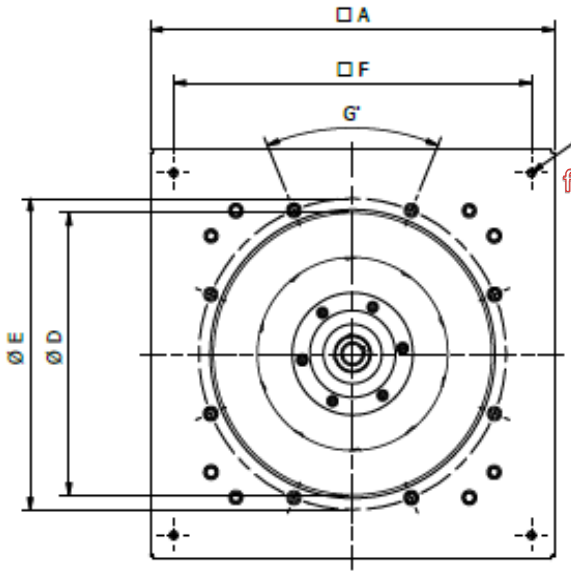
- **2** - ***Inlet Cone*** : *in aluminum or galvanized or black painted deep drawn steel sheet; in copper for ATEX execution.*

- **3** - ***Impeller*** : *in aluminium from size 250 to size 710; in poliammide from size 250 to size 450.*

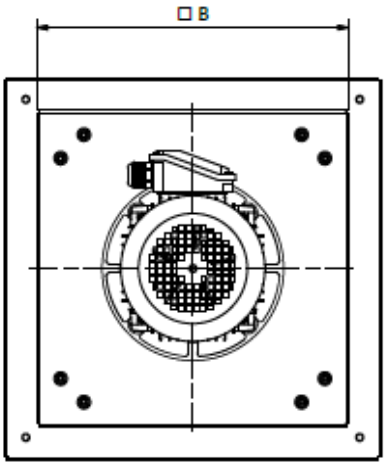
- **4** - ***Hub*** : *in aluminum, cast iron (taperlock), or painted welded steel.*

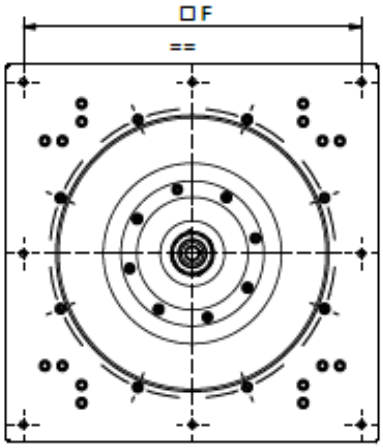
- **5** - ***Electric Motor*** : *in B5 execution from size 71 to size 132*

*Dimension C * and weight are indicative and vary according to the brand of the electric*

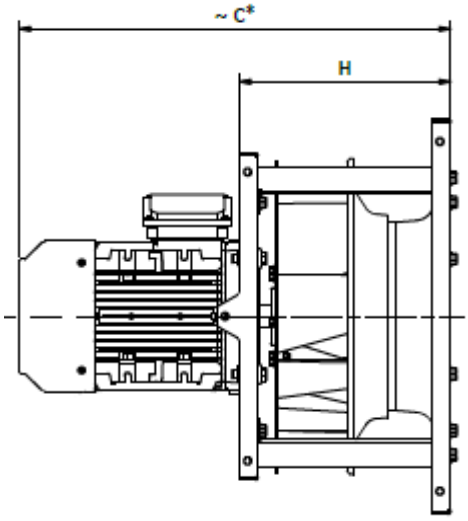


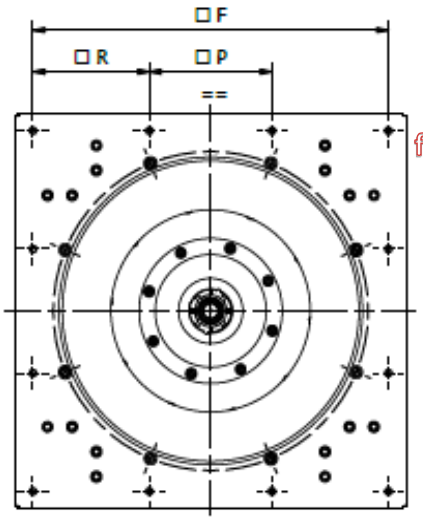
from 250 to 355





from 400 to 450





from 500 to 560

comefri fans of energy saving

OPERATING & MAINTENANCE

5HW

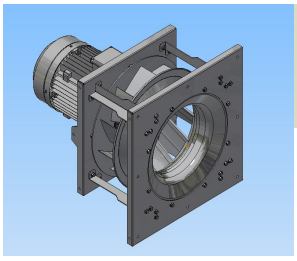
WALL FAN - NPA - TE

#RIF!

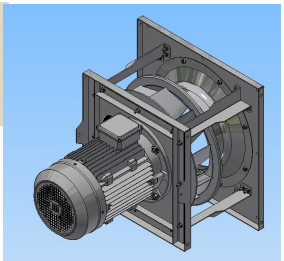
Pos.	NPA	motor size	poles	kW	Taperlock Hub	A	B	C	D	E	F	P	R	G	H	L	M	Weight
						mm	mm	mm	mm	mm	mm	mm	mm	-	mm	mm	-	Kg
1	250	71	2	0,37 / 0,55	TC12-1	400	340	427	263	320	350	/	/	60	238	10	4	18
2		80		0,75 / 1,1				466										20
3		90 S/L		1,5 / 2,2				486							221			28
4	280	71	2	0,37 / 0,55		450	380	439	302	355	400	/	/	60	250	10	4	20
5		80		0,75 / 1,1				478										22
6		90 S/L		1,5 / 2,2				495							230			31
7		100 L		3				529							235			37
8	315	80	2	0,37 / 0,55	TC12-2	450	380	505	332	355	400	/	/	45	277	10	4	23
9		90 S/L		0,75 / 1,1				523							258			32
10		100 L		1,5 / 2,2				551										38
11		112 M		4				572										51
12	355	80	2	0,75 / 1,1		520	430	527	359	395	460	/	/	45	299	10	4	26
13		90 L		2,2				546							281			34
14		100 L		3				574										41
15		112 M		4				595										54
16	400	90 S/L	4	1,1 / 1,5	TC-20	570	480	574	410	440	510	/	/	45	314	10	8	42
17		100 L		2,2 / 3				607							319			49
18		112 M	2	4				628										62
19		132 S		5,5 / 7,5				697							326			75
20	450	90 S/L	4	1,1 / 1,5		640	540	602	459	490	590	/	/	45	341	12	8	51
21		100 L		2,2 / 3				634							346			57
22		112 M	2	4				655										70
23		132 S		5,5 / 7,5				704							352			83
24	500	90 S/L	4	1,1 / 1,5		670	575	637	510	540	610	210	200	45	380	12	12	57
25		100 L		2,2 / 3				670							387			64
26		112 M		4				691										79
27		132 S/M		5,5 / 7,5				756							393			94
28		132 S/M	2	5,5 / 7,5				756										94
29	560	100 L	4	2,2 / 3	TC25	740	645	704	572	610	680	230	225	245	426	12	12	78
30		112 M		4				725										91
31		132 S/M		5,5 / 7,5				775							433			103

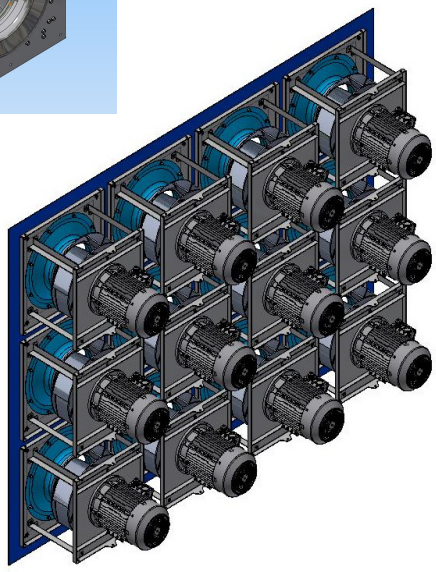
ARRANGEMENT - MOUNTING TYPE "5H"

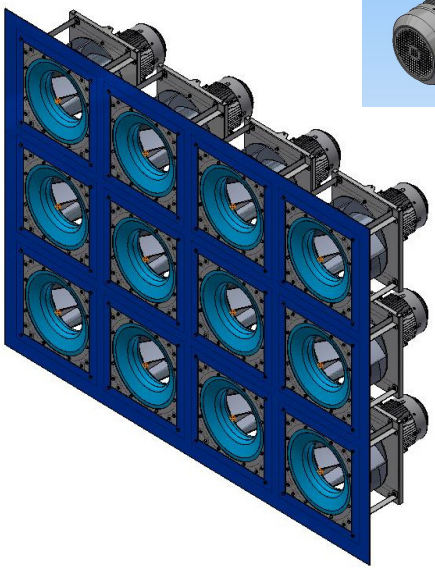
#RIF!



WALL FAN

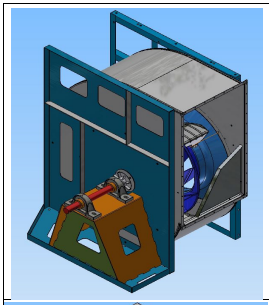






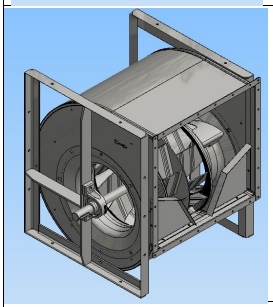
CONSTRUCTIVE EXECUTION - ARRANGEMENT

ECS_01



ARRANGEMENT 1

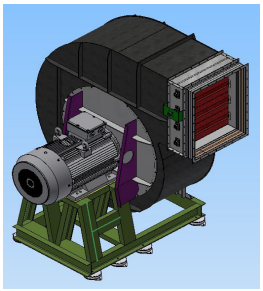
Single-inlet fan for V-belt coupling. Cantilevered impeller on the shaft that rotates upon 2 bearings mounted upon the base supports (seat).



ARRANGEMENT 3

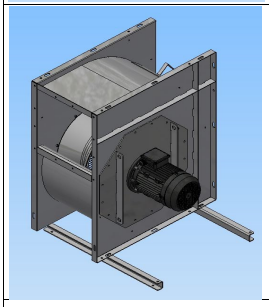
Double-inlet bare-shaft fan for V-belt coupling.
Impeller on the shaft that rotates upon 2 bearings mounted on both sides of the housing and supported by the housing itself.

This execution is also available for the single-inlet fans



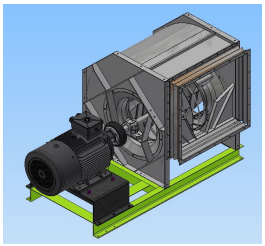
ARRANGEMENT 4

Single-inlet fan with direct coupling. Cantilevered impeller on the motor shaft. No bearing on the fan. Motor in construction form B3 mounted on the baseframe (motor support or"seat").



ARRANGEMENT 5

Single-inlet fan with direct coupling. Cantilevered impeller upon the motor shaft. No bearing on the fan. Motor in construction form B5 flanged to the side of the housing.

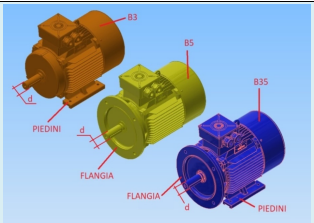


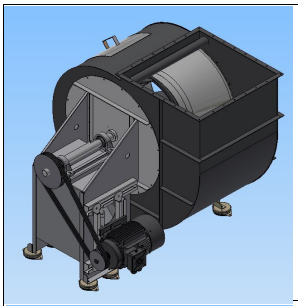
ARRANGEMENT 7

Double-inlet fan with direct coupling through a flexible coupling.
Similar to arrangement 3 but with its motor in construction form B3 mounted on the baseframe motor support or "seat"); all mounted upon a common baseframe.

Execution available also for single-inlet fans

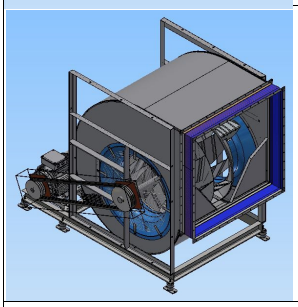
Depending on the arrangement of the fan the construction of the electric motor may change.
The construction forms that are most commonly used (B3, B5 e B35), are summarized in the figure here beside.





ARRANGEMENT 9

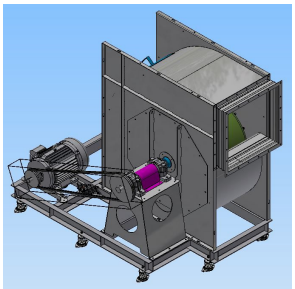
Single-inlet fan with V-belt coupling. Motor mounted externally upon the bearing support.
Cantilevered impeller upon the shaft that rotates upon 2 bearings mounted upon the support base (seat). Motor mounting positions that have been provided for: W or Z.



ARRANGEMENT 11

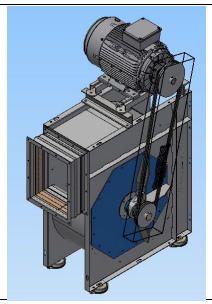
Double-inlet fan with V-belt coupling.
Similar to arrangement 3, but mounted together with the motor on a common baseframe. Mounting positions of the motor provided for: W or Z (rarely Y or X).

This execution is also available for the single-inlet



ARRANGEMENT 12

Single-inlet fan similar to arrangement 1 but mounted together with its motor on a common baseframe. Positions provided for for the mounting of the motor: W or Z (rarely Y or X)
Cantilevered impeller on the shaft that rotates upon 2 bearings mounted upon the supports ("seat").



ARRANGEMENT 14

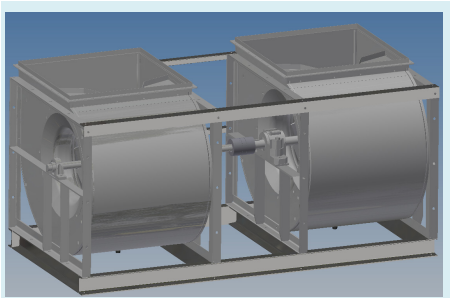
Double-inlet fan with V-belt coupling.
Similar to arrangement 1 but mounted with the motor supported by the housing.

This execution is also available for double-inlet fans.

- Note: the illustrations related to the various represented constructive configurations, models, sizes and arrangements, are to be considered by way of example.

For particular plant engineering needs, it is possible to realize fans of the same size in "double" form, called TWINS or in "triple" form, called "THREEFOLD" fans .

FAN IN TWIN EXECUTION



Double-inlet TWIN fan.
Similar to arrangement 3 but with 2 fans mounted upon a common baseframe and connected by steel section crossbars and a flexible connection to each other. The "light" version does not have a baseframe nor the mounting of the flexible coupling, the crossbars are of bended galvanized steel.

INSTALLATION — INS_01

Installation must be carried out by trained personnel in compliance with these operating instructions. See the technical documentation in the relative technical-commercial catalogue for additional information (characteristic dimensions, distance and diameter fixing holes, weight, etc…) or the information given by the builder on demand.

Before the start-up of the fan, please follow the indications here below:

- ***Checks prior to installation***

- Check the correct operating point of the fan (see label).
- Check the sense of rotation of the impeller indicated by an arrow on the sideplate of the fan.
- Check the sense of rotation of the electric motor, especially in the presence of an anti-rotation equipment (free wheel).
- Check if the bolts are tightened correctly.
- Check the tightening torques of the bolts used to close the bearing supports and to fix to the structure or frame, according to the following indications:

Bearing Support Designation	Screw Support	Wrench CH hexagon (mm)	Tightening torque (Nm), with friction coefficient m = 0.15	Screw Frame	Wrench CH hexagon (mm)	Tightening torque (Nm), with friction coefficient m = 0.15
SNL 506-605	M10x40	17	50	M12	19	80
SNL 507-606	M10x50	17	50	M12	19	80
SE 509	M10x50	17	50	M12	19	80
SE 510-608	M10x55	17	50	M12	19	80
SNL 511-609	M12x60	19	80	M16	24	200
SNL 513-611	M12x65	19	80	M16	24	200

The tightening torques for all fan bolts must be in accordance with the following:

Screw 8.8	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
Hexagonal CH wrench (mm)	13	17	19	22	24	27	30	32	36	41	46
Tightening torque in Nm with friction coefficient μ=0,15	25	50	85	135	205	283	400	532	691	1010	1370

- Check the integrity of the painted surfaces; if there are any scratches of small dimensions (caused by transport for example), do some retouches with a suitable paint product.

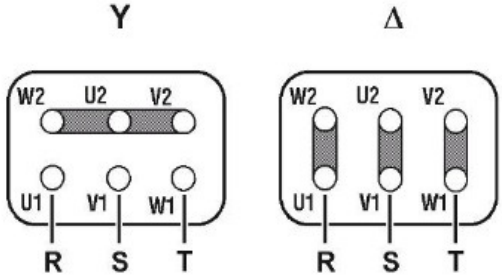
- Rotate the impeller manually and make sure, during a complete rotation, that there is no friction with the inlet cone. During this operation, check that the bearings do not show any sign of irregular friction.

- ***Installation, Positioning and Fixing***

The fan must be firmly fixed to a foundation or steel base frame. It must be fixed while avoiding any strain and deformation to the support structure. When using a foundation and fixing bolts (log bolts), spacers should be added to ensure a perfect contact between the fan and its base frame. Otherwise misalignment or bending moments could occur inducing anomalous vibrations during fan operation. A reinforced concrete foundation is considered ideal for mounting the fan. Safety devices removed from the machine must be reinstalled before starting up the fan again.

- ***Connections, Wiring and Electrical Protections***

The connection to the motor terminal board must be made by following the instructions provided by the motor manufacturer. Direct starting is suitable for motors with a rated power upto 4kW; for motors with a rated power over 4kW a "soft" delta/star start is often used. The motor must be protected against overloading and particular care is required when using motors with spark-proof protection or equipped with thermistors. Damage caused by insufficient motor protection makes the manufacturer's warranty null and void. The customer is responsible for earthing the fan.



START-UP — AVV_01

- ***Safety Checks***

- Make sure that the switch connecting the motor to the power supply network is in the ***OFF position*** *.*
- Check if the connections and/or installation of the mechanical and electrical safety devices are correct.
- Check whether all protective devices as inlet and outlet guards, protective enclosures, shaft guards, transmission guard have been mounted correctly.
- Check that no foreign bodies are in the ducts and in the fan.
- Rotate the impeller by hand and make sure there is no contact between impeller and inlet cone.
- Check the alignment and parallelism of the pulleys and tension of the belts.
- Check if motor plate data are compatible with the tension (V) and frequency (Hz) supplied by the mains.
- Arrangements for inspection (if present) must be closed.
- If storing the fan for over six months, it will be necessary to remove the old grease and proceed with regreasing according to the quantities and types reported in section: "bearings and lubrication".

- ***Run test and start-up***

In order to check the correct sense of rotation of the impeller (see arrow near the fan inlet) the first start-up must be done for a very short period (2-3 seconds).
If the impeller rotates in a sense that is opposite the one indicated it is necessary (operating on the terminal board of the three-phase motor), to disconnect and reverse the position of two of the three power cables. If the motor is of the single-phase type, this handling can be done by changing the position of the connectors inside the terminal board as indicated on the motor plate or by the wiring diagram provided by the manufacturer. All connection-, start-up, testing, operational and maintenance operations must be carried out in compliance with the electrical safety regulations.

- ***Measuring of the Power Absorption of the Electric Motor***

Check if the real working conditions match with the data of the fan and motor plate and with the selection point required in the project development phase.
When the fan has been started up and it has reached its operating speed (constant operating regime), check the absorbed power by the electric motor and compare it with the nominal value indicated on its plate. In case the absorbed power is found out to be higher than the indicated power, switch off the power supply to the motor and check.

- ***Check the Regular Operation***

Check if there are any abnormal noises, vibrations, abnormal temperatures of the treated fluid and of the rotating parts; remove any obstructions from the in- or outlet of the fan, report the presence of any imbalance, vibrations or contact with foreign bodies unrelated to the functions provided for the fan unit in time.

- ***V-belt transmission***

A check of the tension of the V-belts can be done after the first hour of regular functioning of the fan; it is necessary to stop the fan and make sure that the motor power supply remains in the " ***OFF*** *" position until the conclusion of the maintenance activities. Check if the tension of the belts complies with the prescriptions of the section: "Maintenance – V-belt transmission - Regulations", if necessary, repeat the adjustment operations of the V-belt tension through the screws present on the motor support (slides), then restore the safety devices and protections (carter), and restart the fan. A further check can be done after about 3-4 days of functioning of the fan.*

MEASUREMENT TOOLS - MAINTENANCE TOOLS — STR_01

- ***Note***

The list below is to be considered indicative and refers to the instrumentation used by the manufacturer for setting up the product; nothing forbids the use by the user of instruments and equipment of different brands for the same type of measurements and adjustments.

- ***MEASUREMENT TOOLS***

- Belt tension meter (E.g.. TRUMMETER)
- Belt alignment (E.g. CEMB AI 10)
- Laser alignment systems (E.g. PRUFTECHNIK Optaling / Rotalign Touch)
- Vibration analyzer (E.g. SPM – LeonovaDiamond / PRUFTECHNIK Vibxpent)
- Differential pressure gauge (E.g. TESTO / DWYER)

MAINTENANCE TOOLS

- Grease gun (E.g. SKF 175 mm)
- Hook wrench (E.g.. SHK HN)
- Kit of thickness gauges (E.g. SKF)
- Wrench and hex keys (Allen key) - (from 8 to 30 mm)

- ***IMPORTANT!*** *Before starting maintenance, check the fan data shown on its label which is in general on one of the housing sideplates and, if necessary, write down the reference information.*

- ***The fan label*** *(adhesive or metallic), applied to the product is* *a reference of primary importance.*
The label allows, both to the customer and producer, to trace quickly and accurately all the information related to the selection, design, production and installation of the fan.

- ***The code number*** *of the fan indicated on the label allows to identify the product without any misunderstanding; the label shows the maximum operating values, the ones related to the selection of the fan at its working point and any additional information for installation (item).*

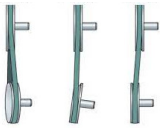
- ***Prevention, Protection and Safety***
Before starting maintenance of the fan it is necessary to observe the following indications:
- Set the switch of the motor control panel to the ***OFF position***
- Disconnect the power cables from the electric motor.
- Make sure that the impeller stands still during fan maintenance.
- Check the temperature of the electric motor, of the bearings and of the V-belts.
- Check if there are any foreign bodies or dangerous materials inside or near the fan.

- In compliance with safety regulations, it is possible, f *or authorized personnel only* *, to measure speed, fan and motor vibrations, motor and bearing temperature, pressure and air volume, motor power absorption and noise level.*
If there is no compliance with the requirements of the safety regulations this can give rise to serious consequences, putting the operator's safety at risk .

- ***Housing and impeller***
Working conditions in presence of dust, condense or solvents can give rise to corrosion, abrasion, encrustation or make ineffective the treatments to which the fan surfaces have been subjected (finishing, galvanizing, insulation, etc. …); it is therefore necessary to implement a series of scheduled cleaning and control activities on the components that are most in contact with the treated fluid: the casing (or housing) and the impeller.
The frequency of cleaning and checking the fan unit is defined by the Maintenance Service according to the characteristics of the plant.

- ***Accessories***
Accessories like the flexible joints that connect the fan to the plant (known also as elastic flanges), require a periodical visual inspection. The flexible material of the joint (fabric in different executions and materials) must not show any lacerations, tears or deterioration of the sealant.
In order to grant a correct sealing of the plant, the damaged joints need to be replaced.
It is necessary to check the integrity of the shaft seals at regular intervals.

- ***Check of the rotating parts***
Check the impeller-shaft alignment periodically as well as the conditions of the fixing bolts. Check if the bolts of the fans are tightened well. The tightening torques on the bearings for all of the fan bolts are indicated in the table of paragraph "INSTALLATION".



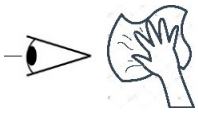
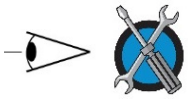
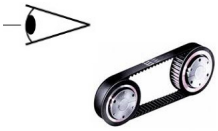
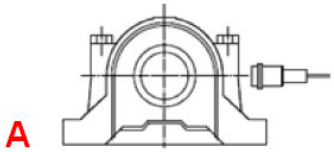
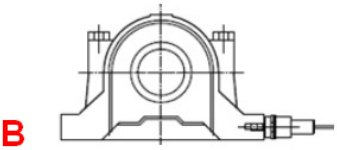
- ***Transmission, V-belt drive tensioning***
It is recommended, depending on the installation and kind of use of the fan, to check the V-belt tension and the belt-alignment regularly, see paragraph "FREQUENCY – TYPE OF INTERVENTION".
This is mandatory in ATEX spark-proof applications according to EN 14986.
The correct belt tension can be evaluated by measuring the belt flexion (see Table 1), or by its related vibration frequency (Hz), measured with a tensiometer (see Table 2).

IMPORTANT!

- For the cleaning activities, DO NOT USE steam hydrocleaners, high-pressure lances or project liquid substances on the fan-motor unit.

MAINTENANCE INTERVENTIONS - FREQUENCY

IMF_01

DESCRIPTION OF MAINTENANCE OR CONTROL	FREQUENCY	
Every 1000 hours - (duration of intervention: 30 min) – Clean the work environment. Clean the product, the work environment, the technical and accident-prevention labels and the control panels if there are any. *Example: a greasy or dirty handle can create a dangerous situation*		**1.000 h** *Do the monthly cleaning in any case*
Every 3000 hours - (duration of intervention: 90 min) - Check and clean the impeller. If there are crusts on the impeller, it is recommended to clean all of its parts accurately eliminating the parts that have been removed by means of a vaccum cleaner. Do a new dynamic impeller balancing if necessary.		**3.000 h**
Every 5000 hours - (duration of intervention: 30 min) - Check guards and protection/safety devices. Check the guards and protection/safety devices (if there are any). *The removal of protections or protection devices is allowed only to qualified professionals; when the intervention is over, the technician must restore the original conditions.*		**5.000 h**
Every 5000 hours - (duration of intervention: 60 min) - Check if the bolts are tightened well. Check each time there are excessive vibrations if the bolts are tightened properly, see: *Table: Screw tightening torques in chapter "INSTALLATION".*		**5.000 h**
Every 5000 hours - (duration of intervention: 60 min) - Lubricate the motor Motors supplied with bearings lubricated for life do not require any restoration of grease. Motors complete with grease nipples require obligatory a re-greasing. *For the motors with grease nipples see manual of the motor producer.*		**5.000 h**
Every 100 / 20000 hours - (duration of intervention: 30 min.) - Re-greasing of bearings. Lubrication of the bearings on separate housings and pillow block bearings, must be done according to precise intervals, which can vary according to the		*For the exact frequency see related table depending on the*
Every 8000 hours - (duration of intervention: 5 hours) - Clean and grease the bearings It is recommended to clean all the bearings carrying out a complete overhaul. Wash them with mineral spirits (light oil). Lubricate the bearings correctly with the appropriate grease. *If absolutely necessary, the restoration of the lubricant in the bearing supports, can be carried out with the impeller in rotation, but only by expert personnel provided with adequate equipment. The operation does not require the opening of the guards and the supports themselves to intervene.* In supports with grease-lubricated bearings it is mandatory to use an appropriate greasing pump by connecting it to the nipple on the support. It is necessary to take the needed precautions to avoid the dispersion of grease.	  	**8.000 h** *For the exact frequency see related table depending on the model.*
Every 5000 hours - (duration of intervention: 3 hours) - Check the transmission: V-belts and pulleys. Do a visual check of the conditions of the transmission components, the tension of the belts and if the dowels of the bushes are tightened correctly; if necessary restore the original conditions by replacing the pulleys and/or V-belt set.		**5.000 h**
Check the vibrations of the fan bearings **Every 3000 hours - (duration of intervention: 1 hour) - Measuring with a portable instrument.** Use a portable instrument for the measuring of the effective value (r.m.s.), of the vibrations (frequency band between 10Hz and 1.000 Hz), **(figure A)**. **24 hours (continuously) - Continuous measuring of the vibrations with an installed sensor.** The sensor for the monitoring of the vibrations is installed on the separate supports at the side of the impeller **(figure B).** ***ATTENTION!*** *The functioning of the fan with a high level of vibrations can cause the breakage of the bearings of the supports and cause damage to things or persons.*	 A  B	

Equipment and tools used during the disassembly of the fan.

A1

lifting belt

(check the load limits)

A2

wrench

5-6-10-13-19-24 mm

A3

lifting hooks and chains

(check the load limits)

A4

pin punches

A5

pneumatic screwdriver

A6

hammer

A7

hexagonal sockets

5-6-10-13-19-24 mm

A8

extractor

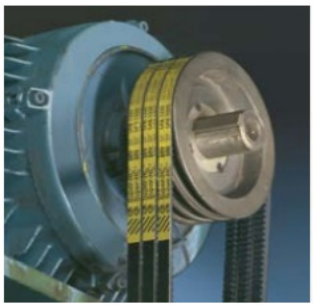
A9

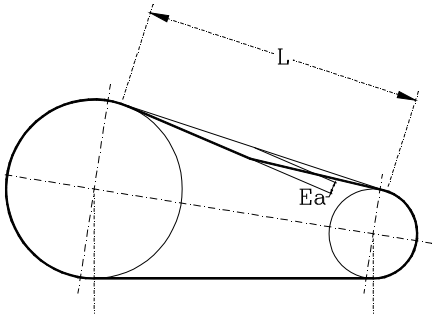
flexible meter

Belt type	Test force on each belt f (N)	Diameter of the smaller pulley dk (mm)	Belt deflection per 100 mm of center distance Ea (mm)
SPZ	25	56 ≤ 71	2,45
		< 71 ≤ 90	2,20
		< 90 ≤ 125	2,05
		< 125	1,90
SPA	50	71 ≤ 100	3,20
		< 100 ≤ 140	2,75
		< 140 ≤ 200	2,55
		< 200	2,45
SPB	75	112 ≤ 160	3,00
		< 160 ≤ 224	2,55
		< 224 ≤ 355	2,22
		< 355	2,10
SPC	125	180 ≤ 250	2,55
		< 250 ≤ 355	2,20
		< 355 ≤ 560	2,00
		< 560	1,90

Note : the belt deflection values are indicative and can undergo slight modifications according to the form and brand of the installed belts.

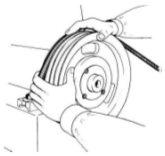
Tbl.1

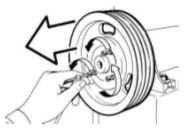




Replacement of the V-belts

Reduce the tension of the V-belts by loosening the adjustment screws placed on the belt tensioner slides at the base of the electric motor.
Using the provided Personal Protective Equipment (P.P.E.), take off the worn belts by hand, check the conditions of the pulleys and install a new complete set of belts.
Tension the new belts through the adjustment screws placed on the belt tensioner slides at the base of the electric motor
***IMPORTANT** : the **complete set of belts** must be replaced, not only the one that is worn.*
For references see chapter: "START-UP" for the fan start-up operations.
The producers of transmission V-belts indicate a (theoretical) value of an average working life of about 25.000 hours; this number of hours can be less under harder working conditions.
In case it is not necessary to replace the belts it is good practice to increase the frequency of controls after the first 20.000 working hours.
See paragraph "MAINTENANCE INTERVENTIONS - FREQUENCY".
IMPORTANT: The spark-proof execution requires belts that are electrostatically conductive.

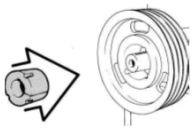




Replacement of pulleys with a taper bush

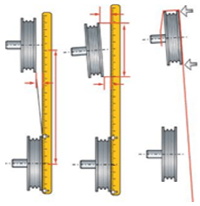
In order to take off the pulley

1. Unscrew the dowels of the bush from the threaded holes.
2. Take off the locking bush from the conical hole.
3. Take off the pulley from the shaft.



In order to fix the pulley

1. Put the pulley on the shaft.
2. Put the bush between the conical hole of the pulley and the shaft.
3. Align the pulleys.
4. Block the bush-pulley assembly by tightening the appropriate dowels.

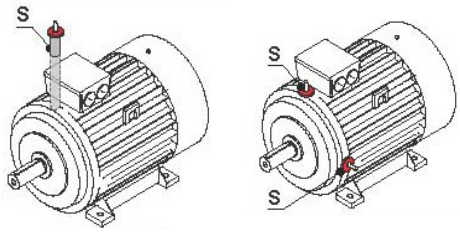


Check if the alignment between the fan pulley and motor pulley is correct.
Assemble and tension the V-belts.

- ***Verify of the motor vibrations***

Every 3000 hours - (duration of intervention: 60 min) - Measuring with a portable instrument. *Use a portable instrument for the measuring of the effective value (r.m.s.), of the vibrations (frequency band between 10Hz and 1.000 Hz).*

24 hours (continuously) - Continuous measuring of the vibrations with an installed sensor. *The sensor (**S**) for the monitoring of the vibrations is installed permanently on the motor.*



ATTENTION! *the functioning of the fan with a high level of vibrations can cause the breakage of the bearings of the supports and cause damage to things or persons.*

LUBRICATION MOTOR BEARINGS				
Motor size	***Lubrication***	***Bearing life***	***Lubrication Quantity / Interval***	***Type of Grease***
< 280	no	40.000 h	-	-
280	si	-	30 g - 8.000 h	UNIREX N3
315	si	-	40 g - 6.000 h	

ALARM and STOP VIBRATION VALUES				
	Fan power	***Rigid assembly***	***Flexible assembly (with rubber or spring shock absorbers)***	***Timeout***
START-UP	minor or = 300 kW	4,5 mm/s	6,3 mm/s	-
ALARM	minor or = 300 kW	7,1 mm/s	11,8 mm/s	10 s
STOP	minor or = 300 kW	9,0 mm/s	12,5 mm/s	none

Reference ISO 14694 catalogue machines BV3 "industrial process" ≤ 300 kW in situ

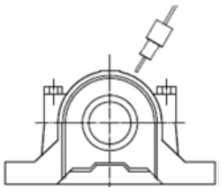
- ***ALARM*** *: the vibration level exceeds the threshold for a time longer than the specified timeout (see table alarm levels), and it is necessary to arrange the activation of an alarm signal to allow an intervention in time by the staff in charge. The intervention must be registered, analyzed and documented with regard to the handlings that have been undertaken.*
- ***STOP*** *: exceeding this limit compromises the safety of people and things. If the indicated threshold is exceeded* ***THE FAN MUST BE TURNED OFF IMMEDIATELY*** *, for the safety of the work area and to allow all the maintenance activities. The activities that are undertaken must be registered, analyzed and documented..*

Note: *each time you start the fan, a* ***maximum (temporary) value is allowed, a timeout (of 10 seconds),*** *during which it is allowed to exceed the above thresholds of alarm and/or stops.*

Only after all activities of control, maintenance, repair or replacement have been carried out by qualified staff, it will be possible to start the fan up again.

- ***Control of the bearing temperature***

Every 10000 hours - (120 min) – Measure the bearing temperature with a portable instrument. (The instrument must be suitable for external measurements).
It is necessary to have a suitable calibrated thermometer.
Measure the temperature of the bearings of the pillow blocks, of the separate supports and of the motor after an operating period of at least 15 minutes.
Check both bearings at the drive side and at the opposite side.
The measured external temperature must not exceed 85°C.



ATTENTION! *the functioning of the fan at high temperatures can cause the breakage of the bearings of the supports/pillow blocks and cause damage to things or persons!*

EXTERNAL TEMPERATURE THRESHOLDS OF BEARINGS | STC_01

EXTERNAL BEARING TEMPERATURE THRESHOLDS, MONOBLOC SUPPORTS, SEPARATE SUPPORTS		
	Temperature	Action
ALARM	**85 °C**	- In the event of a temporary exceeding of the threshold (for less than 24 hours), check for any anomalies: for example poor lubrication, presence of vibrations or noise above the norm, disalignment, dust or foreign bodies.
		- If the indicated threshold temperature is exceeded for an extended period of time (for more than 24 hours), contact the supplier.
STOP	**100 °C**	- In the event of exceeding the indicated temperature, switch off the fan. Check for any anomalies: the level of vibrations, alignments, if everything is clean. Contact the manufacturer. Replace the grease of the supports before any start-up.
The values must be registered		

GENERAL RULES FOR THE MOUNTING AND LUBRICATION OF THE BEARINGS

RGC_01

- Mount the bearing in a clean environment, or take appropriate measures to protect the bearing and the mounting position from contaminants, such as dust, dirt and humidity. Check the supports, shafts and other components of the assembly, in order to grant cleanliness and integrity.

- Keep the bearings and related components in their original packaging until assembly in such a way to preserve their characteristics.

- Read the instructions carefully before proceeding with the activities. The instructions may show alternative tools and methods for measuring. The illustrations are not always proportional and they do not necessarily show the exact drawing. The instructions are valid only for bearings and/or original spare parts. For the recommended tools and devices, check the effective dimensions of the bearing and other components that could interfer with the use of the tool or of the device.

- Take with a piece of cloth the protective film off from the hole and from the external diameter of the bearing.

- If the bearing must be greased and used at very high or very low temperatures, or if the grease is not compatible with the protective film, wash and dry the bearing carefully.

- Take with a piece of cloth the protective film off from the surfaces of the support/bearing group.

- Carry out all the operations of assembly taking care not to damage the single components.

- Normally the bearing must be completely filled with grease. However, if it works at high speed, the available space in the support must be filled up only partially with grease (from 30 upto 50%). For applications without vibrations, where the bearings work at a very low speed and a good protection is required against contamination, it is recommended to fill up the available space in the support with grease upto 90%.

- The filling of lubrication grease is convenient and preferable when the interval of relubrication is less than six months. This allows not to interrupt the work,with regard to the continuous relubrication, allows to obtain a constantly low working temperature.

- The complete renewal of the grease is generally adviced when the lubrication intervals are more than 6 months. This procedure is often applied as part of a maintenance programme of bearings, for example in rail and tram applications.

- A continuous relubrication is done when the estimated relubrication intervals are short, for instance due to the presence of contamination or when other procedures cannot be carried out due to a difficulty of access to the bearings. However a continuous relubrication is not recommended in high rotational speed applications, because the intense whipping of the grease can lead to a high working temperature resulting in the desctruction of the structure of the thickener.

- When there is the use of two different bearings in a system, it is recommended to choose the shortest lubrication interval of the two bearings.

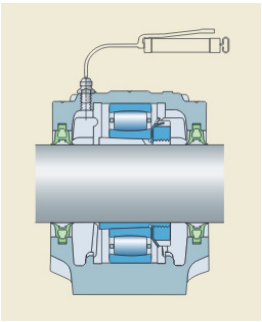
- To replace the exhausted grease in the best way it is important that the new lubrication grease is introduced while the fan is running. In the cases where the fan is not running it is necessary to keep the bearing rotating during the filling operations. When the filling is done sideways (a 40%-filling), it is necessaary to replace the grease completely after five fillings (this is due to an initial filling with a smaller amount of grease).

- ***Filling***

Depending on the chosen filling method , the following filling percentages of the free space in the support are recommended:
40% when the filling is done sideways of the bearing (fig.1).
20% when the filling is done through the circumferential groove and the central lubrication holes available on the support (fig.2).
The suitable filling quantities for a sideway filling can be found from the formula: **Gp = 0,005 D B** , while for the central one the formula is: **Gp = 0,002 D B**

where:
Gp = quantity of grease to be added when filling (g)
D = external diameter of the bearing (mm)
B = overall bearing width (mm)

1



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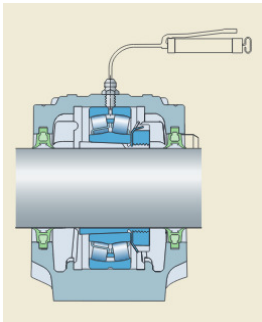

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OPERATING & MAINTENANCE

LRQ

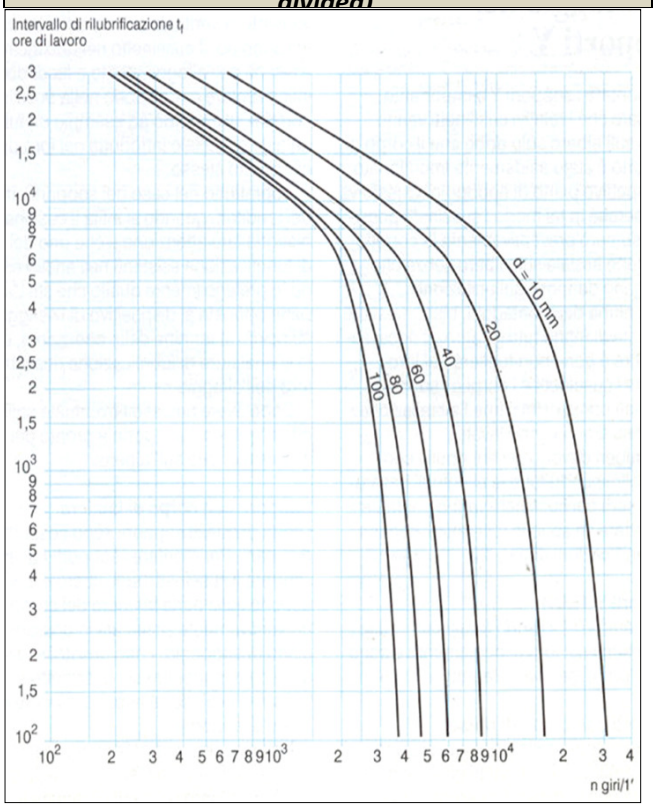
LUBRICANTS — LBR_01

brand	type	base	temperature range
MOBIL	Mobilux EP3	Litio	-30°C / + 130°C
SHELL	Alvania Fett 3	Litio	-20°C / + 130°C
ESSO	Beacon 3	Litio	-20°C / + 130°C
FINA	Marson HTL 3	Litio	-30°C / + 120°C

RE-LUBRICATION INTERVAL — IRL_01

The relubrication interval ***tf*** *is defined as the estimated number of operating hours that a good quality lithium soap mineral base oil grease can perform efficiently when operating at a temperature of 70 ° C (160 ° F) . High performance greases allow for longer life and a longer relubrication interval.*

Relubrication intervals t [h] for plummer blocks (not divided)



A general rule for defining the quantity of relubrication grease, in accordance with the bearing manufacturer's catalog, is the following: ***the quantity of relubrication grease, depending on the speed, varies from 20% to 80% of the quantity of grease initial*** *; the insertion of grease must be done until new grease comes out of the seal; the used lubricant must be let out freely.*

Relubrication intervals for ball bearings (supp. 605 - 608 - 611), e with rollers (supp. 510 - 511 - 513), with support in two halves						
TYPE	Relubrication intervals [h]					
speed [min-1]	ball bearing			roller bearing		
	605	608	611	510	511	513
500	27.000	24.500	21.000	7.000	6.900	5.500
750	21.500	19.000	16.500	4.500	4.400	4.000
1000	17.000	15.500	14.000	3.200	3.200	3.150
1500	15.000	13.500	11.000	1.900	1.900	1.500
2000	12.000	10.500	9.000	1.300	1.300	1.000
2500	10.000	8.500	7.000	900	900	750
3000	8.000	6.500	5.000	600	600	480

QUANTITY OF GREASE FOR THE RE-LUBRICATION OF BEARINGS (grams) — QGR_01

Fan shaft diameter	mm	20	25	30	35	40	45	50	55	65
Pillow block bearing ("Y") NOT divisible	g	3,3	3,9	5,6	6,8	8,4	-	9,9	-	-
Bearing with support ("SNL") divisible in two halves	g	-	-	2206 EK 6,2	22207 EK 8,3	1308 EK 10,4	1309 EK 12,5 2309 EK 18,0 22209 EK 9,8	-	1311 EK 17,4 22211 EK 12,5	22213 EK 18,6

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OPERATING & MAINTENANCE

CSG

BALL BEARINGS WITH RUBBER DAMPING RING

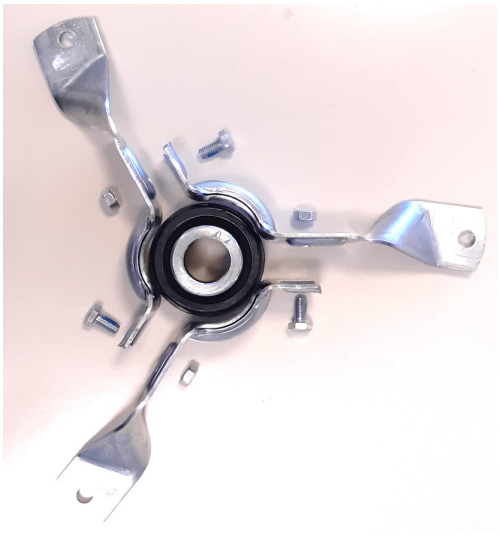
CSG_01

Ø bore	Ball bearings with rubber damper ring lubricated for life.							
mm	Mounting *		B - BL	R - BP	B - BL	R - BP	B - BL	R - BP
	Size	brand	bearing + ring		bearing		rubber ring	
20	160 - 180 200 - 225 250	INA	RABR-B 20/52		RAE 20 NPPB		RABR 47/52	
		SKF	CYS 20 FM		YET 204		RIS 204	
		NTN	AELR204W3		AEL204W3		-	
25	280 - 315	INA	RABR-B 25/62		RAE 25 NPPB		RABR 52/62	
		SKF	CYS 25 FM		YET 205		RIS 205	
		NTN	AELR205W3		AEL205W3		-	
30	355 - 400	INA	RABR-B 30/72		RAE 30 NPPB		RABR 62/72	
		SKF	CYS 30 FM		YET 206		RIS 206 A	
		NTN	AELR206W3		AEL206W3		-	
35	450 - 500	INA	RABR-B 35/80		RAE 35 NPPB		RABR 72/80	
		SKF	CYS 35 FM		YET 207		RIS 207 A	
		NTN	AELR207W3		AEL207W3		-	
40	560 - 630	INA	RABR-B 40/85		RAE 40 NPPB		RABR 80/85	
		SKF	CYS 40 FM		YET 208		RIS 208 A	
		NTN	AELR208W3		AEL208W3		-	
50	710	INA	RABR-B 50/100		RAE 50 NPPB		RABR 90/100	
		SKF	CYS 50 FM		YET 210		RIS 210 A	
		NTN	AELR210D1W3		AEL210D1W3		-	

Ball bearing fans with rubber damper ring.

	Type Model	Mounting	Size												
			160	180	200	225	250	280	315	355	400	450	500	560	630	710
			Ø shaft 20 mm					25		30		35		40		50
DOUBLE INLET	TLZ	B - BL	√	√	√	√	√	√	√	√	√	√	√	√	√	√
		R - BP	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	THLZ	B - BL		√	√	√	√	√	√	√	√	√	√	√	√	√
		R - BP		√	√	√	√	√	√	√	√	√	√	√	√	√
	THLZ FF	B - BL		√	√	√	√	√	√	√	√	√				
		R - BP		√	√	√	√	√	√	√	√	√				
	TZAF	B - BL							√	√	√	√	√	√	√	√
		R - BP							√	√	√	√	√	√	√	√
	TZAF FF	B - BL							√	√	√	√	√	√	√	√
		R - BP							√	√	√	√	√	√	√	√
	VTZ	B - BL							√	√	√	√	√	√	√	√
		R - BP							√	√	√	√	√	√	√	√
	NTHZ	B - BL							√	√	√	√	√	√	√	√
		R - BP							√	√	√	√	√	√	√	√
SINGLE INLET	TLE	B			√	√	√	√	√	√	√	√	√	√	√	√
		R			√	√	√	√	√	√	√	√	√	√	√	√
	THLE	B			√	√	√	√	√	√	√	√	√	√	√	√
		R			√	√	√	√	√	√	√	√	√	√	√	√
	TEAF	B									√	√	√	√	√	√
		R									√	√	√	√	√	√
	NTHE	B									√	√	√	√	√	√
		R									√	√	√	√	√	√

* The "BL" and "BP" configurations refer to the double inlet only.

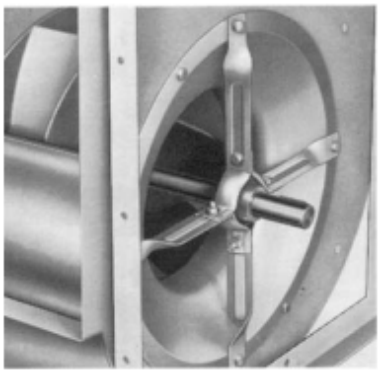


3-spoke cross from size 160 to 315

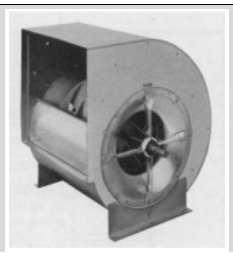
Bearing unit section with rubber ring and nut

Rubber damper ring

Bearing with rubber ring and nut

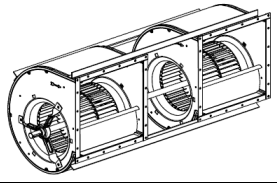


4-spoke cross from size 355 to 710



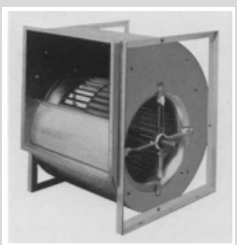
Mounting "B" - Double inlet fan

Configuration "BL"



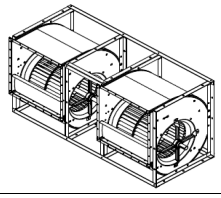
Single inlet fan

Mounting "B"



Mounting "R" - Double inlet fan

Configuration "BP"



comefri fans of energy saving

OPERATING & MAINTENANCE

CSR

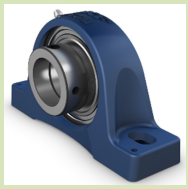
REGREASABLE BALL BEARINGS IN PLUMBED SUPPORTS

CSR_01

Ø bore	Regreasable ball bearings in plummer blocks						
mm	Mounting *		T / BT	T1 / BT1	T / BT	T1 / BT1	T / BT	T1 / BT1
	size	brend	bearing + support		bearing		support	
20	160 - 180 200 - 225 250	INA	PASE 20 N		GRAE 20 NPPB		GG ASE 04 N	
		SKF	SY 20 FM		YET 204		SY 504 M	
		NTN	M-AELP204D1W3		M-AEL204D1W3		P204D1	
25	280 - 315	INA	PASE 25 N		GRAE 25 NPPB		GG ASE 05 N	
		SKF	SY 25 FM		YET 205		SY 505 M	
		NTN	M-AELP205D1W3		M-AEL205D1W3		P205D1	
30	355 - 400	INA	PASE 30 N		GRAE 30 NPPB		GG ASE 06 N	
		SKF	SY 30 FM		YET 206		SY 506 M	
		NTN	M-AELP206D1W3		M-AEL206D1W3		P206D1	
35	450 - 500	INA	PASE 35 N		GRAE 35 NPPB		GG ASE 07 N	
		SKF	SY 35 FM		YET 207		SY 507 M	
		NTN	M-AELP207D1W3		M-AEL207D1W3		P207D1	
40	560 - 630	INA	PASE 40 N		GRAE 40 NPPB		GG ASE/AK 08 N	
		SKF	SY 40 FM		YET 208		SY 508 M	
		NTN	M-AELP208D1W3		M-AEL208D1W3		P208D1	
50	710 - 800	INA	PASE 50 N		GRAE 50 NPPB		GG ASE 10 N	
		SKF	SY 50 FM		YET 210		SY 510 M	
		NTN	M-AELP210D1W3		M-AEL210D1W3		P210D1	
60	900 - 1000	INA	PASE 60 N		GRAE 60 NPPB		GG ASE 12 N	
		SKF	-		-		-	
		NTN	M-AELP212D1W3		M-AEL212D1W3		P212D1	

INA

SKF



NTN

assembly

- 1 - Insert the bearing into the pillow block.

- 2 - Insert the fan shaft into the bearing.

- 3 - Fit the ring (or ring nut).

- 4 - Tighten the screw with a hex wrench.

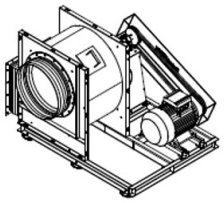
* The "BT" and "BT1" configurations refer to the double inlet only

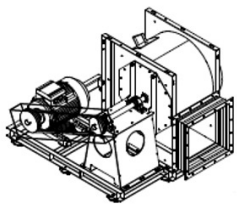
Ball bearing fans with plummer block

	Type Model	Mounting	size 160	180	200	225	250	280	315	355	400	450	500	560	630	710	800	900	1000
			Ø shaft 20 mm					25		30		35		40		50		60	
DOUBLE INLET	TLZ	T	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
		BT	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	THLZ	T		v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
		BT		v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	THLZ FF	T1		v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
		BT1		v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	TZAF	T1							v	v	v	v	v	v	v	v	v	v	v
		BT1							v	v	v	v	v	v	v	v	v	v	v
	TZAF FF	T1							v	v	v	v	v	v	v	v	v	v	v
		BT1							v	v	v	v	v	v	v	v	v	v	v
	VTZ	T1							v	v	v	v	v	v	v	v	v	v	v
		BT1							v	v	v	v	v	v	v	v	v	v	v
	NTHZ	T1							v	v	v	v	v	v	v	v	v	v	v
		BT1							v	v	v	v	v	v	v	v	v	v	v
DSINGLE INLET	TLE	T / TG			v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
		LK			v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	THLE	T / TG			v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
		LK			v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	TEAF	T / TG									v	v	v	v	v	v	v	v	v
		LK									v	v	v	v	v	v	v	v	v
	NTHE	T / TG									v	v	v	v	v	v	v	v	v
		LK									v	v	v	v	v	v	v	v	v

** The "LK" (arrangement 12), refer to the single inlet only.

"LK" mounting arrangement 12 single inlet

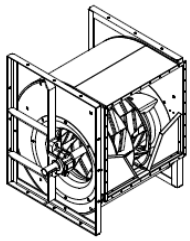




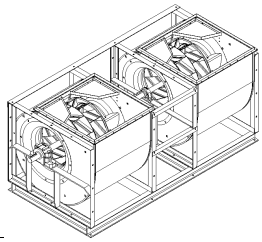
MOUNTINGS
T - T1 - BT - BT1 - TG - LK

- For fan sizes from 160 to 1000, the bearing supports used are of the self-aligning type, with single row of balls with eccentric fixing collar.
- In the mountings in question, the bearing supports are mounted on frames in welded and epoxy painted steel section and on support bases in bent galvanized or folded, welded and epoxy painted steel sheet.
- The supports are equipped with grease nipples. The bearings have been sized to guarantee a minimum duration of 20,000 hours.
- The "LK" (Lager Konsole) mounting, or arrangement 12 (foreseen for simple inlet fans), has the bearings positioned outside the air flow; it is used where the temperature level of the treated fluid is high or where there is the presence of aggressive substances, dust or particles transported along the ventilation circuit.

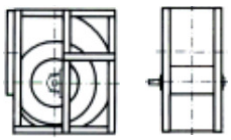
T / T1 mounting double inlet



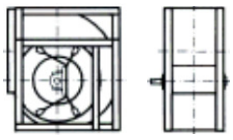
BT / BT1 mounting double inlet



T / T1 mounting singlele inlet



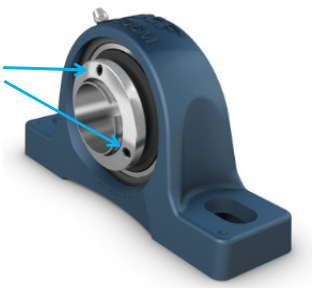
TG mounting singlele inlet

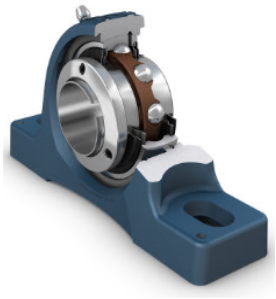


REGREASABLE BEARINGS IN PLUMBED SUPPORTS SKF "ConCentra" SERIES

CSC_01

Disassembly





1. Loosen the set screws in the mounting collar.

2. Loosen the ring with small taps on the edge.

3. Remove the fixing screws.

4. Extract the unit from the shaft.

ATTENTION

Do not tighten the pressure screws until the bearing has been positioned on the shaft. If the screws are tightened prematurely, the dowel bush may be deformed.

Do not disassemble the bush and the mounting collar from the bearing before installation.

Assembly

1. Push unit Y with the support onto the shaft with the fastening device facing outwards.

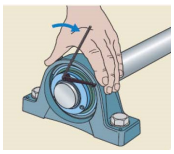
2. Place the Y unit on the support surface. Insert the fixing bolts or nuts and tighten them firmly.

3. Rotate the mounting collar against the bush so that a set screw is opposite the slot in the bush.

4. Holding the wrench with the shorter arm, tighten the screws by ½ turn. Continue to tighten the screws.

5. Start tightening the pressure screws using the longer end of the wrench. Tighten the screws ¼ of a turn according to the assembly diagram, until the wrench begins to flex.

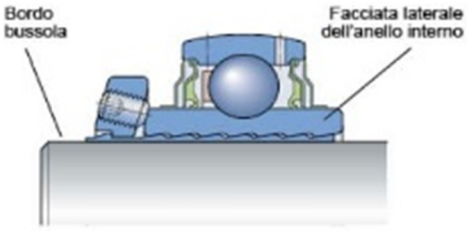
6. Tighten the pressure screws according to the torque indicated in the table.



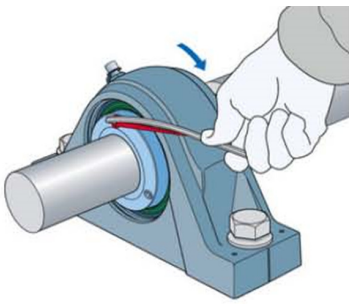
IMPORTANT

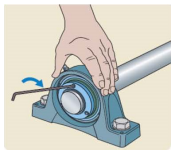
Do not use hammers, pipes or unsuitable tools to tighten the grains.

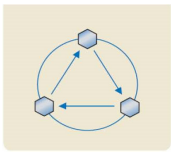
Loosen the tightening



Tighten the screws using the torque indicator







** 20 mm diameter not included in the "ConCentra" series*

Comefri code	*bearing + support*	*support*	*bearing*	*Ø fan shaft (mm)*	*Ø of the metric screw 8.8*	*Hex key (mm)*	*Tightening torque (Nm), with friction coefficient m = 0.15*
99913508	SYJ 20 KF	SYJ 504	YAR 204	20 *	M6	3	4
99915349	SYJ 25 KF	SYJ 505	YSA 205	25	M5	2,5	4,2
99913377	SY 30 LF	SY 506	YSP 206	30	M5	2,5	4,2
99913378	SY 35 LF	SY 507	YSP 207	35	M6	3	7,4
99913379	SY 40 LF	SY 508	YET 208	40	M6	3	7,4
99913380	SY 50 LF	SY 510	YET 210	41	M6	3	7,4

comefri fans of energy saving

OPERATING & MAINTENANCE

MSN

ASSEMBLY OF BEARINGS IN SPLIT HOUSING SKF "SNL" - "SE" SERIES

MSN_01

Assembly

1 . *Place the base of the housing on the frame. Insert the fixing bolts but do not tighten them.*

2 . *Insert one half of the seal into each groove in the housing base (in case of stepped shafts, fit the spacer first). Fill the space between the two internal sealing lips with grease. If the housing is intended for the shaft end, fit an end cover in place of a seal half.*

3 . *Mount the bearing directly on the shaft, if it has a step, or use an adapter sleeve. Fill the bearing completely with grease. Put the remaining amount of the recommended grease into the stand base on both sides.*

4 . *Fit the second bearing and housing.*

5 . *Place the shaft with the two bearings in the two bases of the supports.*

6 . *In case of locating position arrangements, place a stop ring on each side of the bearing.*

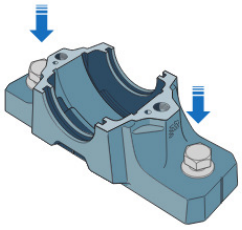
7 . *Carefully align the two support bases. Vertical markings in the center of the side and end faces of the support bases can facilitate the procedure. Lightly tighten the fixing bolts on both holders.*

8 . *The remaining halves of the seals must be inserted into the appropriate grooves in the two bearing caps and the space between the internal sealing lips filled with grease.*

9 . *Place the two caps on each base and tighten the cap bolts (or join the cap and base) to the correct torque. The cap and base of different supports are not interchangeable with each other. Check the caps and bases of each stand to verify that the serial number shown is the same.*

10 . *Check the alignment of the two supports and fully tighten the bolts in the bases of the supports.*

1



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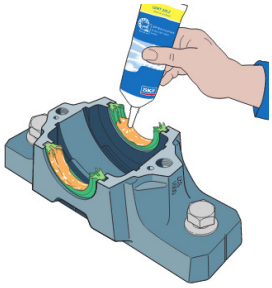

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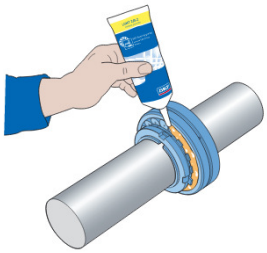
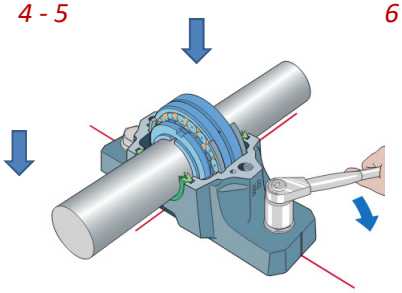
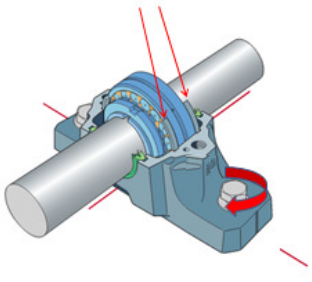


4 - 5



6 - 7



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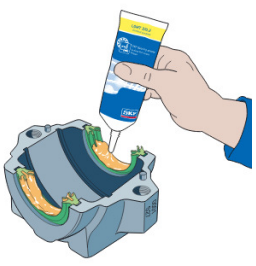

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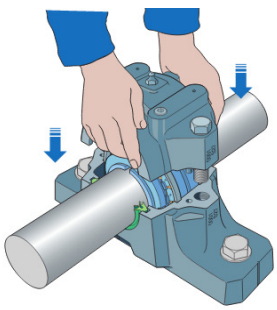


REPLACEMENT OF BEARINGS IN SPLIT HOUSING "SNI " - "SF" SERIES

SSN_01

- Replacement of the bearings mounted on the divisible SNL / SE support

1 . Disassemble any accessories mounted on the shaft that could hinder the replacement of the bearing. Take off the upper cap of the support loosening the bolts on both sides. Grant an adequate support for the shaft in order to avoid any damage to impeller and inlet cone. Put the support on the support surface. Put in the fixing bolts but do not tighten them.

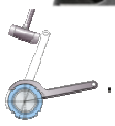
2 . Take off the locking rings from the side of the bearing (please note that only one bearing is equipped with locking rings) and the ring halves from the lower part and from the upper part of the support, taking away the grease.

3 . On both sides of the fan: lift up the flap of the safety washer bent into the groove of the traction ring; unscrew the threaded ring by using a hammer and a punch; take the old bearing out; position the new bearing; screw the threaded ring on the adapter sleeve until there's a consistent resistance; carry out the definitive tightening of the ring adjusting it with an appropriate key, or acting upon the grooves, adjust the related tightening torque provided for by the producer of the bearings checking further, with the use of a gauge, the final internal radial space which will have to be conform to what has been indicated by the builder; in the end bend a flap of the safety washer into the groove of the traction nut. Do not bend it until the bottom of the groove (for detailed specifications of the parameters and operating instructions related to the assembly and disassembly of the bearings, see the technical catalogues of the related producers).

4 . Mount the new sealing ring in the grooves of the support base. Grease the sealing ring and arrange the greased shaft/bearing unit on the support base. Mount one or more locking rings upon one bearing only (the other bearing will not be blocked). Put in the other locking ring, with its lips already greased, inside the top of the block. Grease the whole unit taking care to fill up only a third of the available space with the grease itself. Fill the bearing with the proper type and quantity of grease as indicated in paragraph "QUANTITY OF GREASE FOR THE INITIAL FILLING OR COMPLETE REPLACEMENT".
Place the upper part of the support (cap) upon the lower one (base) and tighten the bolts with the appropriate tightening torque as indicated in the table of the "INSTALLATION" paragraph.
Rotate the impeller to check the correct rotation and detect any malfunction of the bearings and the rotating parts.
Please note that an excessive quantity of grease can cause an abrupt rise in temperature in the bearing, which can turn into damage to the lubricating properties of the grease and cause damage to the bearing.

*- Double-row ball bearings from size **315** to size **500** .*
*- Double-row barrel roller bearings from size **560** .*

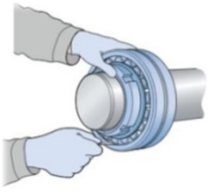
4.1 . Screw the ring nut orienting it with a front bevel to the bearing but do not mount the washer.
Use an SKF HN or HN .. B socket wrench to tighten the nut.
Tighten the nut until the bearing advances in the correct position. For the correct position see the pictures.



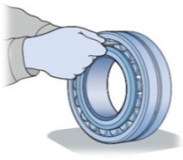
- Measurements and checks during the assembly

*- **Tightening torque***
Tighten the nut by hand just enough to establish a contact between bearing and shaft.
If a bush with metric thread is used, tighten the nut at a 75° angle by using a sector wrench.
Reposition the wrench at 180° with regard to the initial position and tighten it a few more degrees with a light hammer blow on the wrench shaft. This allows to straighten the bearing in case it is in an oblique position.

*- **Remaining clearance***
Measure the remaining clearance using a feeler gauge. It is necessary to measure the initial clearance of the bearing before its assembly and then after its assembly in its seat until the predetermined clearance reduction is reached. The internal radial clearance must have a minimum value of 0,05 mm and a maximum of 0,07 mm.
The clearance must always be measured between the external ring and a roller that is not charged, for instance the roller in the higher position (12 o'clock).



*- **Note** :*
before doing the measuring, rotate the bearing to allow the rollers to take their correct position.
During the operation, press the roller of the measuring point slightly against the existing guide ring between the two rows, then insert the blade in the middle of the roller.
The measured internal radial clearance must be the same for the two rows of rollers.
The remaining clearance must be minimal:
0.05 mm bearing with Normal clearance.
0.065 mm bearing with clearance C3.



ANTI-VIBRATION - RUBBER SHOCK ABSORBERS

DAG_01

Rubber shock absorbers "DAG"

Vibrations, oscillations, shocks and noise can give rise to failures or anomalies in the operation of the fan. Thanks to the use of specific materials and techniques it is possible to minimize the extent of these phenomena.

The "range" of reference standards on vibration and noise is increasingly wide and the attention of manufacturers, installers and system-, machine- and plant users is focusing more and more on this topic.

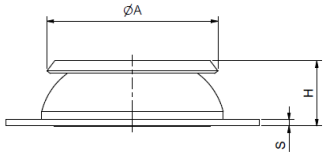
Comefri indicates the rubber vibration dampers with "DAG" (better known as shock absorbers or "silent-block"); the "DAG" dampers are mainly used for the standard product, but they can be used for special constructions as well.

In order to avoid damage to the antivibration supports during transport and handling of the fan, they are disassembled after testing and packed separately complete with screws.

The type, number and position of each single rubber shock damper is calculated taken into account the total mass that has to be supported (fan, motor, transmission, accessories, etc.).

On specific request and for special applications it is possible to use shock dampers with different constructive characteristics and of a different brand.

Here below there's a summary of the main characteristics of Comefri"DAG" shock dampers:



Materials

Damping part: of black elastomer.
Metal parts: of galvanized steel, passivated.

Tolerances

DIN 7715 M3

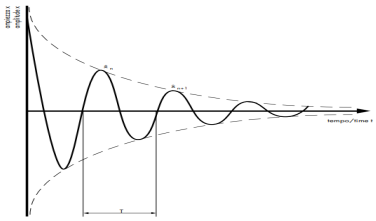
Operating temperatures

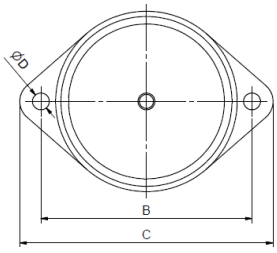
From -30°C to +70°C

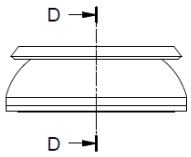
Applications

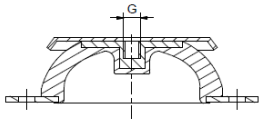
Rotating machines and airconditioning appliances with limited values of unbalance.

Damping of a sinusoidal oscillation









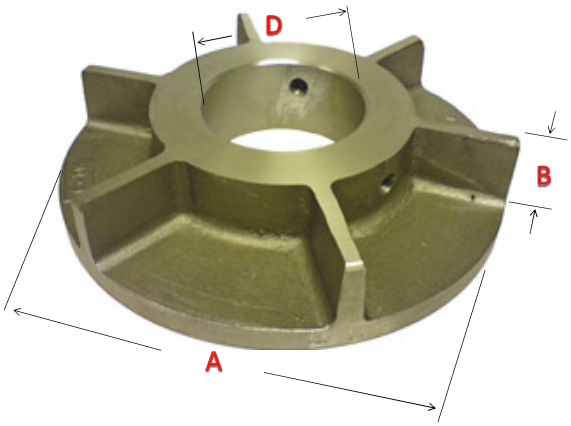
D-D

Rif. TAB0345_C

Code Comefri article	Name Complete Unit	Hardness sh° ± 5	A (mm)	C (mm)	H (mm)	G (mm)	B (mm)	D (mm)	S (mm)	Max capacity (Kg)	Min Capacity (Kg)	Elastic Constant (Kg/mm)	Maximum Static Yielding (mm)	Minimum Static Yielding (mm)
99976100	CAPK 40-60	60	60	64	20	M6	52	6,2	2	8,5	3	~ 3	2,5	1,0
99976118	CAPK 60-45	45	60	90	24	M6	76	6,2	3	18	6	~ 6	3,1	1,0
99976093	CAPK 60-60	60	60	90	24	M6	76	6,2	3	25	9	~ 9	2,9	1,0
99976094	CAPK 60-75	75	60	90	24	M6	76	6,2	3	41	16	~ 16	2,6	1,0
99976095	CAPK 80-60	60	80	120	27	M8	100	8,2	3	78	29	~ 20	4,0	1,5
99976096	CAPK 100-60	60	100	148	28	M10	124	10,2	3	148	56	~ 37	4,0	1,5
99976097	CAPK 150-60	60	150	214	39	M14	182	12,2	4	229	69	~ 35	6,6	2,0
99976098	CAPK 150-75	75	150	214	39	M14	182	12,2	4	358	123	~ 62	5,8	2,0
99976099	CAPK 200-45	45	200	280	44	M18	240	14,5	5	498	140	~ 70	7,1	2,0
99976119	CAPK 200-75	75	200	280	44	M18	240	14,5	5	1200	572	~ 222	5,4	2,0

Tab. 1

Cooling disc				
Ø A	***Ø D***		***B***	***blades***
external diameter	*shaft / hub diameter*		*height*	*n°*
(mm)	*(from mm)*	*(to mm)*	*(mm)*	
115	20	30	25	6
137	28	55	28	8
157	30	60	30	8
172	30	60	30	8
190	50	85	30	8
215	60	110	32	8



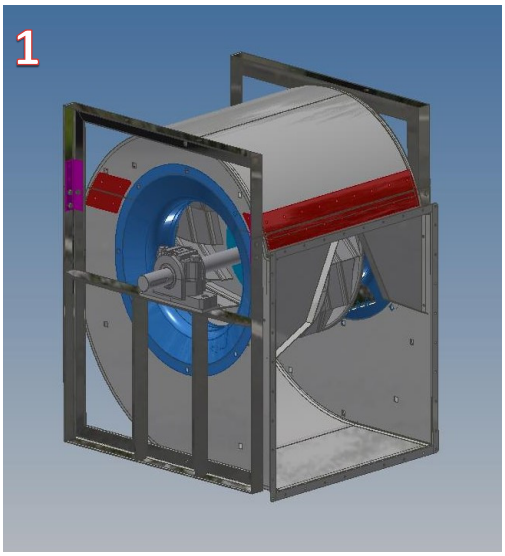
- ***One piece cooling disc*** *in cast 6061 aluminum for mounting on motor shaft, fan shaft, fan hub.* ***Tab. 1*** *shows the measures of the standard discs (**Ø A**) and the relative diameters of the practicable holes (**Ø D**). Possible reductions in A and B dimensions, due to construction requirements.*

Tab. 2

Cooling disc (in two parts)				
Ø A	***Ø D***		***B***	***blades***
external diameter	*shaft / hub diameter*		*height*	*n°*
(mm)	*(from mm)*	*(to mm)*	*(mm)*	
170	20	50	26	8
190	55	80	28	8
210	85	100	28	8
290	105	120	45	8
340	125	140	50	8

- Cooling disc divided into two parts *in cast 6061 aluminum for mounting on motor shaft, fan shaft, fan hub.* ***Tab. 2*** *shows the measures of the standard discs (**Ø A**) and the relative diameters of the practicable holes (**Ø D**). Possible reductions in A and B dimensions, due to construction requirements.*

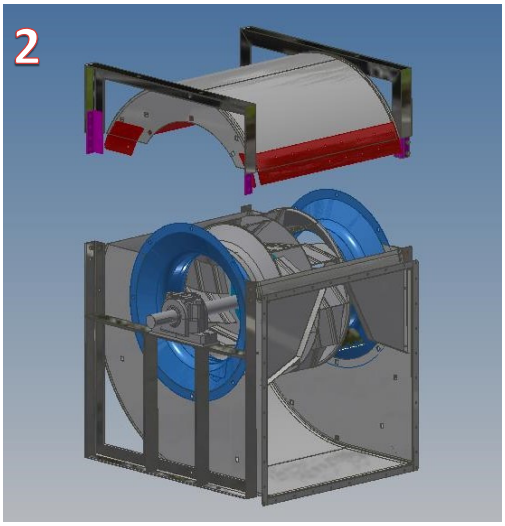
FAN CASING DIVIDED HORIZONTALLY INTO TWO PARTS — GEH01



Horizontally Split Casing (GEHO)

1

- On specific request, where it is necessary to replace fans in areas where access is difficult (ships, industrial plants, etc ...), it is possible to divide the fan casing into two halves (GEHO); this modification makes it possible to reduce the maximum overall dimensions of the fan casing.
- If this operation were sufficient, the cut would only affect the frames and the case; this allows a considerable saving of time in carrying out maintenance activities as the remaining components would not be disassembled.
- NOTE: for a correct design of the fan, the information from the customer relating to the installation is of primary importance.



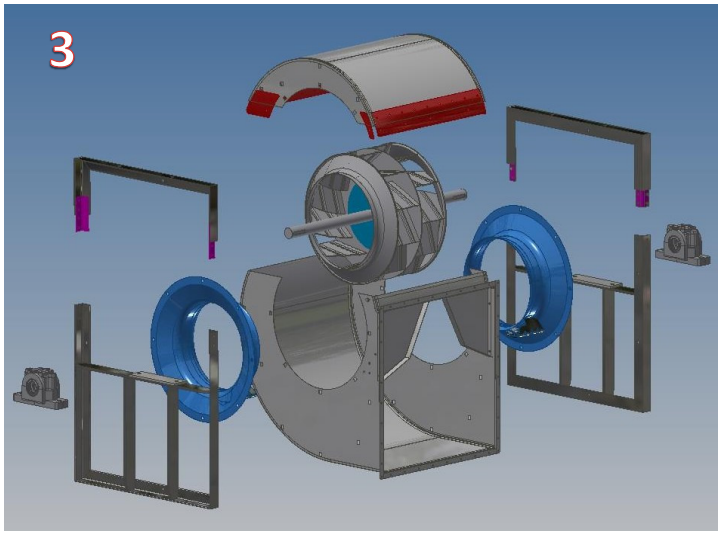
2

- Operations:

- 1) Unscrew the screws from the joining bands of the two half-shells.
- 2) Unscrew the union screws between inlet cones and the half-shell.
- 3) Unscrew the screws joining the frames.
- 4) Install the half-fan.
- 5) Reposition the half-shell without tightening the screws too much.
- 6) Check the alignments and finally tighten all the screws.

3

Exploded view of the fan with case divided horizontally into two parts.



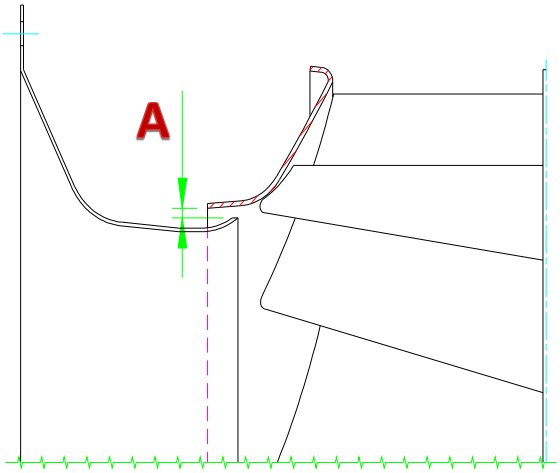
SPARK PROOF EXECUTION - NOTES

ATX_01

- ***Spark proof execution (ATEX 2014/34/UE)***

In this paragraph additional maintenance activities are listed for the centrifugal fans that are meant for operating in an explosive atmosphere in compliance with "ATEX" Directive 2014/34/UE.

Modifications and/or alterations of the original characteristics of the product are NOT authorized*; maintenance activities that are not provided for in this manual on an ATEX product can be the cause of a risk for the safety of a person.*



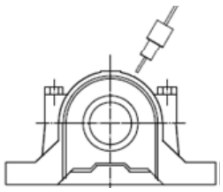
- ***IMPORTANT****: after each intervention for maintenance, CHECK: if the minimum clearance (see measure "**A**") between the inlet cone and the front disk of the impeller is complied with and, in the end, if the impeller is centered correctly.*

- ***Visual and acoustic inspections***

- Check that there is no deposit of dust/materials or any damage (cause of impeller unbalance).
- Check the integrity and the cleanliness of the finish and the protective coatings; if necessary, retouch with compatible products or replace the damaged part.
- Check the integrity and cleanliness of the inlet and outlet guards and if they are fixed correctly.
- Check the integrity and cleanliness of the flexible inlet and outlet couplings and if they are fixed correctly.
- Check the integrity of the sealant of the inlet and outlet flanges and of the inspection door.
- Check the integrity and cleanliness of the shaft seal.
- Check the integrity and cleanliness of the bearing sealing rings.
- Check the noise levelof the fan -motor system.

- ***Check the operating parameters***

- Check if the operating speed matches with the data of the fan label.
- Check if the absorbed motor power is correct.
- Check if there are no abnormal vibrations.
- Check the surface temperature of the motor and of the bearing supports.
- Check if the operating conditions (volume – pressure) match with the project data.



- ***Impeller-shaft assembly***

- Check the tightening of the hub's grains to the shaft and/or the head screw of the motor shaft; see table in chapter "INSTALLATION".

- ***Check the V-belt transmission***

- See chapter "MAINTENANCE" (paragraph "Transmission"), for informations about belt-drive requirements in ATEX applications.

*- **IMPORTANT:** slippage of V-belts and/or misalignment of the pulleys can cause overheating .*
- The V-belts must be electrostatically conductive, in order to avoid the risk of electrostatic discharge (according the requirements of ISO 1813).

- ***Cleaning of the housing and of the impeller***

- See chapter: "FREQUENCY - TYPE OF INTERVENTION" .
- The ATEX fans are supplied with inspection door and drain plug.

- ***Grounding system***

- Check with a special tester the value of the electrical resistance (ohm) of the grounding system.

- ***Electric motor***

- Maintenance of the electric motor: in accordance with the requirements of the producer of the electric motor.

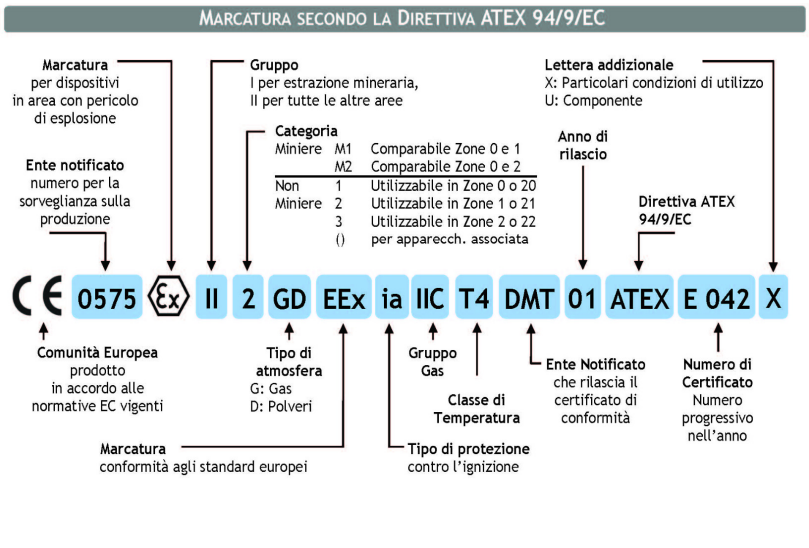
SPARK-PROOF EXECUTION - NOTES

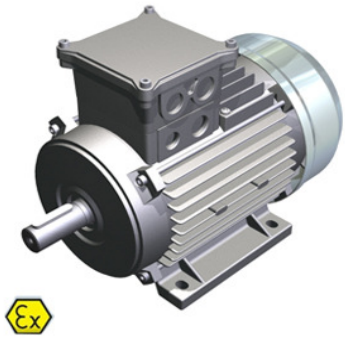
ATX_02

- Mimimum clearance between inlet cone and front disk of the impeller ***(measure " A ")***
After maintenance or after restoration of the normal operating conditions, make sure the centering of the impeller is correct and that the clearance between inlet cone and its front disk (measure " A ") respects the indicated value of the following table:

Model	Measure A	Fan size																			
		180	200	225	250	280	315	355	400	450	500	560	630	710	800	900	1000	1120	1250	1400	1600
BCE25 - BAFE - BCZ25 KHLE25 - KHLE35	(mm)	-	-	-	-	-	-	-	4,0	5,0	5,0	6,5	6,5	6,5	8,5	8,5	8,5	10,0	11,0	12,0	13,0
KHLE15 - 17		-	-	-	-	-	-	-	3,0	4,0	4,0	5,5	5,5	5,5	6,5	7,5	7,5	-	-	-	-
BCE15 - 17		-	-	-	-	-	-	-	4,0	5,0	5,0	6,5	6,5	7,5	7,5	8,5	8,5	9,0	10,0	11,0	11,0
NPA		-	-	-	-	-	2,0	2,5	3,0	4,0	4,0	5,0	5,0	6,0	7,0	7,0	7,0	8,5	9,5	10,5	-
NPL		-	-	-	2,0	2,0	2,0	2,5	3,0	4,0	4,0	5,0	5,0	5,0	6,0	7,0	7,0	7,0	8,5	9,5	-
TZAF FF - VTZ - NTHZ - MAZ - MHZ - TZAF - NTHE		-	-	-	-	-	2,0	2,5	3,0	4,0	4,0	5,0	5,0	6,0	7,0	7,0	7,0	8,5	9,5	10,5	-
THLZ FF - THLZ - HLZ - THLE - THE - TE		2,0	2,0	2,0	2,0	2,0	2,0	2,0	3,0	3,0	4,0	4,0	5,0	5,0	6,0	7,0	7,0	7,0	7,5	-	-

- Replacement of the electric motor
The replacement of the motor can be done by the installer and/or user without invalidating the ATEX certification provided by COMEFRI, as long as the following requirements are met:
- the new motor corresponds to and is certified for the same ATEX field of application as the replaced motor (Group and ATEX category must be the same as those of the changed motor, as well as the surface temperature class, etc.).
- The installation complies with the prescriptions of the manufacturer of the motor and it follows the instructions of this manual with regard to how to install the motor, the pulleys and V-belts, directly-coupled impellers, couplings, transmission carters and shaft.
- The replacement of the motor must be formally reported in the register for maintenance ("machine register").
- Provide for insulating material (for example "Terostat") to be placed between different materials that are in contact with each other (for example stainless steel, galvanized steel, copper, aluminium, cast iron, etc...), in order to prevent phenomena of eddy currents and corrosion.





TROUBLESHOOTING — RPR_01

problem	possible cause	solution
excessive noise	the impeller touches the inlet cone or the fan casing	Adjust the alignment of the impeller and/or the inlet cone. Tighten the impeller hub or the bushes of the bearings on the shaft.
		Cleaning of the impeller / Check if the impeller is balanced. If necessary, balance the impeller on site.
	v-belt drive	Tighten the dowels of the pulleys on the motor/fan shaft. Adjust the tension of the belts /Align the pulleys adequately. Replace the set of V-belts and/or pulleys.
	bearings	Replace the bearings, washers, sealings, bushes, protections and lubrication grease. Tighten the bushes, and check the components.
low volume	fan	Check the sense of rotation of the impeller. Remove obstructions, if there are any, from the inlet and/or outlet. If the speed is below the one on the label, increase the fan speed.
	circuit	Check if there are any circuit leaks.
high volume	circuit	Redimension the circuit. Check if there are no protection grids, batteries, filters.
	fan	If higher than the one on the label, decrease the fan speed.
static pressure is not correct	Unexpected pressure losses in the circuit	Eliminate or modify any obstructions in the plant. Adjust the temperature. Redimension the circuit. Clean the filters/batteries.
high power absorption	fan	Check the sense of rotation of the impeller Reduce the fan speed.
	circuit	Redimension the circuit. Check if the functioning of shutters, batteries and by-pass is correct. Check the filters and inspection doors.
the fan doesn't work	electric power	Check the power supply, the thermal protections and the switches on the electric control panel of the motor-fan. Check the value of the supplied voltage.
	v-belt drive	Check the integrity of the transmission components. Check the correct tightening of the bush-pulley dowels.
	motor	Over use of the electric motor; check if the installed motor satisfies the values of power absorbed by the fan.
overheated bearings	lubrication	Check the quantity and condition of the lubricating grease
	mechanical causes	Replace any damaged bearings. Loosen, if necessary, the tension of the belts. Align the bearings. Check the conditions of the shaft.
vibrations	impeller unbalance	Remove deposited dust or materials from the impeller. Check if the impeller is balanced and, if necessary, balance it again on site.
	bearings	Replace the bearings. Lubricate the bearings. Tighten the ferrules, bushes, washers and screws.
	v-belt drive	Tighten the pulleys on the motor shaft and fan shaft. Adjust the tension of the belts / check and align the pulleys. Replace the set of worn belts and/or pulleys.

SPARE PARTS — RIC_01

- The use of original COMEFRI spare parts is recommended.

- COMEFRI declines all responsibility for any failures and/or damage resulting from the use of non-original spare parts.

- Should it be necessary to order COMEFRI spare parts the indication of the manufacturing number and fan code number shown on the technical data label is of primary importance.

- NOTE: this manual may be subject to changes depending on any updates of the "ATEX" reference standard.

- COMEFRI declines all responsibility for any damage and inconvenience that may be suffered as a direct or indirect consequence of methods, procedures and use in contradiction with or not completely in accordance with the instructions of this manual.

- COMEFRI reserves the right to modify and update this manual without prior notice.
For further informations and explanations related to the covered topics, please contact COMEFRI S.p.A., Industrial Fans Dept, Magnano in Riviera (UD).

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