

CDC 21 ÷ 318

CDC-EV 428 ÷ 1020



English

Français

Air handling units

Centrales de traitement d'air

IOM CDC-N.3GBF

Date : **January / Janvier 2006**

Supersedes / Annule et remplace : **IMW 221.2M/09.01**



1 - Introduction

The purpose of this manual is to give the rules of installation, startup, operation and maintenance to the users of the air handling units.

It doesn't provide a full description of all maintenance works assuring the long life and the reliability of this type of equipment. Only the services of a qualified technician can assure a reliable and durable running of the unit.

2 - Safety Precautions

Before installing the machine, please read the following safety precautions carefully:



Warning

The installation, the commissioning and the maintenance of these machines must be performed by qualified personnels who are familiar with local codes and regulations and experienced with this type of equipment.



Warning

All field wiring must be installed in accordance with local electric norms.



Warning

Insure that the power supply of the unit is in conformity with the available power supply before undertaking the electric wiring.



Warning

The unit must BE GROUNDED to avoid the risks due to a defect of insulation.



Warning

All wiring must not touch the source of heat or the moving parts of the fan-motor assembly.



Caution

The handling of the unit must be achieved by using the lifting systems suitable for the size and the weight of the unit.



Caution

NEVER penetrate in a fan section or stay in the unit when the fan is running.



Caution

DISCONNECT power to the fan-motor assembly before working on this one. Take the fuse with you if the disconnect switch is not close by.



Caution

DISCONNECT power to the electric heater battery before working on or close to this one. If the battery was in operation, wait that the heat is dissipated.



Caution

DO NOT open a door before the fan is completely stopped. The pressure generated by the rotation of the fan can project or open brutally the access door on the person opening this one.



Caution

DO NOT work on dampers before these are blocked and disconnected.



Caution

MAKE SURE that the fan is well fixed before working on this one.



Caution

DO NOT restart the unit before having checked that all components have been reset.



Caution

NEVER pressurize the unit beyond these specifications and make certain that the dampers are open.

3 - Inspection and Storage

Upon receipt of the material on site, all items should be carefully checked against the bills of lading to be sure all crates and cartons have been received.

All damage visible on the units or on the packings as well as all mistake of delivery must make the subject of a reserve notified on the delivery note of the carrier.

Send within 48 hours a registered letter to the carrier mentioning precisely the damages occurred; a copy of this letter shall be sent to constructor or its representative.

If the units must not be immediately installed, it is strongly recommended to leave them inside their packing and to store them in a clean and dry place.

4 - Lifting and Handling

The good method of handling depends on the equipment, the size of the shipping sections, their final destination.

Figures 1 and 2 show the different possibilities that are offered.

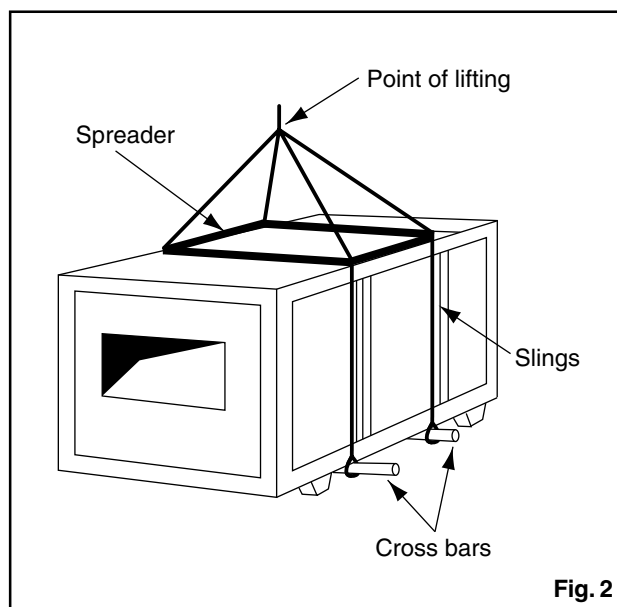
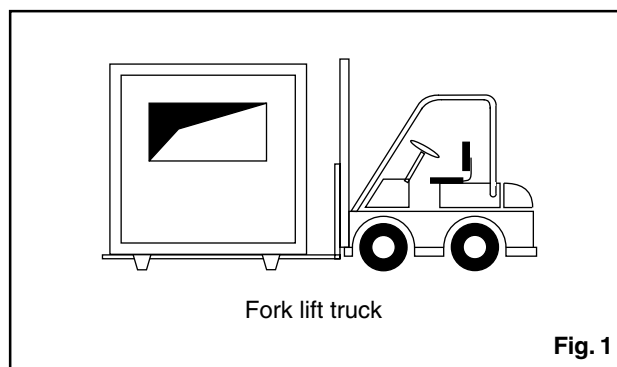
Use a spreader to prevent damage to the unit cabinetry.

Before hoisting into position, test lift to insure stability and balance. Avoid twisting or uneven lifting of the units.

Special care should be taken when handling the fan section. All fans are dynamically balanced before leaving the plant. Rough handling, however, can cause misalignment or a sprung shaft. Fans and shaft should be carefully inspected before unit installation to make sure this has not happened.

The coil sections as well as the mixing sections having dampers should also be handled with special care. Dampers are set and inspected before leaving the plant but should be checked on arrival to the job to be sure the bell arms and connecting rod setscrews have not become loose in shipment.

All these sections have been inspected before leaving the factory. It is therefore important to insure that no bolts, screws or other fixing system are loosened or missing before the commissioning.



Caution

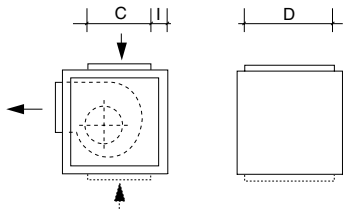
All panels of unit cabinetry are coated with a removable plastic film to protect them during the transportation.

This protection should be removed as soon as the units are received on site, at the risk of meeting later on with difficulties of peeling caused by sun radiations and bad weathers.

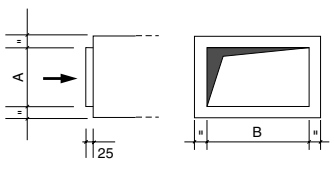
5 - Dimensions for Ductwork Connections

Inlet side

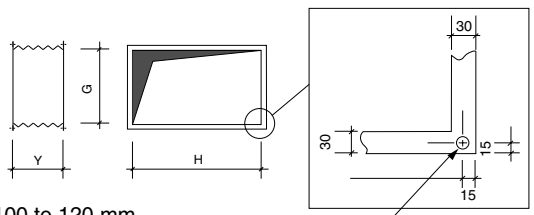
Inlet duct collar - Fan arrangement RS or RI



Full face inlet duct collar



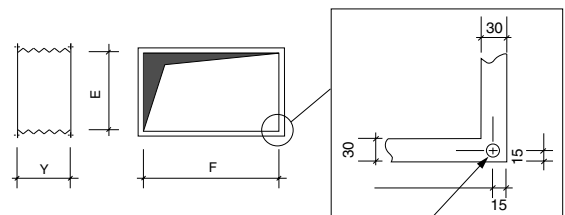
Inlet flexible connector for fan arrangement RS and RI



Y = 100 to 120 mm

4 holes of $\varnothing 10$

Full face inlet flexible connector



Y = 100 to 120 mm

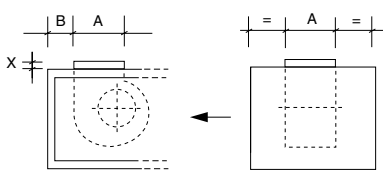
4 holes of $\varnothing 10$

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
A	370	530	650	650	650	970	1270	1270	1270	1570	1884	1884	1884	2504	2504
B	650	650	970	1070	1270	1270	1270	1570	1850	1850	2054	2504	3194	3194	3894
C	336	336	436	436	532	532	638	638	736	736	936	936	936	936	936
D	650	650	970	1070	1270	1270	1270	1570	1850	1850	2054	2504	3194	3194	3894
E	370	530	650	650	650	970	1270	1270	1270	1570	1884	1884	1884	2504	2504
F	650	650	970	1070	1270	1270	1270	1570	1850	1850	2054	2504	3194	3194	3894
G	336	336	436	436	532	532	638	638	736	736	936	936	936	936	936
H	650	650	970	1070	1270	1270	1270	1570	1850	1850	2054	2504	3194	3194	3894
I	74	74	74	74	76	76	73	73	74	74	83	83	83	83	83

Note : A x B and C x D : exterior dimensions. E x F and G x H : interior dimensions. Tolerance : ± 2 mm.

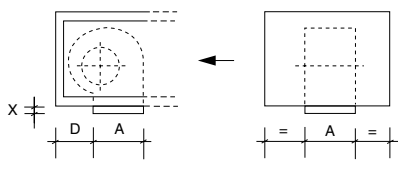
Fan discharge side

Standard discharge duct collar - Fan arrangement SS

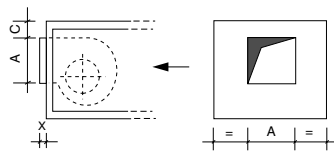


X = 40 mm (sizes 21 to 318) or 50 mm (sizes 428 to 1020)

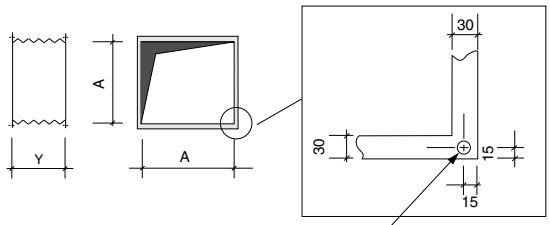
Standard discharge duct collar - Fan arrangement SI



Standard discharge duct collar - Fan arrangement SH



Fan discharge flexible connector



X = 40 mm (sizes 21 to 318) or 50 mm (sizes 428 to 1020)
Y = 100 to 120 mm

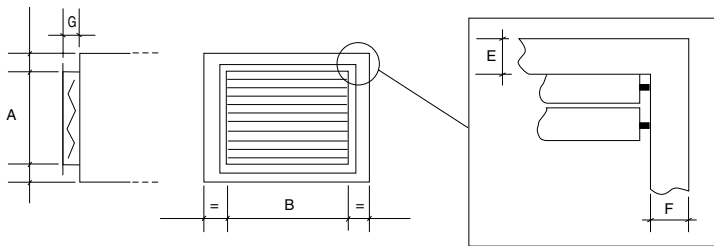
4 holes of $\varnothing 10$

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
A	400	400	500	600	600	700	900	900	1000	1100	1300	1400	1500	1600	1600
B	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
C	40	65	65	65	65	65	165	165	40	165	250	120	120	540	540
D	100	250	250	250	250	250	250	350	350	450	400	400	400	400	400

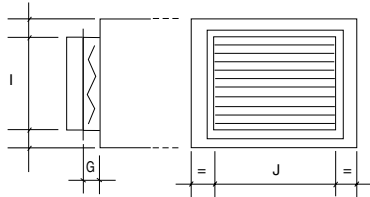
Note : A : exterior dimension. Tolerance : ± 2 mm.

5 - Dimensions for Ductwork Connections (cont'd)

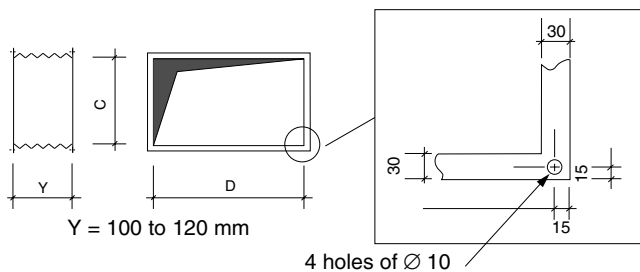
External shut-off damper



Duct collar



Flexible connector



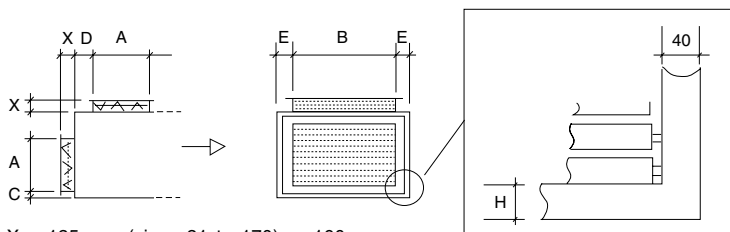
Sizes	21	35	56	71	85
A	394	532	638	638	638
B	630	630	950	1050	1250
C	370	530	650	650	650
D	650	650	970	1070	1270
E	18	30	30	30	30
F	40	40	40	40	40
G	125	125	125	125	125
I	370	530	650	650	650
J	650	650	970	1070	1270

Sizes	125	170	214	255	318
A	970	1270	1250	1250	1550
B	1250	1250	1550	1830	1830
C	970	1270	1270	1270	1570
D	1270	1270	1570	1850	1850
E	30	30	40	40	40
F	40	40	40	40	40
G	125	125	160	160	160
I	970	1270	1270	1270	1570
J	1270	1270	1570	1850	1850

Sizes	428	510	638	850	1020
A	1864	1864	1864	2484	2484
B	2034	2484	3108	3108	3808
C	1884	1884	1884	2504	2504
D	2054	2504	3194	3194	3894
E	40	40	40	40	40
F	40	40	40	40	40
G	160	160	160	160	160
I	1884	1884	1884	2504	2504
J	2054	2504	3194	3194	3894

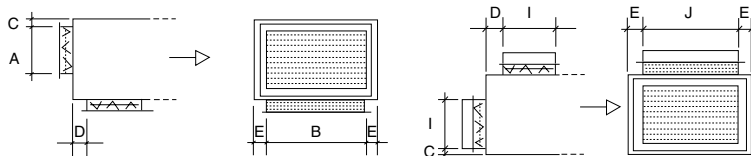
Note : A x B and C x D : interior dimensions.
I x J : exterior dimensions. Tolerance : ± 2 mm.

Standard 2-way mixing box

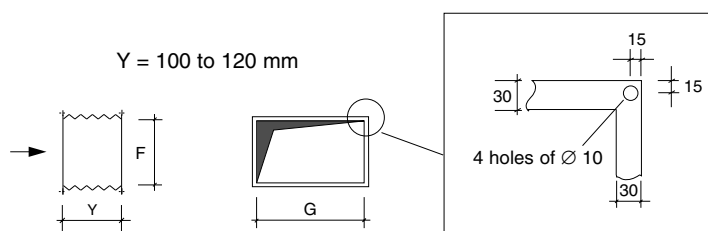


X = 125 mm (sizes 21 to 170) or 160 mm (sizes 214 to 1020)

Duct collar



Flexible connector



Sizes	21	35	56	71	85
A	336	336	436	436	532
B	630	630	950	1050	1250
C	74	74	74	74	76
D	74	74	74	74	76
E	85	85	85	85	85
F	336	336	436	436	532
G	650	650	970	1070	1270
H	30	30	30	30	30
I	336	336	436	436	532
J	650	650	970	1070	1270

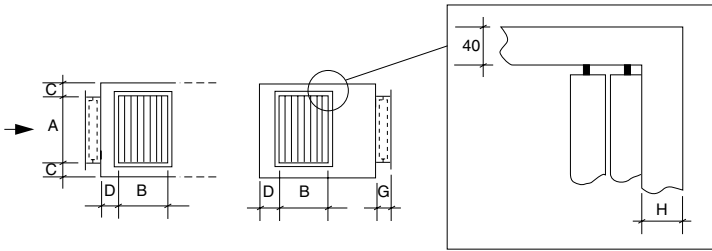
Sizes	125	170	214	255	318
A	532	638	616	716	716
B	1250	1250	1550	1830	1830
C	76	73	84	84	84
D	76	73	84	84	84
E	85	85	85	85	85
F	532	638	638	736	736
G	1270	1270	1570	1850	1850
H	30	30	40	40	40
I	532	638	638	736	736
J	1270	1270	1570	1850	1850

Sizes	428	510	638	850	1020
A	916	916	916	916	916
B	2034	2484	3108	3108	3808
C	93	93	93	93	93
D	93	93	93	93	93
E	93	93	96	96	96
F	936	936	936	936	936
G	2054	2504	3194	3194	3894
H	40	40	40	40	40
I	936	936	936	936	936
J	2054	2504	3194	3194	3894

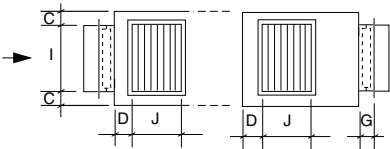
Note : A x B and F x G : interior dimensions. I x J : exterior dimensions.
Tolerance : ± 2 mm.

5 - Dimensions for Ductwork Connections (cont'd)

2-way mixing box with side dampers

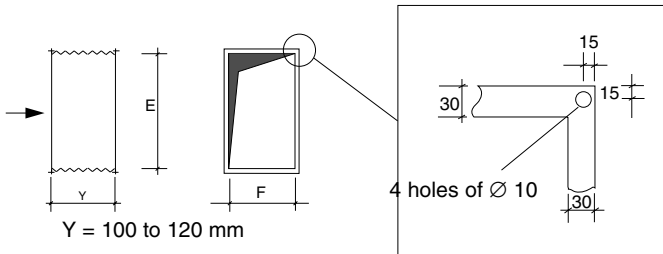


Duct collar



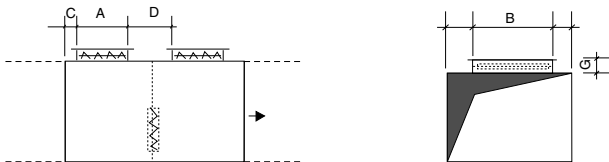
Remark : On units supplied with roof, the control of side dampers is located at lower part. In this case, make imperatively provision for a base frame under the unit in order to make access easier to the control of the dampers.

Flexible connector



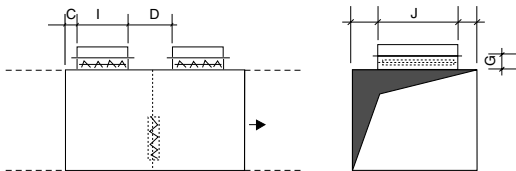
Note : A x B and E x F : interior dimensions. I x J : exterior dimensions.
Tolerance : ± 2 mm.

Standard 3-way mixing box

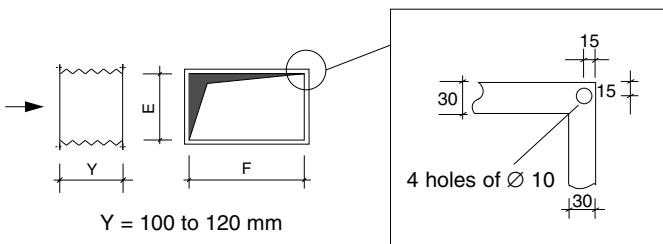


Fresh and exhaust air dampers can be located at bottom side.

Duct collar



Flexible connector



Note : A x B and E x F : interior dimensions. I x J : exterior dimensions.
Tolerance : ± 2 mm.

Sizes	21	35	56	71	85
A	350	510	630	630	630
B	336	336	436	436	532
C	85	85	85	85	85
D	74	74	74	74	76
E	370	532	650	650	650
F	336	336	436	436	532
G	125	125	125	125	125
H	30	30	30	30	30
I	370	532	650	650	650
J	336	336	436	436	532

Sizes	125	170	214	255	318
A	950	1250	1250	1250	1550
B	532	638	638	638	616
C	85	85	85	85	85
D	76	73	73	73	84
E	970	1270	1270	1270	1570
F	532	638	638	638	636
G	125	125	125	125	160
H	30	30	30	30	40
I	970	1270	1270	1270	1570
J	532	638	638	638	636

Sizes	428	510	638	850	1020
A	1864	1864	1864	2484	2484
B	916	916	916	916	916
C	93	93	93	93	93
D	93	93	93	93	93
E	1884	1884	1884	2504	2504
F	936	936	936	936	936
G	160	160	160	160	160
H	40	40	40	40	40
I	1884	1884	1884	2504	2504
J	936	936	936	936	936

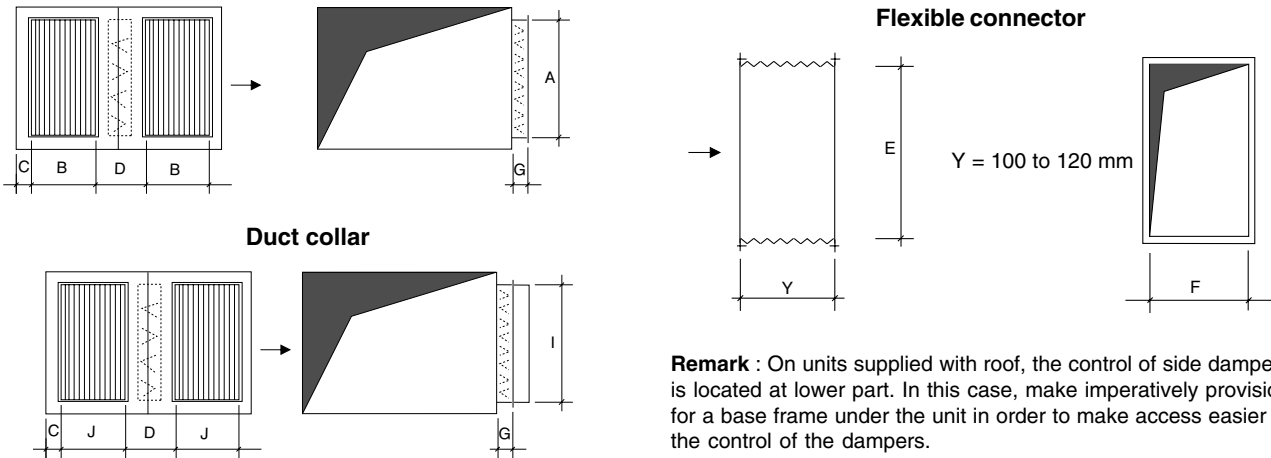
Sizes	21	35	56	71	85
A	336	336	436	436	532
B	630	630	950	1050	1250
C	32	32	32	32	34
D	64	64	64	64	68
E	336	336	436	436	532
F	650	650	970	1070	1270
G	125	125	125	125	125
I	336	336	436	436	532
J	650	650	970	1070	1270

Sizes	125	170	214	255	318
A	532	638	616	716	716
B	1250	1250	1550	1830	1830
C	34	31	42	42	42
D	68	62	84	84	84
E	532	638	638	736	736
F	1270	1270	1570	1850	1850
G	125	125	160	160	160
I	532	638	638	736	736
J	1270	1270	1570	1850	1850

Sizes	428	510	638	850	1020
A	916	916	916	916	916
B	2034	2484	3108	3108	3808
C	42	42	42	42	42
D	284	284	284	284	284
E	936	936	936	936	936
F	2054	2504	3194	3194	3894
G	160	160	160	160	160
I	936	936	936	936	936
J	2054	2504	3194	3194	3894

5 - Dimensions for Ductwork Connections (cont'd)

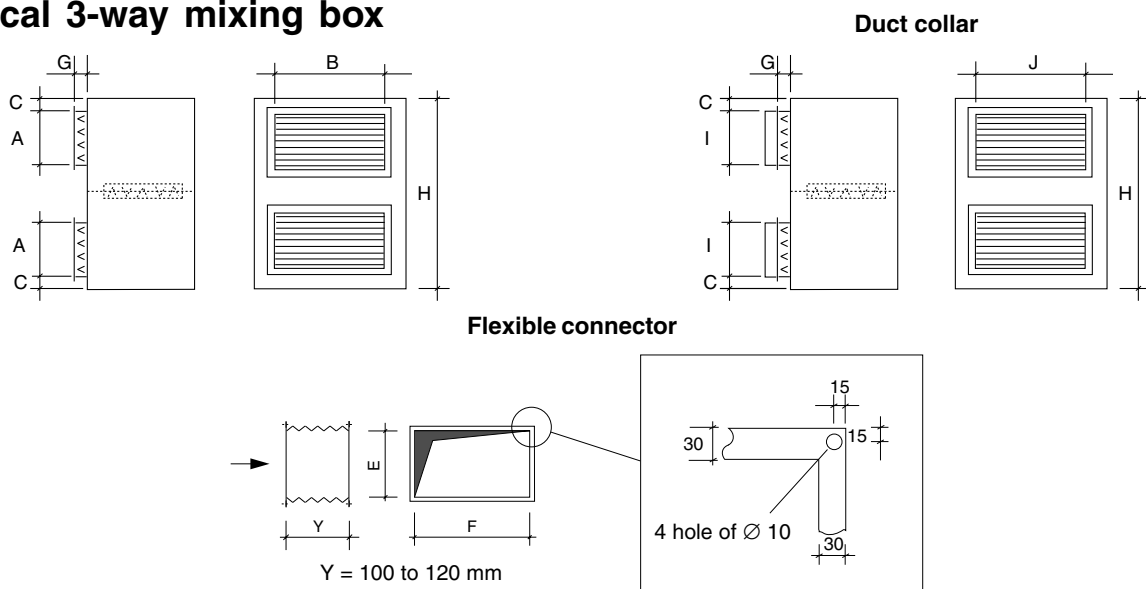
3-way mixing box with side dampers



Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
A	350	510	630	630	630	950	1250	1250	1250	1550	1864	1864	1864	2484	2484
B	336	336	436	436	532	532	638	638	638	616	916	916	916	916	916
C	32	32	32	32	34	34	31	31	31	42	42	42	42	42	42
D	64	64	64	64	68	68	62	62	262	284	284	284	284	284	284
E	370	532	650	650	650	970	1270	1270	1270	1570	1884	1884	1884	2504	2504
F	336	336	436	436	532	532	638	638	638	636	936	936	936	936	936
G	125	125	125	125	125	125	125	125	125	160	160	160	160	160	160
I	370	532	650	650	650	970	1270	1270	1270	1570	1884	1884	1884	2504	2504
J	336	336	436	436	532	532	638	638	638	636	936	936	936	936	936

Note : A x B and E x F : interior dimensions. I x J : exterior dimensions. Tolerance : ± 2 mm.

Vertical 3-way mixing box



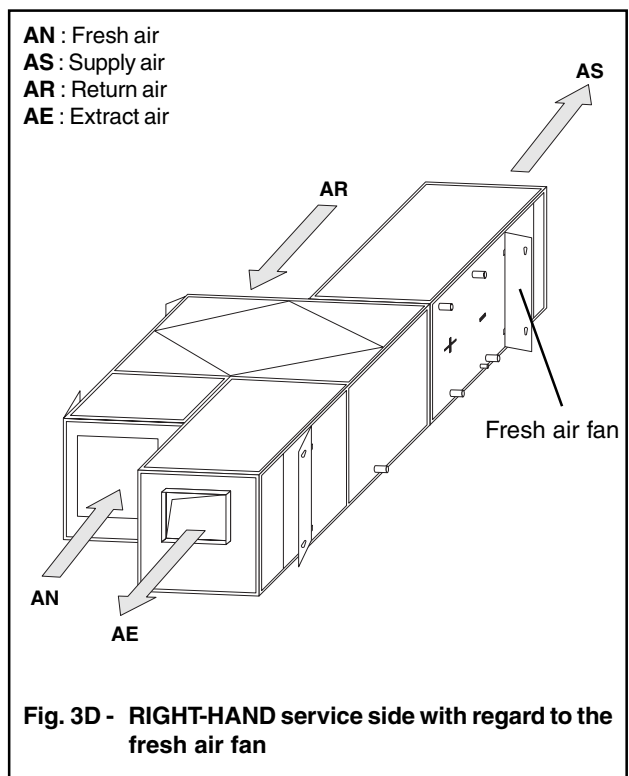
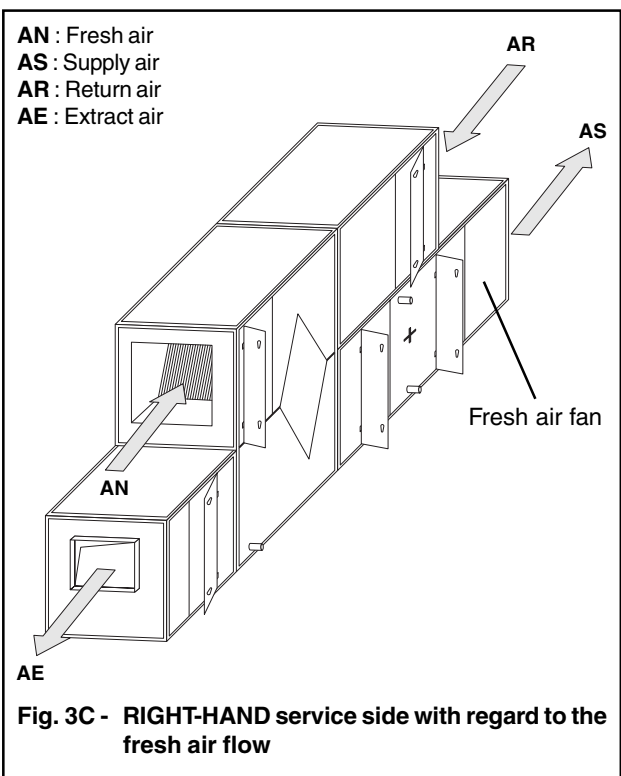
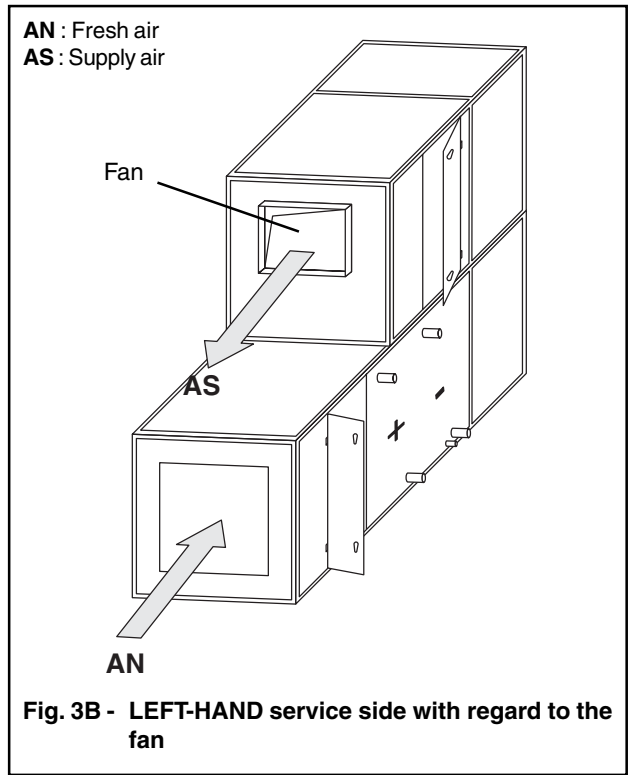
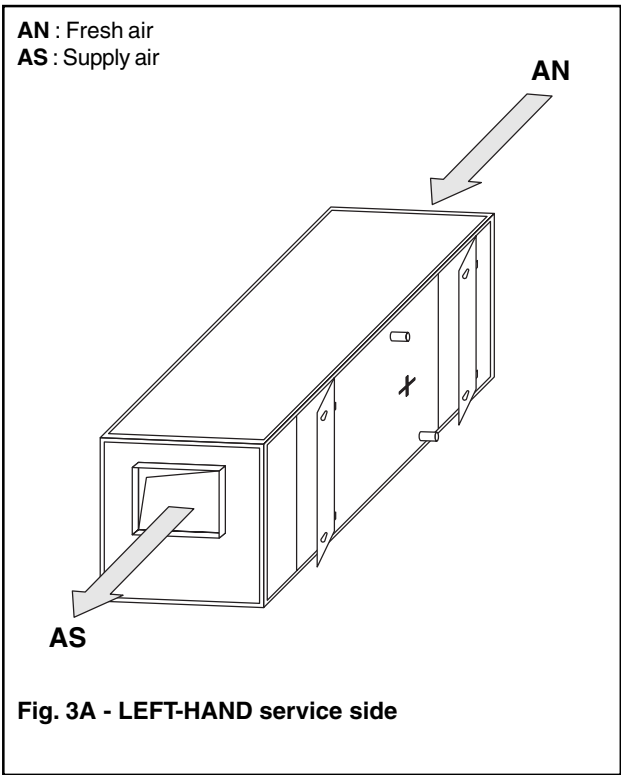
Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
A	336	336	436	436	532	532	638	616	716	-	-	-	-	-	-
B	630	630	950	1050	1250	1250	1250	1550	1830	-	-	-	-	-	-
C	74	74	74	74	76	76	73	84	84	-	-	-	-	-	-
E	336	336	436	436	532	532	638	638	736	-	-	-	-	-	-
F	650	650	970	1070	1270	1270	1270	1570	1850	-	-	-	-	-	-
G	125	125	125	125	125	125	125	160	160	-	-	-	-	-	-
H	1040	1360	1600	1600	1600	2240	2840	2840	2840	-	-	-	-	-	-
I	336	336	436	436	532	532	638	638	736	-	-	-	-	-	-
J	650	650	970	1070	1270	1270	1270	1570	1850	-	-	-	-	-	-

Note : A x B and E x F : interior dimensions. I x J : exterior dimensions. Tolerance : ± 2 mm.

6 - Definition of the Service Side

The service side is defined as the side where there are access to main functions (filters, fan-motor assembly, electric heater, inspection), access to accessories (pressure tapping points, manometers, disconnect switch, rods of dampers, etc.) and water connections (coils, condensate drain).

The drawings below show the service sides defined for different air handling unit configurations.



7 - Installation

7.1 - Unit placement

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes.

Sheet metal parts, self-tapping screws, clips, and such items inherently have sharp edges, and it is necessary that the installer exercises caution.

This equipment is to be installed only by an experienced installation company which employs trained personnel.

All units can be equipped with a base frame under each shipping section (**optional** on sizes 21 to 318 and **standard** on sizes 428 to 1020) making their installation easier on a flat floor.

Every section must be levelled to facilitate the assembly of sections and insure proper drainage of condensate pan.

If vibration isolators are required, they have to be installed between unit base frame and floor, and correctly determined to be sure vibrations will be eliminated. It is important to ensure the surface evenness of the unit all along its length.

The installation of the unit must allow an easy access, necessary for maintenance purposes on the unit.

Adequate space should be left around the unit for piping coils and drains, maintenance such as filter replacement, drain pan inspection and cleaning, lubrication and belt adjustment. Sufficient space should be provided on the side of the unit for coil and fan removal should that become necessary. This space must be at least equal to the width of the unit (see fig. 4).

Flexible connectors should be used on the outlet and inlet duct connections of all units. They must be connected to the discharge duct collar or directly to frameworks of full face outlet and inlet sides.



Warning

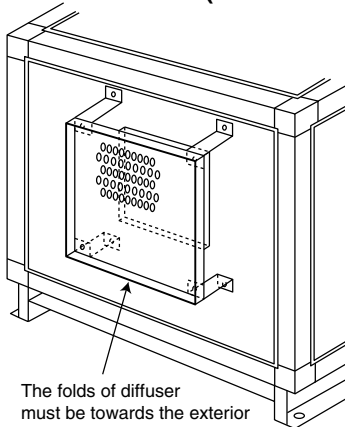
Standard air handling units are designed for indoor installation. If they are to be installed outdoors, make sure the necessary equipment such as roof, rain hood, etc. are provided.



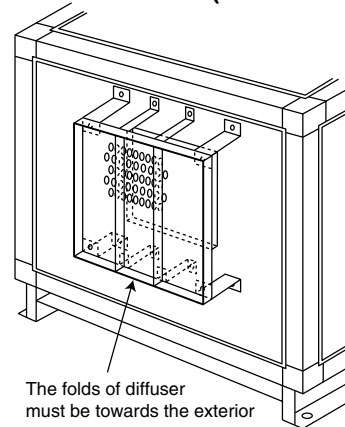
Caution

Air diffuser at fan discharge side will be supplied loose. Make certain that it will be installed at site (see installation diagrams below).

Installation of air diffuser (sizes 21 to 318)



Installation of air diffuser (sizes 428 to 1020)



Service clearances

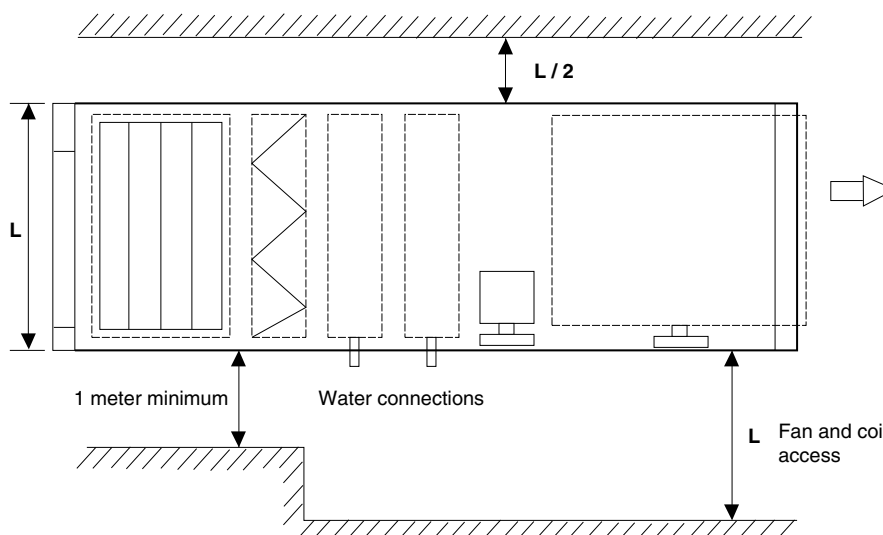
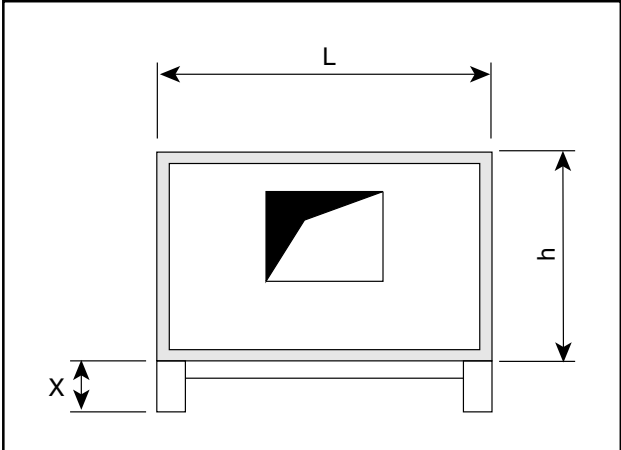


Fig. 4 (top view)

7 - Installation (cont'd)

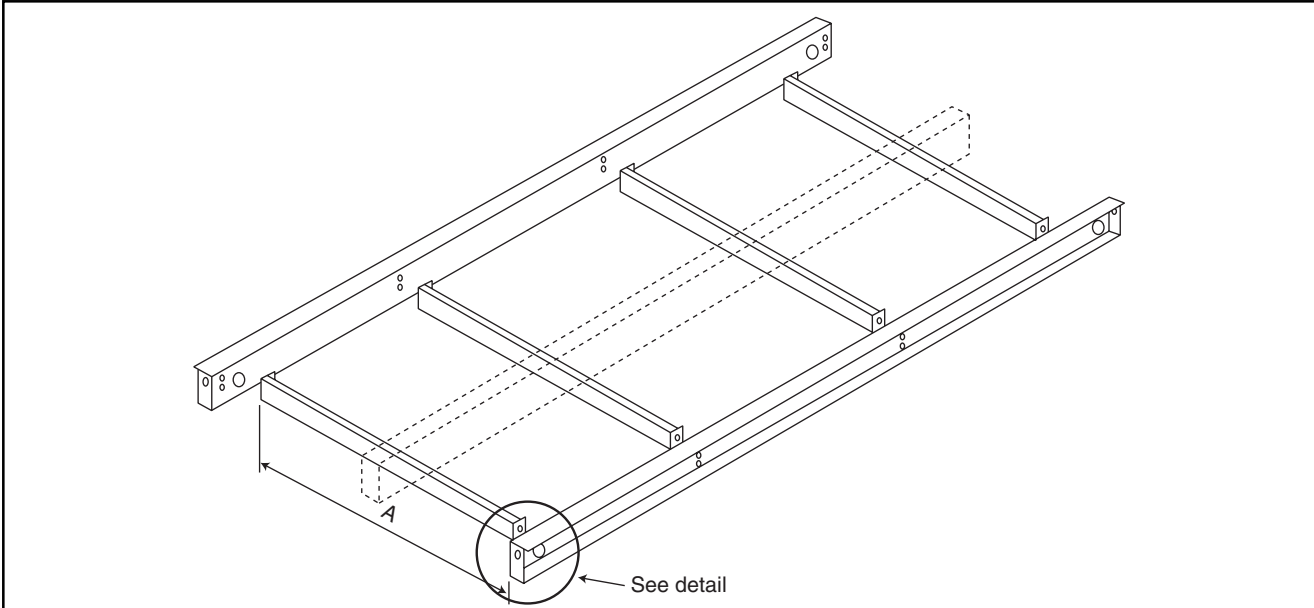
Dimensions of the units



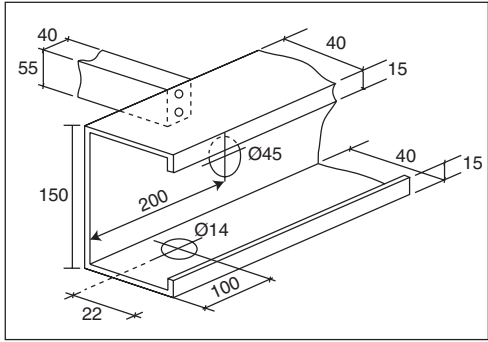
Sizes	Dimensions		
	L	h	X *
21	800	520	150
35	800	680	150
56	1120	800	150
71	1220	800	150
85	1420	800	150
125	1420	1120	150
170	1420	1420	150
214	1720	1420	150
255	2000	1420	150
318	2000	1720	150
428	2220	2050	180
510	2670	2050	180
638	3300	2050	180
850	3300	2670	180
1020	4000	2670	180

* Unit with base frame (optional on sizes 21 to 318 and standard on sizes 428 to 1020).

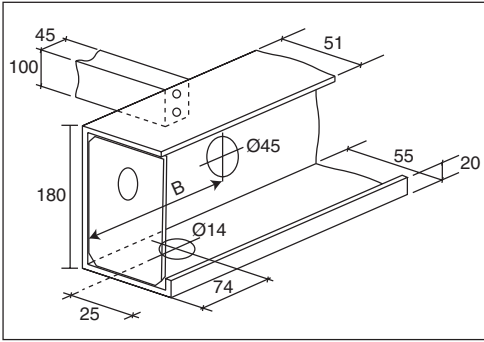
Dimensions of the base frames



Detail of base frame sizes 21 to 318



Detail of base frame sizes 428 to 1020



Dimension B (mm) :

- 150 for module with max. length of 1700 mm.
- 200 for module with length up to 1900 mm.
- 250 for module with length higher than 1900 mm.

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638 *	850 *	1020 *
A (mm)	712	712	1032	1132	1332	1332	1332	1632	1912	1912	2110	2560	2x1593	2x1593	2x1940

* Units having a base frame fitted with an additional side member represented in dotted figure.

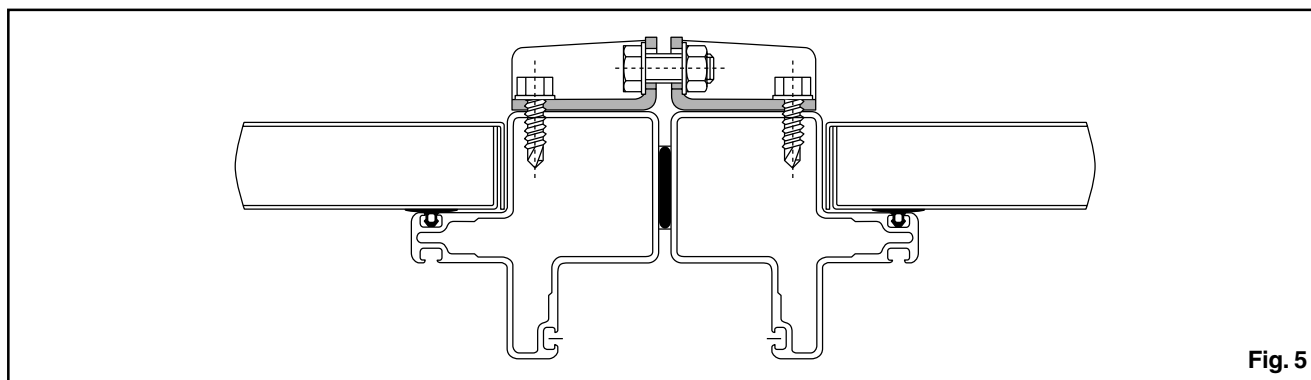
7 - Installation (cont'd)

7.2 - Assembly of the sections

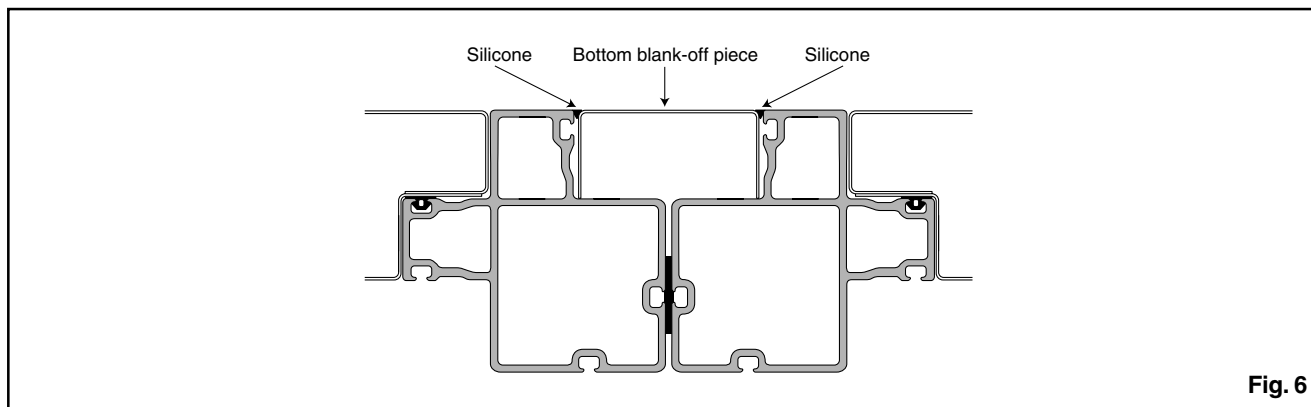
The units can ship fully assembled or as separate shipping sections. Units that require field assembly of shipping sections must be rigged into position first. Shipping sections are provided with assembly clamps. Joining gaskets are also supplied to insure an air tight seal between two sections once they are assembled together. Assembly of shipping sections shall be done as follows :

1. Stick the joining gaskets onto the aluminium frame of the shipping section.
2. Rig the unit into position and line shipping sections up in direction of air flow. Sections must be pulled together to press the joining gaskets.
3. Fasten the 2 shipping sections together using clamps for external section to section assembly as shown in figure 5.
4. On sizes 428 to 1020, install the bottom blank-off piece between the two frameworks and apply the field supplied silicone around the edges (see fig. 6).

External section to section assembly (sizes 21 to 1020)



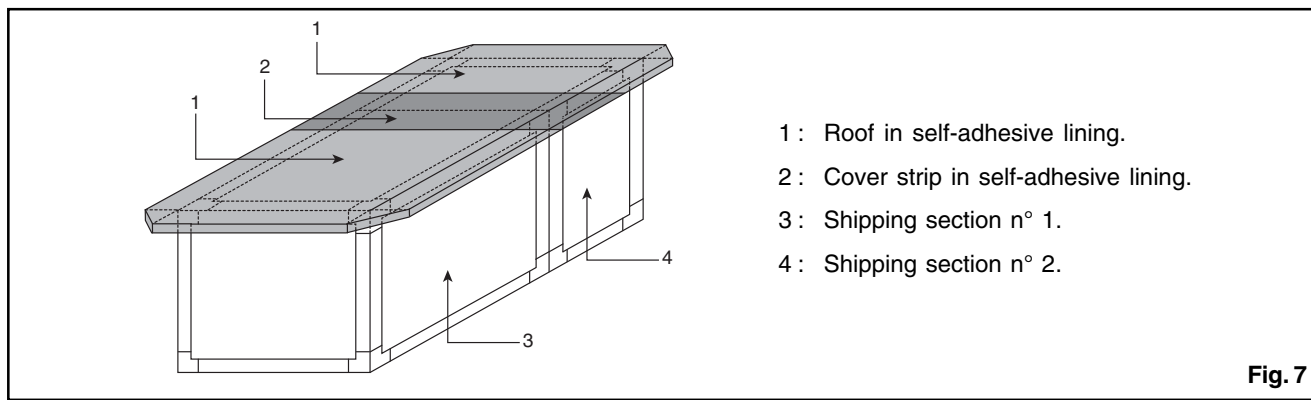
Floor completion (sizes 428 to 1020)



7.3 - Assembly of the roof

The outdoor units shall be equipped with factory-installed roof which is stuck on the top of each shipping section. A cover strip

must be installed at site, at the junction point of the two shipping sections after assembling the latter (see fig. 7).



- 1 : Roof in self-adhesive lining.
- 2 : Cover strip in self-adhesive lining.
- 3 : Shipping section n° 1.
- 4 : Shipping section n° 2.

7 - Installation (cont'd)

7.4 - Water piping

Water piping should be in accordance with accepted industry standards.

Undue stress should not be applied at the connection to coil headers. Pipework should be supported independently of the coils.

It is strongly recommended to install flexible isolators on water inlet and water outlet.

Water piping should have air vent and drain orifice, respectively located at the highest point and the lowest point of the installation.

Manual shutoff valves should be used on water inlet and water outlet of the coils to allow their maintenance.

Units must be levelled to insure proper operation and drainage of coils and drain pan.

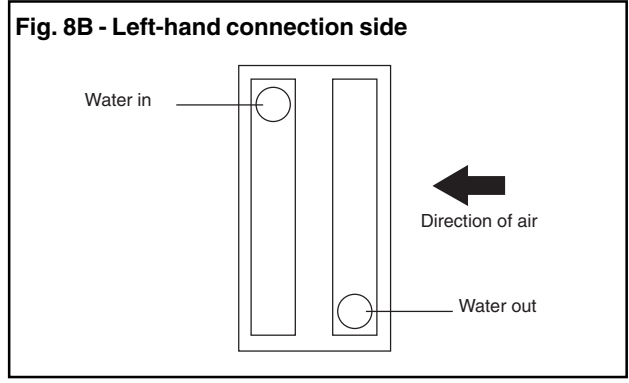
Coil connections

Coils are equipped with steel headers of which the connections are extended to exterior of the unit.

Each coil has two connection orifices, one is at higher part and the other at lower part, permitting the same coil to be used for left hand or right hand water supply.

To insure an optimal heat transfer efficiency, water supply of coil should be arranged in counter-flow to the direction of air.

Water inlet and water outlet change from top to bottom orifice depending on whether the coil connection side is left hand or right hand (see fig. 8A and 8B).

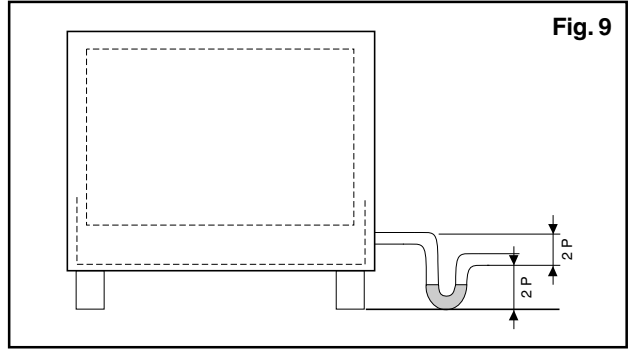


Condensate drain connection

Drain lines should have the same diameter as that of the drain pan connection.

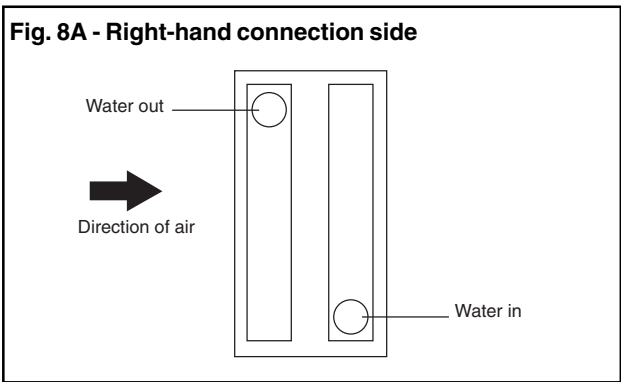
Drain pan should have traps to permit the condensate from the coils to drain freely.

On both blow-through and draw-through units, the trap depth and the distance between the trap outlet and the drain pan outlet should be twice the static pressure in the drain pan section under normal operation to assure the trap remains sealed (see fig. 9).



⚠
Warning

When installing couplings, do not apply undue stress to the connection extending through unit panel. Use backup pipe wrench to avoid breaking the weld between coil connection and header.



Winterizing water coils

In winter, due to a general shutdown of the installation or a failure of outdoor air damper control, coil freeze-up may occur.

To avoid coil damage, it is recommended to drain completely the non used coils or to fill them with an anti-freeze solution.

The concentration of anti-freeze solution must be regularly and carefully checked before each winter season. It is highly advised to place a heating coil before a cooling coil for an operation during winter season.

⚠
Caution

Carefully read instructions for mixing anti-freeze solution used. Some products will have a higher freezing point in its natural state than when mixed with water.
The freezing of coils is not the responsibility of the manufacturer.

7 - Installation (cont'd)

Water volume and connection size of coils

Sizes		21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
2 rows heat	Water vol. (l)	2.1	3.1	5.2	5.5	6.2	10	13.1	15.2	19.5	23.4	30	42	49	72	82
	Conn. size	26x34	26x34	33x42	33x42	33x42	33x42	50x60	50x60	50x60	50x60	50x60	66x76	66x76	66x76	80x90
2 rows cool	Water vol. (l)	2.1	2.8	5.1	5.4	6	8.8	11.5	17.2	18.8	28.9	30	42	49	72	82
	Conn. size	26x34	26x34	33x42	33x42	33x42	33x42	50x60	50x60	50x60	50x60	50x60	66x76	66x76	66x76	80x90
4 rows cool	Water vol. (l)	3.3	4.6	8.1	8.7	10.5	17.6	23	26.7	30	42.8	56	68	88	116	136
	Conn. size	26x34	26x34	33x42	33x42	50x60	50x60	50x60	50x60	50x60	66x76	66x76	66x76	80x90	80x90	80x90
6 rows cool	Water vol. (l)	4.5	6.9	13.1	14	15.9	23.5	35.3	40.8	45.8	57	77	101	122	160	209
	Conn. size	26x34	33x42	50x60	50x60	50x60	50x60	66x76	66x76	66x76	66x76	66x76	80x90	80x90	102x114	102x114
8 rows cool	Water vol. (l)	6.2	9.2	16.2	17.4	19.9	33	43.2	50.6	57.2	71.2	98	128	169	223	264
	Conn. size	33x42	33x42	50x60	50x60	50x60	50x60	66x76	66x76	66x76	66x76	66x76	66x76	80x90	102x114	102x114
10 rows cool	Water vol. (l)	7.2	10.6	18.7	20.2	23.1	37.8	49.5	58.4	66.4	82.8					
	Conn. size	33x42	40x49	50x60	50x60	50x60	66x76	66x76	66x76	66x76	66x76					
12 rows cool	Water vol. (l)	8.4	12.6	21.7	24.2	28.1	43.8	56.5	66.4	75.4	92.8					
	Conn. size	33x42	40x49	50x60	50x60	50x60	66x76	66x76	66x76	66x76	66x76					

Notes :

- 1) **WK** coils : 2 row heating coils and 2 to 8 row cooling coils (sizes 428 to 1020).
- 2) **WM** coils : 2 to 12 row cooling coils (sizes 21 to 318).
- 3) Fin spacing : **2.0 mm** for WK coils and **2.5 mm** for WM coils.
- 4) Connection type : **BSP male threaded** for diameter 26 x 34 to 50 x 60, **smooth** for diameter $\geq 66 \times 76$.

7.5 - Electrical connections

The units are not supplied with electrical panel. Wiring on the electric motors must be done at site. All motors are designed and produced in accordance with the standards in use. The connection of these motors will be done according to the indications affixed on the nameplate and on the diagram located in the terminal box.

All motors are equipped, as standard, with a normally closed internal overload protection sensor. This safety device shall

be imperatively connected to the control circuit of the motor. The non-respect of this instruction will cancel compulsorily the warranty on the motor.

Electrical panels must not be mounted on doors or panels providing access to interior of the unit.

Power supply cables entering into the unit, must be run through cable glands mounted on unit panel.

All orifices for cable entry done on the panels must be sealed to prevent leakage.

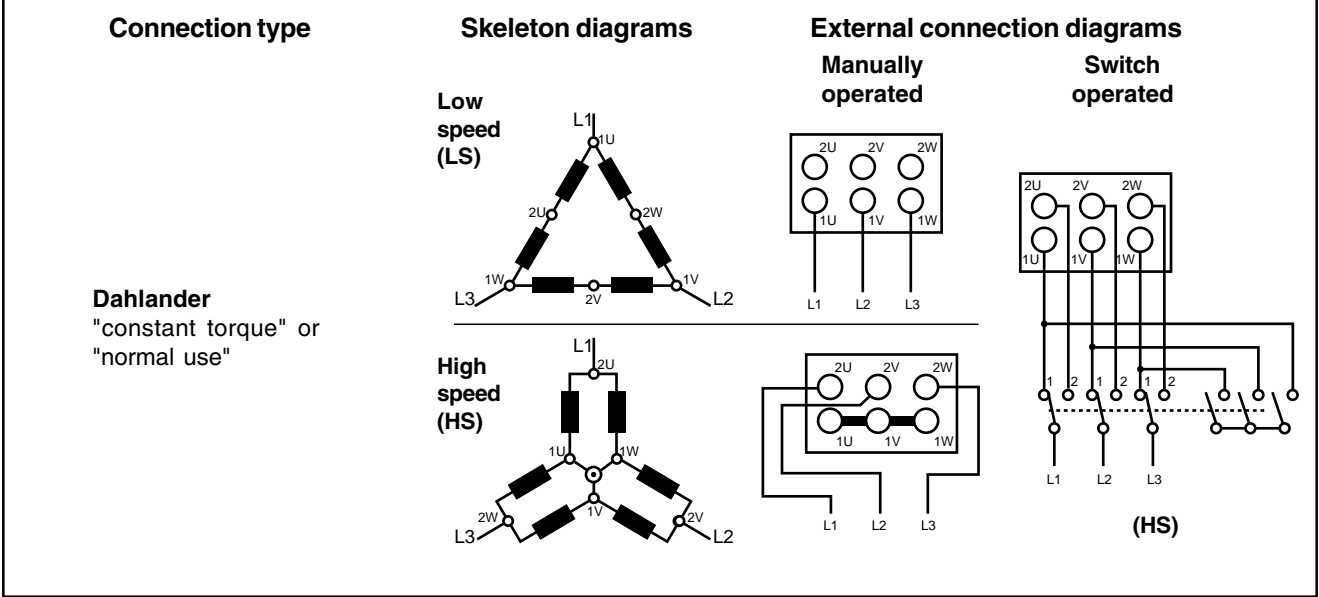
Single speed motors (1)

Dual-voltage motors with Y / Δ connections	Skeleton diagrams	External connection diagrams	
		D.O.L. starting	Y / Δ starting
<ul style="list-style-type: none"> - Voltage : U - Connection : Δ (at lower marked voltage) - e.g. : 230 V / Δ 			
<ul style="list-style-type: none"> - Voltage : $U \sqrt{3}$ - Connection : Y (at higher marked voltage) - e.g. : 400 V / Y 			

- (1) Diagrams valid for :
- 3-phase 230 Δ / 400 Y V motors with power from 0.25 to 4.5 kW at 1500 rpm and from 0.25 to 5.5 kW at 3000 rpm,
 - 3-phase 400 Δ V motors with power higher or equal to 5.5 kW at 1500 rpm, using Y / Δ starter.

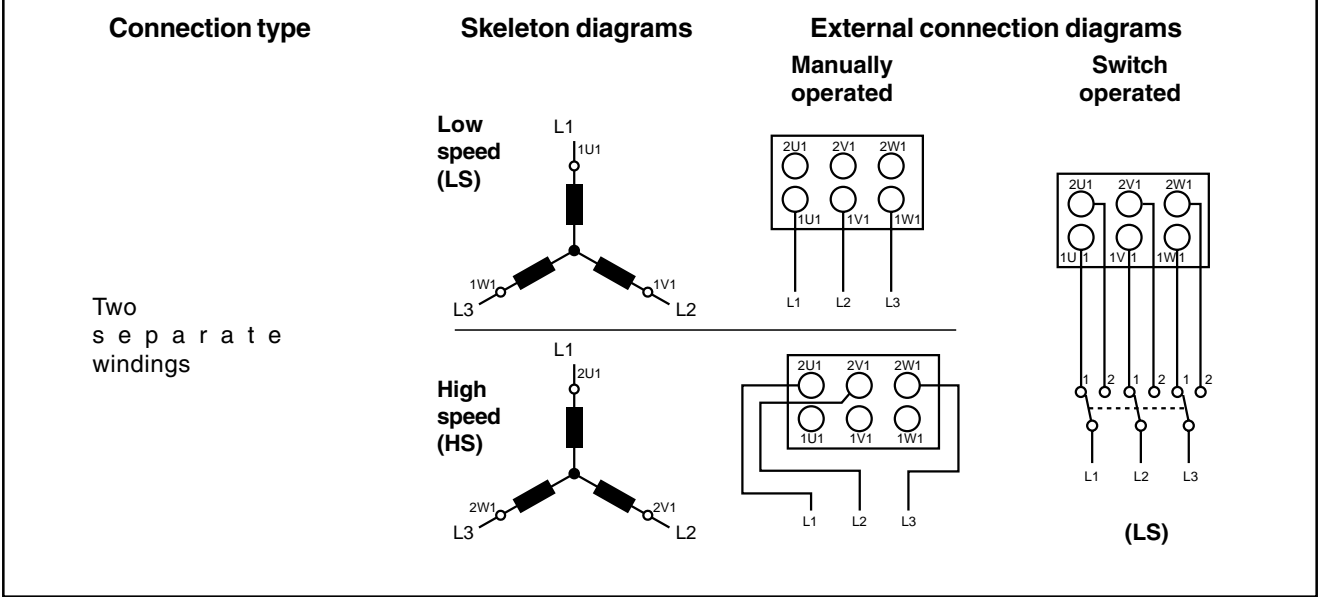
7 - Installation (cont'd)

2-speed motors (2)



(2) Diagrams valid for 3-phase 400 V motors at 1500 / 750 rpm and 3000 / 1500 rpm.

2-speed motors (3)



(3) Diagrams valid for 3-phase 400 V motors at 1500 / 1000 rpm.

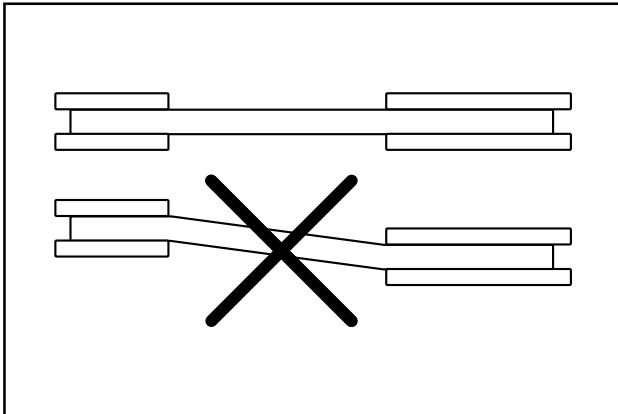
8 - Before Startup Checks

When performing startup and service, thorough safety precautions should always be taken.

Only qualified individuals should perform these functions.

1. Check that the unit is completely and properly installed with ductwork connected and that the protective plastic film has been removed.
2. Check that all construction debris are removed and filters are clean.
3. Check that the electrical work is complete and properly terminated.
4. Check that the electrical connections are tight and that the proper voltage is connected.
5. Check that all holes for cable entry are tightly sealed.
6. Check tightness of setscrews on motors, bearings and fans.
7. Check alignment of fan and motor pulleys and belt tension (see drawings below).
8. Check that coil and drain pan connections are properly done.
9. Leak test thermal system to insure that connections are tight.
10. Check that condensate drain is trapped.
11. Check that fans rotate freely.

Belt alignment

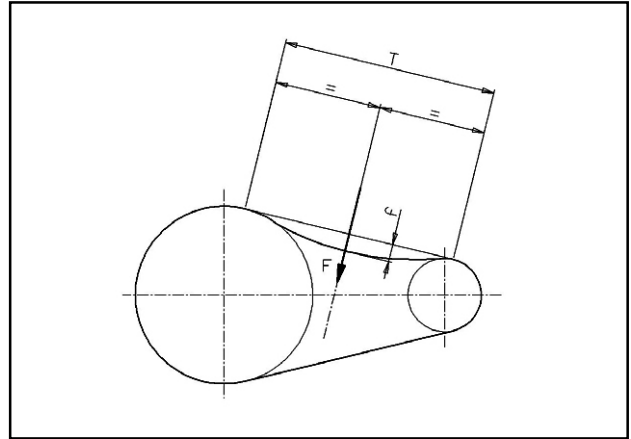


Belt tensioning

If you do not have a specific instrument, such as a tension gauge, to measure the belt tension, you can apply the following approximate method :

Proceed with the tensioning of the belts by gradual tensioning of the motor base. Correct running of the fan is determined by the correct tensioning. To ensure correct tensioning it is necessary to measure the tensioning force of each belt by means of a dynamometer. Measure in the middle of the free length 'T' a perpendicular force able to

deflect the belt of a deflexion "f" of 1.5mm for each 100mm of "T". Then compare the result with the dynamometer values F' and F" in the following table.



Belt section	External dia. minor pulley (mm)	RPM minor pulley	Min. F' Newton	Max. F" Newton
SPZ	50 ÷ 90	1200 ÷ 5000	10	15
	100 ÷ 150	900 ÷ 1800	20	30
	155 ÷ 180	600 ÷ 1200	25	35
SPA	90 ÷ 145	900 ÷ 1800	25	35
	150 ÷ 195	600 ÷ 1200	30	45
	200 ÷ 250	400 ÷ 900	35	50
SPB	170 ÷ 235	900 ÷ 1800	35	45
	250 ÷ 320	600 ÷ 1500	40	60
	330 ÷ 400	400 ÷ 900	45	65
SPC	250 ÷ 320	900 ÷ 1800	70	100
	330 ÷ 400	600 ÷ 1200	80	115
	440 ÷ 520	400 ÷ 900	90	130

Remarks :

1. If $F < F'$, a higher belt tension is required. If $F > F''$, the belts are too tight.
2. During the running-in period of the fan belts an early decrease in tension takes place. It is therefore necessary at the initial assembly to tension the belts 1.3 times higher than the "f" deflexion shown in the tables. Belt tensions should be checked regularly and always after the first eight working hours.

Problems due to a too low belt tension

- Belts turn over in pulley grooves with excessive wear.
- Excessive running noise.
- Severe belt vibration.
- Anomalous loads.

Problems due to a too high belt tension

- Excessive loads on bearings, shaft and motor with a consequent decrease of their life.
- Rise in loads on all the other components.
- Increase in vibration and noise.

9 - Fan Startup



Caution

Before entering any fan section, make sure the electrical power source to the fan motor is disconnected and locked.

Fan should start and run. Observe the rotation and if it is not correct, reverse two cables of the 3-phase motor power supply.

Safety precautions

The standard units are not equipped with belt guard. The access doors must not be opened while the unit is running to avoid the hazard of moving machinery and strong suction forces tending to keep the doors in a closed position.

After first 48 hours of operation

1. Disconnect and lock electrical power source. Check the tightness of bearings, wheel and sheave setscrews (or capscrews).
2. Re-check belt tension, adjust if necessary. Belts tensioned sufficiently to slip one to two seconds at startup will perform satisfactorily extending life and reducing vibrations. If re-tensioning is necessary, be certain pulley sheave alignment is retained.

Unit storage

If air handling units are to be stored for any period of time, it is important to periodically rotate the fan wheel. The fan wheel needs to be rotated to prevent any deflection in the fan shaft which could cause unbalanced fan operation. Also it is important to keep the fan bearings lubricated. If the fan wheel is not periodically rotated, grease will settle in the lower part of the bearing. This can lead to oxidation on the upper portion of the bearing surface which can cause bearing failure.

10 - Maintenance

The user of the air handling units is responsible for the maintenance of the equipments to keep them in good condition of operation.

1. Electrical supply to the fan motor must correspond to the rated voltage on the motor nameplate and be in conformity with the National Electrical Code and local restrictions.
2. Earth wiring to the unit metal structure must be regularly checked.
3. Motor thermal relays and electrical contacts must be regularly checked.
4. Check all moving parts for wear every six months. Check setscrews of motors, fans and bearings for tightness every six months.
5. Filters must be clean to obtain maximum efficiency. They should be inspected periodically and be replaced if necessary. Units should never be operating without filters.
6. Due to the fact that drain pans in any air conditioning unit will have some moisture in them, algae, etc., will grow due to airborne spores and bacteria. Periodic cleaning is necessary to prevent this build-up from plugging the drain and causing the drain pan to overflow. Also, the drain pans should be kept clean to prevent the spread of disease. Cleaning should be performed by qualified personnel.
7. The condensate drain pan can pick up lint and dirt, especially with dirty filters. Inspect twice a year to avoid the possibility of overflow.
8. Coils must be clean to obtain the maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Care must be taken not to damage the fins while cleaning.



Caution

Fin edges are sharp and can cause injury hazard. Avoid contact with them.

Fan bearings

Every maintenance operation must be carried out with suitable tools.

A first check of the bearing can be done simply by listening to it. A normal bearing generates a smooth and uniform sound; while a damaged bearing generates a loud and irregular sound.

A low metallic noise, due to standard gap between the components, is normal, especially at low speed.

Excessive vibrations or temperature are often a sign of possible damages.

Check periodically seals integrity and the bearing locking system.

Make sure that there is not excessive leak of grease from the bearing. A leak of a little quantity of grease is normal, especially in the first working hours.

The bearings mounted on our fans are estimated to have a mechanical life (L_{10h}) of 40,000 working hours when selected within the operating limits and standard conditions mentioned in the catalogue or with an appropriately sized drive.

The actual life of the grease contained inside the bearings may be shorter than the mechanical life of the bearing itself.

Fans of the L and R versions use single row, deep groove, self-aligning ball bearings. Sealed and life lubricated, they are locked on the shaft with an eccentric ring clamp and supported, inside electrically conductive rubber shock absorbers, on inlet bolted spiders (Fig.10).

Fans of the K version use sealed, single row, self-aligning ball bearings, with eccentric clamp, mounted inside cast iron pillow blocks, with grease nipples, bolted to the side-frames (Fig. 11).

Fans of the K1 version use reinforced single row sealed ball bearings, locked on the shaft with a conical sleeve and mounted inside cast-iron pillow blocks, with grease nipples, bolted to the side-frames (Fig. 12).

10 - Maintenance (cont'd)

Fan bearings (cont'd)

All the fans of the K2 version have sealed heavy-duty bearings of different types, according to the fan size: single row ball bearings with conical sleeve inside cast iron pillow blocks (500); double-row ball bearings with conical sleeve inside split block housings (560, 630, 710 and 800) or double row, self-aligning roller bearings inside single piece pillow blocks (900 and 1000). All the pillow blocks have grease nipples for lubrication and are bolted to specially reinforced side-frames (Fig. 13).

Periodical re-lubrication is necessary to achieve the full mechanical life of bearings.

Fig. 10



Fig. 12



Fig. 11

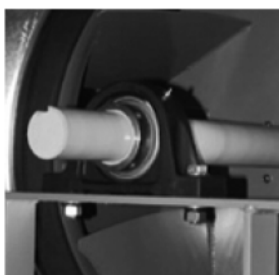


Fig. 13



figure is valid for bearings on horizontal shafts with normal loads and for temperatures not higher than 70°C. For higher temperatures we suggest halving the time between re-lubrication every 15°C increase in ambient temperature, without exceeding the maximum working temperature stated in the catalogue.

These values are not valid in presence of water, humidity or solid impurities, which can go inside the bearings. In this case we recommend to renew frequently the whole grease.

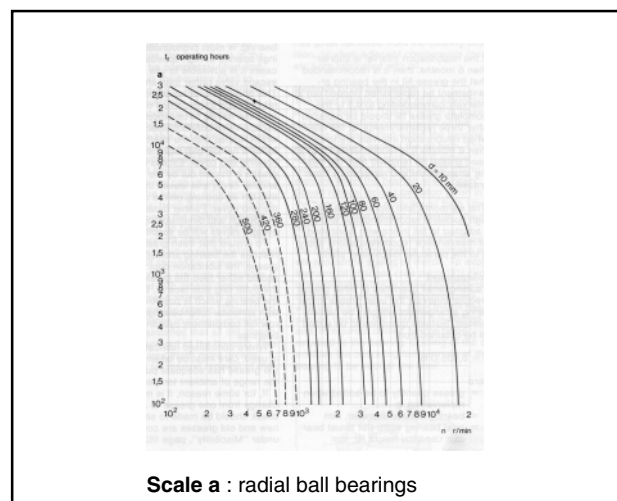
Never schedule re-lubrication intervals over of 30,000 hours.

The grease quantity to be supplied can be obtained from the equation below for applications in standard conditions (temperature not exceeding 70°C) :

$$(g/h) = 0.005 \times D \times B$$

where :

- g = grease quantity (g)
- h = working hours
- D = bearing outside diameter (mm)
- B = total bearing width (mm)



Bearings lubrication

Many factors can determine when re-lubrication of the bearings is required: the type and dimension of bearing, its operating speed, the working temperature, pulleys dimension, installed motor power, type of grease and the working environment. It is therefore only possible to give some indications based on statistical data available.

For these reasons the re-lubrication intervals t_f (time period, at the end of which 99% of the bearings are still reliably lubricated, and represent L1 grease lives. The L10 grease lives are approximately 2.7 the L1 lives) can be obtained from the attached figure taking into account the rotational speed and diameter. This

To re-lubricate it is necessary to use the same grease as that employed at the initial lubrication.

Bearing type	Grease type
Y	Lithium soap grease with a mineral oil base according to DIN 51825-K3K-30 consistency NLGI 3
SNL-SYT	Lithium soap grease with a mineral oil base - consistency NLGI 2

Air filters

Air filters must be used inside the units. The cleaning of these filters must be regularly performed according to the utilization or be replaced if necessary.

The tables below show the dimensions and the quantities of the filters to be used for each unit.

Flat filters, metal and synthetic (G3 and G4 classes) types

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
Dimensions H x l (mm)	378x744	538x744	658x1064	658x1164	658x682	978x682	1278x682	1278x554	1278x486	1578x486	490x592	592x592	592x592	592x592	592x592
Quantity	1	1	1	1	2	2	2	3	4	4	12	12	15	20	24
Max. air vol. (m ³ /h)	3380	4820	8430	9220	10810	16060	20985	25570	29905	36940	42840	51000	63750	85000	102000
Final Delta P (Pa)	150 Pa for metal filters - 200 Pa for synthetic filters G3 - 250 Pa for synthetic filters G4														

10 - Maintenance (cont'd)

Angular filters, metal and synthetic (G3 and G4 classes) types

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
287 x 287 (12" x 12")			1	1											
287 x 592 (12" x 24")	2		1	1	2										
490 x 592 (20" x 24")		2	2	1				12			16				
592 x 592 (24" x 24")				1	2	6	8		12	15		16	20	25	30
Max. air vol. (m ³ /h)	4250	7440	10305	10985	12750	25500	34000	42840	51000	63750	57120	68000	85000	106250	127500
Final Delta P (Pa)	150 Pa for metal filters - 200 Pa for synthetic filters G3 - 250 Pa for synthetic filters G4														

Bag filters (F6 and F8 classes)

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
287 x 592 (12" x 24")	1		1			2				3					
490 x 592 (20" x 24")		1		2				6			12				
592 x 592 (24" x 24")			1		2	2	4		6	6		12	15	20	24
Max. air vol. (m ³ /h)	2125	3570	6375	7440	8500	12570	17000	21420	25500	31875	42840	51000	63750	85000	102000
Final Delta P (Pa)	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350

Compact filters (F6 and F8 classes)

Sizes	21	35	56	71	85	125	170	214	255	318	428	510	638	850	1020
287 x 592 (12" x 24")	1		1			2				3					
490 x 592 (20" x 24")		1		2				6			12				
592 x 592 (24" x 24")			1		2	2	4		6	6		12	15	20	24
Max. air vol. (m ³ /h)	2500	465	7500	8330	10000	15000	20000	24990	30000	37500	49980	60000	75000	100000	120000
Final Delta P (Pa)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

11 - Operating Guidelines

Quality of water

It is not our policy to make recommendations on water treatment. Contact a local water treatment company regarding this treatment.

However, this topic is critical and care should be taken to make sure it is done properly to obtain effective treatment.

The use of water without treatment can provoke excessive soiling inside water coil tubes with serious repercussions and damages on unit efficiency.

Manufacturer will not be responsible for the use of non-treated water or incorrectly treated one.

Operating limits

- Do not exceed operating limits indicated in the following tables.

A fan wheel that is operated beyond the rpm and temperature limits may suffer permanent distortion or fracture. The resulting unbalance may cause severe unit vibration.

- Vibrations.

Fans have been statically and dynamically balanced at works. Any running vibration indicates an abnormal working and should be stopped. Excessive vibration from any cause

contributes to premature fan and motor failure. Overall vibration levels should be monitored every 3 months of operation. An increase in level is an indication of potential trouble.

Vibration causes

- Wheel imbalance.
 - Dirt or debris on wheel blades.
 - Loss of the balance weight.
 - Wheel distorted due to overspeed or mechanical shock.
- Bent shaft.
- Drive failure.
 - Drive misalignment.
 - Bad belts ; inadequate tension.
- Faulty bearings, loose hold-down bolts.
- Motor out of balance.
- Faulty fan suspension.
- Inadequate unit vibration isolators.
- Surging : result of bad calculation of pressure drops at fan discharge.

11 - Operating Guidelines (cont'd)

Operating limits - Standard forward curved fans

Unit sizes			Fan wheel diameter (mm)	Max. speed (rpm)	Max. power (kW)
Std	Option 1	Option 2			
21			160L	4200	3
	21		180L	4000	3
35			200L	3800	4
	35		225L	3400	4
56			250L	2800	4
71-85	56		280L	2500	5.5
	71-85		315L	2100	5.5
125			355L	1800	7.5
	125		400L	1600	7.5
170		125	450L	1400	11
214	170		500L	1200	11
255	214		560L	1100	15
318-428	255		630L	900	15
510	318-428		710K	850	22
638	510	428	800K	750	22
850	638	510	900K	650	30
1020	850		1000K	600	37

Operating limits - Standard backward curved fans

Unit sizes			Fan wheel diameter (mm)	Max. speed (rpm)	Max. power (kW)
Std	Option 1	Option 2			
21			180L	6800	2.2
35			200L	6000	3
	35		225L	5800	4
56			250L	4600	4
71-85	56		280L	4000	5.5
	71-85		315L	3500	5.5
125			355L	3300	7.5
	125		400L	2700	7.5
170		125	450L	2500	11
214	170		500L	2100	11
255	214		560L	1950	15
318-428	255		630R	1600	15
510	318-428		710K	1500	22
638	510	428	800K	1200	22
850	638	510	900K	1100	30
1020	850		1000K	1000	37

Operating limits - pressure

Type of unit	Maximum negative pressure	Maximum positive pressure
Low and medium pressure units	1000 Pa	1000 Pa

Operating limits - temperature

Application	Maximum air temperature
Electric motors *	60 °C
Structure	80 °C

* For temperatures between 40 and 60 °C, the motors must be undersized.

Temperature range	Continuous operation	12 h per day operation
up to 60 °C	6 months	1 year
up to 80 °C	3 months	6 months

*As part of our ongoing product improvement programme, our products are subject to change without prior notice. Non contractual photos.
Dans un souci d'amélioration constante, nos produits peuvent être modifiés sans préavis. Photos non contractuelles.*



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