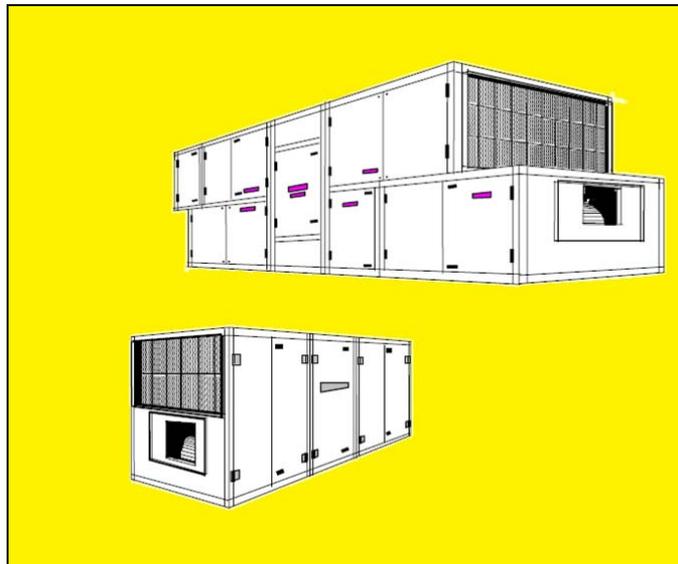




Installation and Maintenance Manual

RG Series



For long term reliability and proper function of Tempeff equipment, it is essential that these instructions are followed.

These are general instructions, valid where applicable

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Bulletin No. IM 2-1
July 2010



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MANUAL

FOR TEMPEFF AIR HANDLING UNIT WITH DUAL CORE HEAT EXCHANGERS

General

The instructions for assembly, operating and maintenance must be followed carefully in order to achieve short and long term function and reliability. It is also a prerequisite for the warranty to apply.

This manual shall be easily accessible to the staff responsible for the operation of this unit.

If the product is modified or changed without consent or instruction from Tempeff the ETL listing (if applicable) may no longer be valid, and the warranty may no longer be valid.

Due to the custom nature of the product not all cases are covered in this manual. In the cases where special items are included in the product, specific instructions can be obtained from the local authorized Tempeff Representative, or by contacting the Tempeff Factory.

INTENDED USE

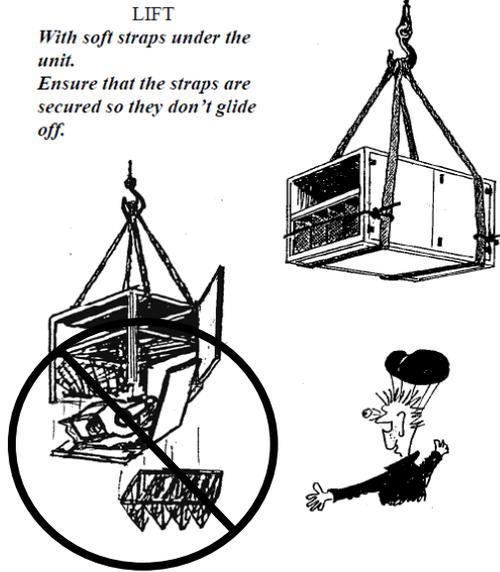
The unit is intended for comfort heating/cooling use only with no mixing of corrosive or flammable gases.

Storage

Failing to follow the enclosed instructions may cause damage to the equipment, and void warranty.

- 1) When storing both indoor and outdoor units, openings and access doors must be sealed
- 2) Equipment must be adequately protected from weather until final installation is complete. Equipment stored outdoors must be heated. NOTE: Factory shrink wrap or poly is not considered sufficient protection against the weather when stored in an area exposed to the elements. The contractor is responsible for fully tarping the equipment to prevent damage from weather or construction damage.
- 3) During extended periods of storage, it is important to rotate the fan and motor bearings by hand at least once a month to prevent bearing damage. The bearings should also be greased at the same frequency. Ensure bearings are not over greased as it may result in ruptured seals and premature bearing failure once in operation.
- 4) To ensure equipment stays in as-shipped condition, and to avoid corrosion, inspect the equipment twice weekly while in storage. If moisture is discovered on the surface of the equipment immediately heat and ventilate the equipment to prevent corrosion.

Instructions for lifting with a Crane



When using lifting lugs to raise the unit spreader bars must be used to prevent damage to the equipment. If lifting lugs are not present each unit must be lifted with soft straps under the lower framework. Since the profiles used are slippery, the soft straps must be secured to keep the straps from sliding off.

The unit is not designed to carry its' own weight from the upper framework.

In the smaller units the al-cell packs may be delivered inside the accumulator chambers. **Cell Packs must be unloaded before lifting and reinstalled after the unit is in place.**

WARNING!

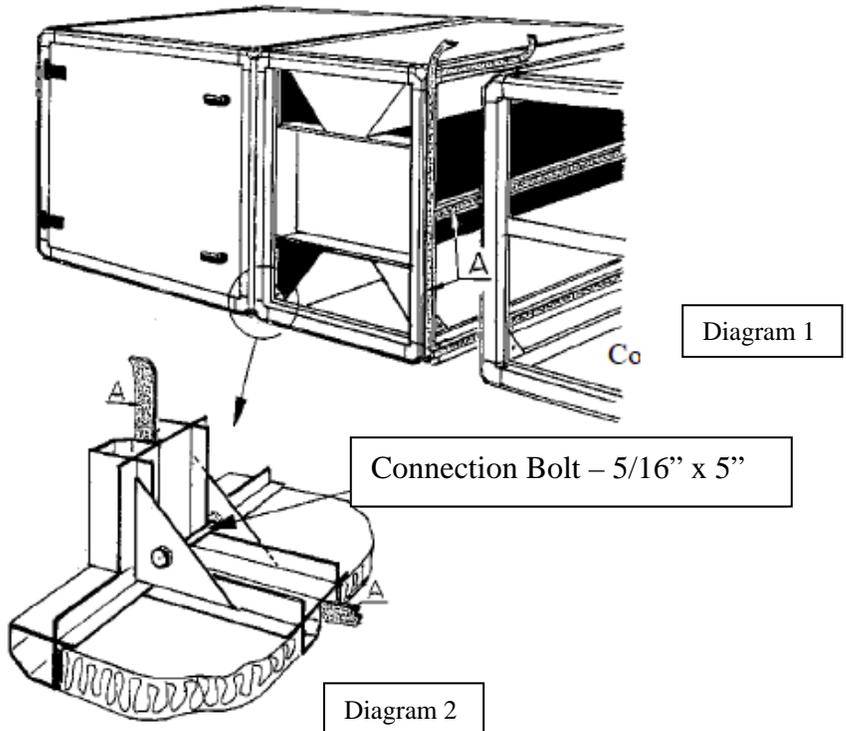
The upper framework and/or extending parts of the unit may not be used for lifting.

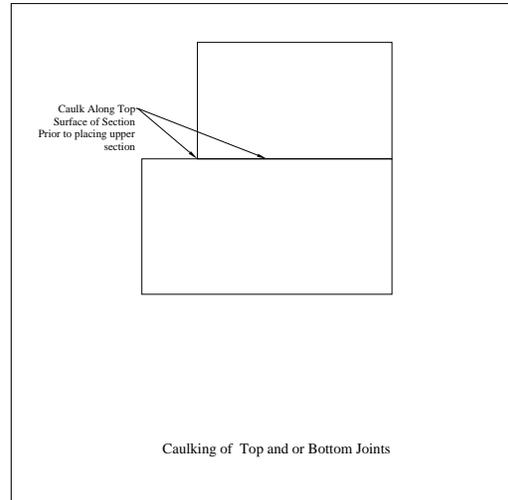
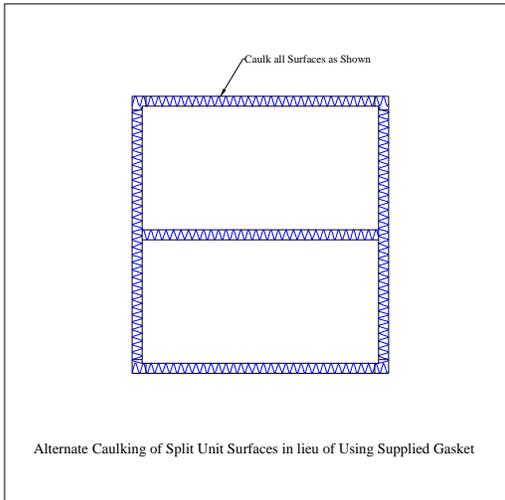
Mounting the individual sections

Unit shall be placed on a solid and bare surface suitable for the present environment and installation, such as elevated for drain connection if applicable.

Due to the weight of the cell packs it is necessary to ensure that all parts of the unit are well supported, not only under the outer framework but also in between the outer frame. Units wider than 1.5 m supports not wider than 0.8 m (32 inches) from each other.

A (Diagram 1 & 2) = self adhesive gasketing shall be used where the units connect to each other. Suitable high quality caulking may be used in lieu of gasket. (Page 4)

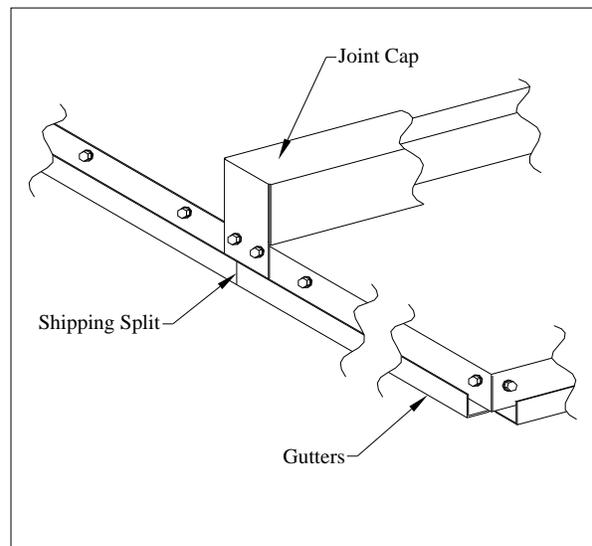




Outdoor units with sections stacked one on top of the other should be caulked prior to placing the section on the other.

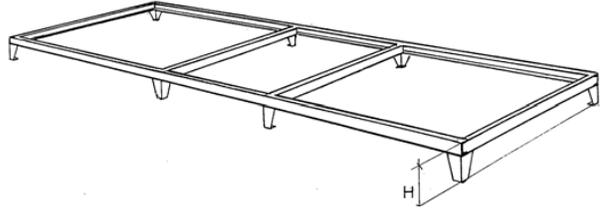
OUTDOOR SPLIT SECTIONS

For each split on an outdoor unit a split cap is provided to bridge the roof splits. This cap is an integral part of the roof structure and must be installed. Pre-drill pilot holes on side of cap, then fasten using common sheet metal screws. A minimum of 2 screws per side are required.



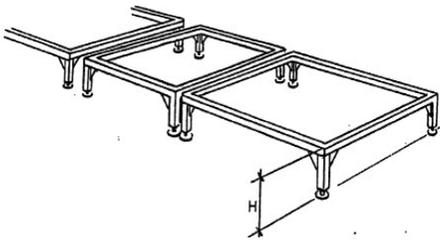
Suggested Framework

The unit shall be assembled on a solid and plain surface. A frame of square steel bars is recommended. It must be supported at each end and at each unit connection. Support leg to slab, or rod from roof shall also be fit at each end and each unit connection as shown on the picture.



When designing the frame the weight of the unit must be accounted for. Note that the weight of the cell packs makes the units heavier than normal AHU's.

Therefore units with widths greater than 1.5m (4.92 feet) must be supported by two outer bars. Max width between bars is 800mm (32 inches).



Smaller RG units can be mounted directly on rigid mineral fiber insulation boards placed on the floor slab if it is level and if a water drain trap is not required.

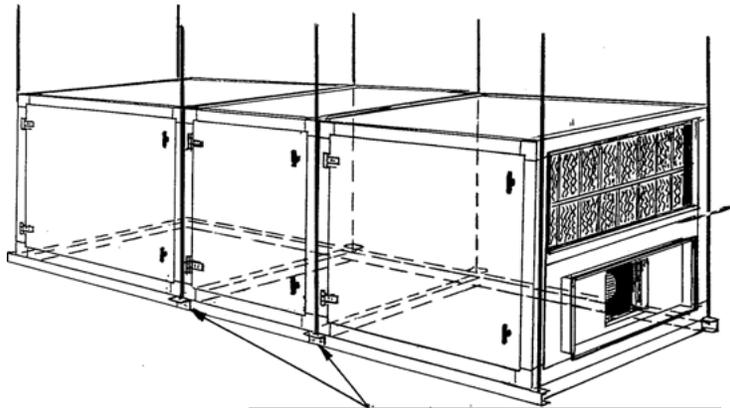
Leveling shall be made using water level or laser instrument. If the unit requires a water drain trap the height of the legs shall be calculated accordingly. See page 7 for details.

Hanging a unit from the roof

If the unit is to be hung from the roof, it must rest on a framework supported by rods hanging from the roof.

Support rods shall be centered with the connections between the sections of the unit and the connection points between the rods and the frame shall be located so that the rods don't interfere with the opening of the doors or the connection of ducts.

When designing and building the supporting frame work (by others) and rods the weight of the unit must be taken into consideration. The cell packs make the units heavier than traditional air handlers.



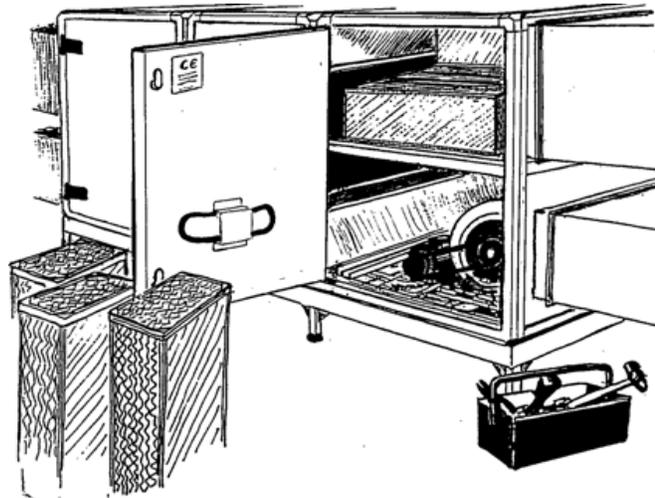
Rods connect to the framework (supplied by others) outside the unit and center with the unit section connection point.

Fitting of Cell Packs into RG units

Care in handling of the Al-cell packs must be taken. For functional reasons the cages are quite small and therefore subject to deformation if treated roughly.

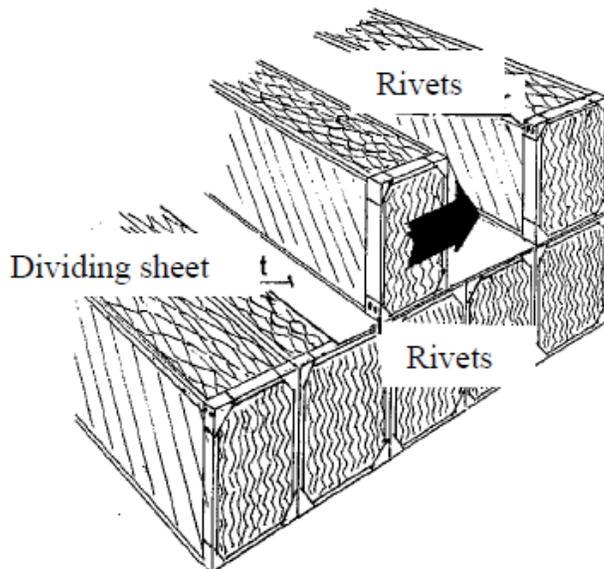
Cell packs are normally delivered wrapped standing on a pallet. When the wrapping is removed, ensure that the packs don't fall. If they do fall they normally take on a rhomboid form and they must be reformed to square before being fitted into the chamber.

This must be done by hand! The resistance that needs to be overcome is largely friction between the plates.



Smaller units are often delivered with the cell packs already installed in the chamber. They must be taken out before erection of the unit and reinstalled after.

The cell packs shall be slid into position on the beams and between the guide vanes. They must be packed properly; otherwise the doors may not close.



Note!

The rivets must be oriented so that they do not contact each other. Turn the packs so that one set of rivets is on top, and the next is on the bottom. See picture.

When the unit contains packs more than one row high they should be slid in on the supplied dividing angles. These angles should be placed at the ends of the packs, so the cores slide in on the angles.

Some unit sizes have one set of cell packs of different size than the others. These have a different depth and shall be installed last, closest to the inspection door on each row.

Connecting Cooling and Heating Coils

In all cases, coil manufacturers installation instructions take precedence.

With water coils, ensure the connections are made so that leaving water from the coil is what the entering air sees (counterflow).

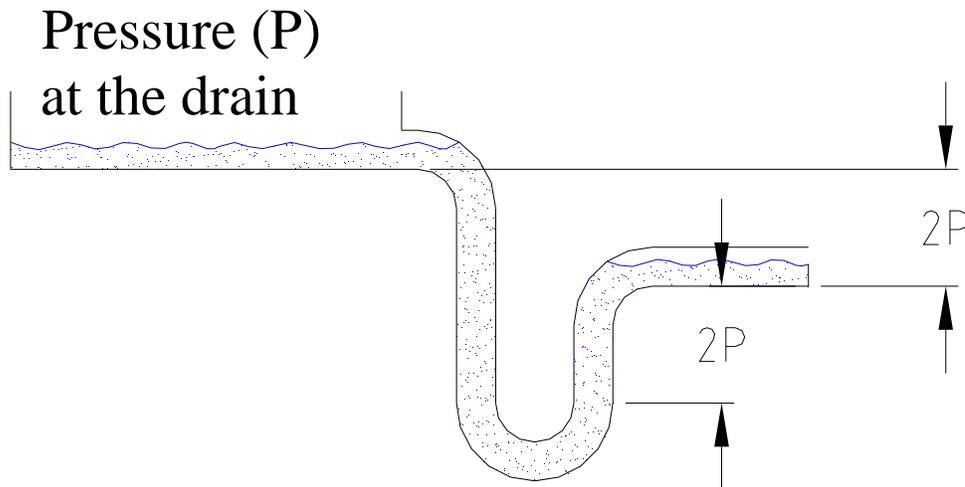
Mounting an anti-freeze protection device on water coils is strongly recommended to prevent damage to the coil due to freezing. Frost damage is not covered by warranty.

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

Ensure care is taken when handling and connecting coils. Connections and pipes are fragile, and can easily be damaged.

Installing Condensate Drain Traps

Units equipped with optional drain connection must have drain traps field provided and installed on each drain. 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 for the trap to remain sealed. For example if the pressure is 2" W.C, 2P will be 4" deep.



This height will also determine the height H of the mounting framework as detailed on page 4. H should be 4P, plus 2".

Installation Requirements

1. Service clearances must be maintained on the access side of the unit. Recommended minimum clearances are equal to the section length if unit is equipped with single door, or section length/2 if unit is equipped with double door, as clearance must be sufficient to open doors. Consult dimensional diagram to verify required service clearances.
2. All relevant local and national codes (NEC or CEC) must be adhered to for clearances to electrical connections. 1m or 36 inches is the minimum from the face of any electrical enclosure to any wall or obstruction.
3. Installer is responsible for checking all damper bolts to ensure tightness, as during shipping these bolts may become loose.
4. Installer is also responsible for checking tightness of all electrical terminals and connections, as these connections may become loose during shipping and result in performance issues.
5. Consult wiring diagram to verify which electrical connections must be made in the field, such as unit power, and field connections for the damper to be controlled by BMS. All wiring must be performed in accordance with all applicable codes and ordinances. Warranty is voided if wiring is not in accordance with these standards.
6. If unit is controlled by BMS, controls contractor must ensure the dampers are first on and last off (after the blowers have been shut down) to avoid damage to the dampers.
7. If unit is equipped with blowers, ensure that shipping blocks have been removed from isolation frame.

Before Start-up

1. Ensure that unit is completely and properly installed, and all ductwork is connected. Ensure that all construction debris has been removed, and that filters are clean.
2. Verify that all electrical connections have been made, and check to ensure that correct voltage has been applied to the appropriate sections. Check to ensure electrical connections are tight.
3. Rotate the fans manually to ensure they rotate freely. Check to ensure that belts have been tightened and sheaves aligned using a straight edge.
4. Verify that all damper blades close properly. Blades should be tight enough that a finger cannot be pushed through but not so tight that the damper blade causes the housing to deflect. Excessive tension can cause damage to damper section.
5. Check setscrews and nuts/bolts in damper linkages, bearings and fan wheels (if unit is equipped with blowers). **Note that equipment damage due to loose fasteners is improper start-up and will not be covered under warranty!**
 - a. **After 48hrs:** Ensure unit has been properly locked out. Check tightness of all damper linkage, bearing, wheel and sheave setscrews.
 - b. Check belt tension.
6. Verify that all holes in floors are sealed to prevent water leakage.

Start-up/Commissioning procedure

When performing start-up and service, thorough safety precautions must always be taken. These functions must always be performed by trained, experienced personnel. View “Before Start-up” description before attempting start-up.

 WARNING
<p>FIRE/ELECTRIC SHOCK HAZARD. Can cause property damage, personal injury or death. Fan power supply must be wired and motor frame grounded in accordance with local electric codes.</p>
 AVERTISSEMENT
<p>Risques d'incendie et d'électrocution pouvant causer des dommages matériels, des blessures et même la mort. L'alimentation électrique du moteur du ventilateur de même que la mise à la terre du châssis du moteur doivent être faits conformément aux codes d'installations électriques en vigueur.</p>

 WARNING
<p>ROTATING FAN Can cause severe injury or death. Before servicing fans, lockout and tag out power.</p>
 AVERTISSEMENT
<p>PIÈCES MOBILES DANGEREUSES. Avant de réparer ou entretenir les ventilateurs, coupez l'alimentation électrique de cet appareil et bloquez le commutateur à OFF.</p>

 WARNING
<p>FAN MOTOR REQUIRES OVERLOAD PROTECTION. Failure to provide motor overload protection can result in fire, property damage, electric shock, personal injury or death. Connect motor to an overload protective device rated in compliance with local electric codes.</p>
 AVERTISSEMENT
<p>Risques d'incendie et d'électrocution pouvant causer des dommages matériels, des blessures et même la mort. Connecter au moteur du ventilateur électrique un dispositif de protection contre les surcharges conforme aux codes d'installations électriques en vigueur.</p>

1. Verify that there is power to the fan motors
2. Verify that there is power to the unit control cabinet (consult wiring diagram for unit control cabinet power terminals)
3. Enable supply air fans and exhaust air fans, and check for correct rotation. If incorrect rotation, correct wiring to ensure fans rotate in proper direction.
4. Check supply and exhaust motor amp draws against rated amp draw on motor rating plate.
5. Test operation of damper motors.
 - a. Put switch S1 in position 1. Actuator M7 should operate continuously.
 - b. Put switch S1 in position 2. Actuator M6 should operate continuously.
 - c. If unit is pneumatic, consult sequence in shop drawing package to verify proper damper motor testing
 - d. Put switch S1 back in position 0.
6. Put switch S2 in position 0. Check to see if dampers are in a “+” formation inside of unit, closing off all air to building. Ensure all blades are firmly closed with no gaps.
7. Put switch S2 in position M. If Ambient air is above 68 deg F (20 deg C), increase temperature on thermostat GT2 (exhaust t’stat) until it is above ambient temperature. If expected supply air is above 59 deg F (15 deg C) increase temperature on thermostat GT1 (supply t’stat) until it is above expected temperature. Dampers should now cycle every 60 seconds.
8. Change GT2 back to 68 deg F (20 deg C), and GT1 back to 59 deg F (15 deg C). If the unit is to be operated as a standalone unit, leave the S2 switch in M mode. If the BMS is to operate the unit, put the S2 switch in A mode.
9. If the unit is controlled by BMS, contacts are used to control the damper mode. Consult the wiring diagrams & sequence to verify wiring. Ensure dampers are first on and last off (after blowers shut down) to avoid damage to dampers.
10. If unit does not operate as expected, consult wiring diagram and begin troubleshooting wiring with your voltmeter. Ensure all wiring terminations have been tightened.

Maintenance

Regular maintenance is necessary to ensure the efficient operation and long life of this unit. This maintenance should be performed by, or supervised by qualified service personnel. A maintenance schedule should be prepared for the unit based on its application and location.

Recommended Monthly Maintenance

1. Check for loose connections in the wiring
2. Check the voltage at the unit while it is in operation.
3. Check motor amperage draws against the rating plate values.
4. Inspect all contactors to ensure that they are clean and making good contact.
5. Clean or replace air filters if necessary.
6. Check all damper, linkages and damper actuators, adjust and tighten as required.
7. Check all belts ; adjust or replace as necessary.
8. Check operation of all safety controls.

Recommended Yearly Maintenance

1. Perform the monthly maintenance recommended.
2. Inspect the blower wheels and housing; clean if necessary
3. Inspect all setscrews on blower wheels and pulleys to ensure they are secured to their respective shafts.
4. Inspect all operating and safety controls; clean and replace if necessary.
5. Inspect heat exchanger cores, clean if necessary.

BEARING INSTALLATION AND MAINTENANCE

NOTE: To prevent premature failure – please ensure greasing instructions below are applied. As well, tighten bearing set screws, collars, and wheel lugs every four to six months.

ENGINEERING – BALL & ROLLER BEARINGS LUBRICATION

For bearings that are equipped with a hydraulic grease fitting threaded into the housing the proper amount of lubricant in the bearing is important. Both excessive and inadequate lubrication may cause failure.

The bearings should be re-lubricated while they are rotating (if it is safe to do so); the grease should be pumped in slowly until a slight bead forms around the seals. The bead in addition to acting as an indicator of adequate relubrication provides additional protection against the entry of foreign matter and helps flush out contaminants in the bearing.

By the time the slight bead has formed, it will be noticed that the bearing temperature will rise. It is not uncommon for the temperature to raise as much as 30°F after re-lubrication. If necessary to re-lubricate while the bearing is idle, refer to the recommended re-lubrication grease chart tables on the following page for various sizes of the bearings.

LUBRICANT - STANDARD BEARINGS

All bearing units are pre-lubricated at the factory with lithium soap grease, which is compatible with multi-purpose grease readily available from local suppliers. The lubricant selected for factory lubrication uses a highly refined mineral oil with a high viscosity index, thickened with lithium soap to conform to NLGI grade 2 consistency. A suitable additive package is added to protect the highly polished rolling contact surfaces from corrosion and oxidation of the lubricant. The lubricant is satisfactory for an operating temperature range of -30°F to +250°F.

Select standard industrial grade greases that conform to the following specifications for optimum bearing performance:

General Duty Ball & Roller;
 58-75 SUS @ 210°F
 450-750 SUS @ 100°F

Premium Duty Ball & Roller;
 68-75.1 SUS @ 210°F
 600-750 SUS @ 100°F

Heavy Duty Roller Bearing;
 82 SUS @ 210°F
 886 SUS @ 100°F

NOTE: For heavy loaded roller bearing applications, grease with EP additives is often recommended for optimum performance.

TABLE: RECOMMENDED LUBRICATION

Ball Bearings		Roller Bearing	
Shaft Size (inches)	Grease Charge (ounces)	Shaft Size (inches)	Grease Charge (ounces)
¼ to 3/16	0.03	1-3/16 to 1-1/4	0.1
½ to ¾	0.1	1-3/8 to 1-7/16	0.22
1-1/4 to 1-1/2	0.15	1-1/2 to 1-11/16	0.32
1-11/16 to 1-15/16	0.2	1-3/4 to 2	0.5
2 to 2-7/16	0.3	2 to 2-3/16	0.55
2-1/2 to 2-15/16	0.5	2-1/4 to 2-1/2	0.65
3 to 3-7/16	0.85	2-11/16 to 3	0.85
3-1/2 to 4	1.5	3-3/16 to 3-1/2	1.25
-	-	3-15/16 to 4	2.5
-	-	4-7/16 to 4-1/2	3.1

Frequency of re-lubrication depends on operating conditions. The bearing operating temperature is the best index for determining a re-lubrication schedule. The following chart gives the frequency of re-lubrication based upon continuous operation for various operating temperatures and can be used as a satisfactory guide for determining when bearings should be re-lubricated.

TABLE: LUBRICATION FREQUENCY

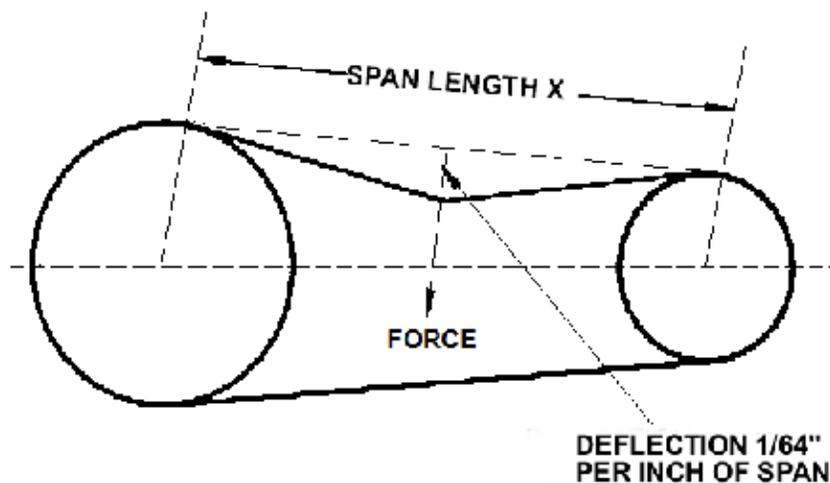
Speed	Temperature	Cleanliness	Greasing Interval
100 RPM	Up to 120 °F	Clean	5 months
500 RPM	Up to 130 °F	Clean	2 months
1000 RPM	Up to 210 °F	Clean	2 weeks
1500 RPM	Over 150 °F	Dirty	Weekly
Any speed	Up to 150 °F	Dirty	1 week to 1 month
Any speed	Over 150 °F	Dirty	Daily to 1 week
Any speed	Any temperature	Very dirty	Daily to 1 week
Any speed	Any temperature	Extreme Conditions	Daily to 1 week

TENSIONING V-BELT DRIVES

1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24-48 hours of operation.
3. Over-tensioning shortens the belt and bearing life.
4. Keep belts free from foreign material that may cause slip.
5. Make V-drive inspection on a periodic basis. Re-tension when slipping occurs. Never apply belt dressing as this will damage the belt and cause early failure.

Check and tighten belt tension. The following procedure is recommended for tightening belts:

- a. Measure span "X" shown in Figure A.
- b. At the center of span length "X", apply a force perpendicular to the span and large enough to deflect belt $1/64$ " for each inch of span length. Example – the required deflection for a 40" span would be $40/64$ " or $5/8$ ".
- c. Compare the force applied with the values given in the table below. If the force is between the minimum and maximum range shown, the drive tension should be satisfactory. A force below the minimum value indicates an under tightened belt and a force that exceeds the maximum value indicates an over tightened belt.



BELT CROSS SECTION (Marked on Belt)	MOTOR PULLEY PITCH DIAMETER	DEFLECTION FORCE	
		MINIMUM	MAXIMUM
A	3.0" – 3.6"	2.62 lbs	3.25 lbs
	3.8" – 4.8"	3.0 lbs	4.0 lbs
	5.0" – 7.0"	3.25 lbs	5.0 lbs
B	3.4" – 4.2"	3.0 lbs	5.0 lbs
	4.4" – 5.6"	4.0 lbs	5.87 lbs
	5.8" – 8.6"	5.25 lbs	7.87 lbs



Product Warranty

Warranty on Tempeff Heat Recovery devices is one (1) year from unit start-up date or 15 months from date of shipment from our factory. Tempeff heat exchanger modules are warranted against material or manufacturing defects for a period of 10 years.

Our warranty applies for original shipment on all parts and components fabricated by or installed by us with the exception of air filters, and blower belts.

Within the one year warranty, replacement parts will be shipped collect and charged to customer account with credit being issued after receipt of, and examination of the returned parts: freight prepaid to the factory.

This warranty does not include freight, labor, or sales tax that may be incurred by the purchasers and is subject to the following conditions:

- 1) The unit shall be installed by a qualified heating or ventilation contractor in accordance with the provisions of the service manual.
- 2) The unit shall have been installed in accordance with all national and local codes.
- 3) The unit shall have been subject to only normal use in service and shall not have been misused, neglected, altered or otherwise damaged.
- 4) The unit shall have been operated within its published capacity and with the prescribed fuel.
- 5) All automatic controls shall have been operative at all times.
- 6) The heat exchanger has not been subjected to corrosive environments
- 7) There is no evidence of tampering or deliberate destruction.
- 8) Frost damage to coils is not covered by this warranty

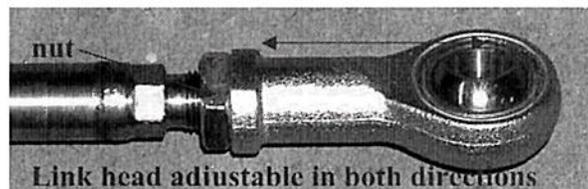
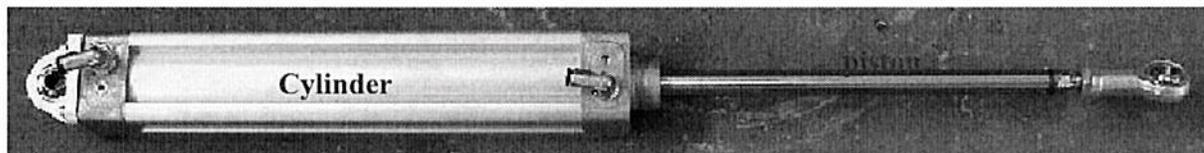
No representative of Tempeff or any of its distributors or dealers is authorized to assume for Tempeff any other obligations or liability in connection with this product, nor alter the terms of this warranty in any way. This warranty is limited to the express provisions contained herein and does not extend to liability for labor or travel costs incurred in replacing defective parts.

Authorization to return any alleged defective parts must be obtained from the factory before the part is transported and the owner shall prepay the transportation charges for any alleged defective parts. Tempeff will not accept charges for parts purchased unless the conditions of this warranty have been satisfied.

The express warranties herein contained are in lieu of other warranties, expressed or implied, including the warranty of merchantability and of fitness for any particular purpose. Tempeff shall not be liable for damages, including special, incidental, or consequential damages arising out of or in connection with the performance of the heat recovery devices, or its use by the owner. Tempeff liability is limited exclusively to repair and or replacement of the defective part. Parts can be obtained from Tempeff North America, 675 Washington Ave, Winnipeg, Manitoba, R2K 1M4, on the basis that credit will be issued if defective parts returned qualify for replacement pursuant to the terms and conditions of this warranty.

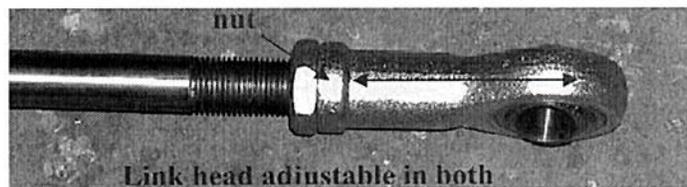
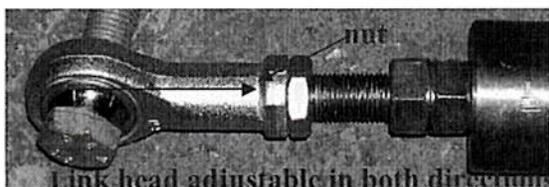
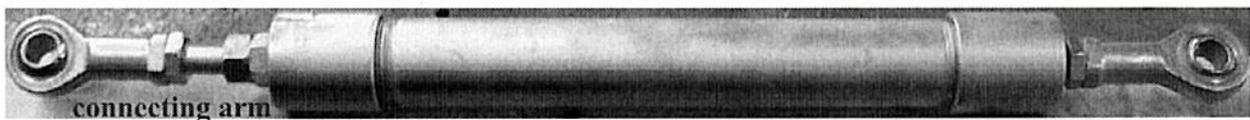
2.2 Adjustment of the damper blades – Open Mode

In order to adjust the damper blades in the open position, you can adjust the head of the cylinder piston to approximately 10 mm in each direction. Loosen the nut and adjust the link head so that the damper blades can reach the desired angle in the open position. Probably you have to disconnect the link head from the link arm before it can be adjusted. Note that it is not certain that the damper blades can reach a precise perpendicular position against the frame in the open position. Tightening nut again.



2.3 Adjustment of the damper blades – Close Mode

The damper blades which are affected by the connecting arm (throttle blade approximate center) shall be closed first. Pull the springs before, until the second damper blade can be close-fitting. In order to adjust the damper blades in the open position, you can adjust the head of the cylinder piston to approximately 10 mm in each direction. Loosen the nut and adjust the link head so that the damper blades can reach the desired angle in the open position. Probably you have to disconnect the link head from the link arm before it can be adjusted. Note that it is not certain that the damper blades can reach a precise perpendicular position against the frame in the open position. Tightening nut again.



3. Operation and maintenance instruction

Operation and maintenance work should only be performed by authorized personnel. Prior to any surgery or work in the air damper the electricity should be switched off. Also make sure that no air remains in the system that can cause unexpected movement, and thus harm the person who is working in the damper.

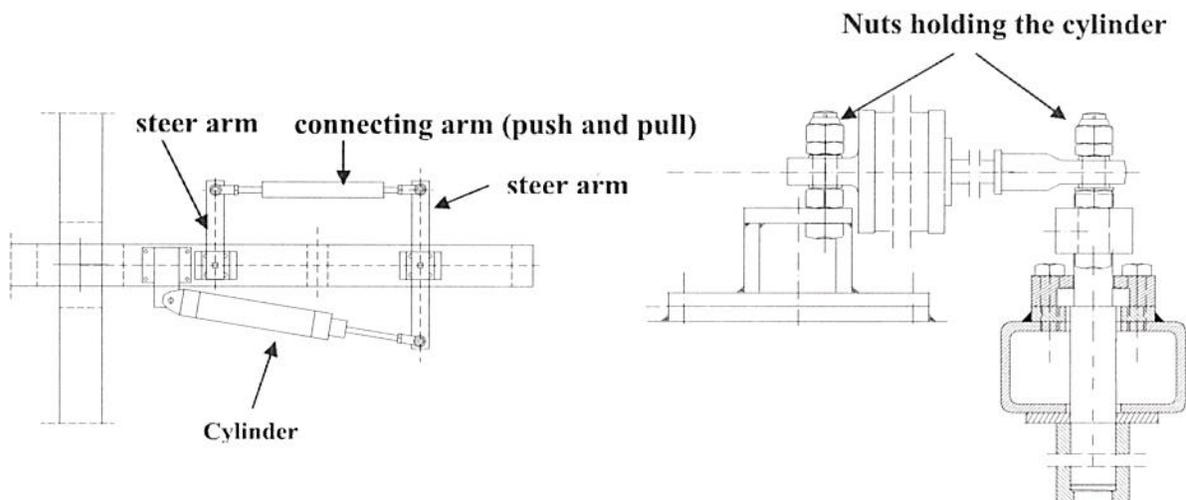
Maintenance is recommended twice a year or more if necessary. Please check the link heads, bearings, steer arm, draft arms, seals, pneumatic connections, and that nuts and bolts are properly tightened. Check that no visible damage is on the equipment and that all moving parts can move unimpeded. If necessary, add lubricant on parts. Check that the damper blades close tightly against the sealing bars. Remove dust and dirt. Check that the damper blades do not move too fast in operation. If so, adjust the speed by using the throttle of the valves in pneumatic cabinet. High speed can cause damage to equipment. Never use compressed air with higher pressure than 6.2 bar (approx. 90 psi).

3.1 Replacement of cylinders

Operation and maintenance work should only be performed by authorized personnel. Prior to any surgery or work in the air damper the electricity should be switched off. Also make sure that no air remains in the system that can cause unexpected movement, and thus harm the person who is working in the damper.

Remove any cover plates on the upper inside of the damper to access the cylinders. Remove the case from the cylinder. Loosen the nuts holding the cylinder and lift it away from his seat. Note the link head location on the plunger to facilitate the re-assembly and adjustment.

(For details see drawings below)



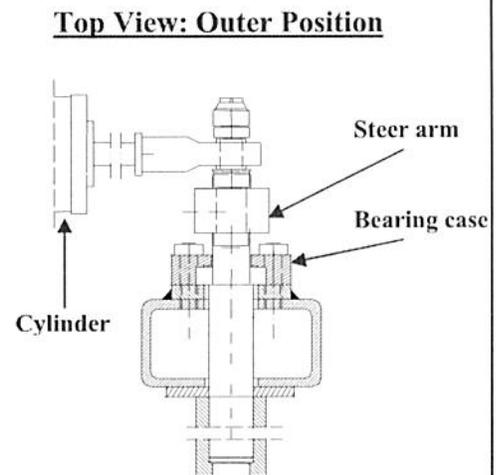
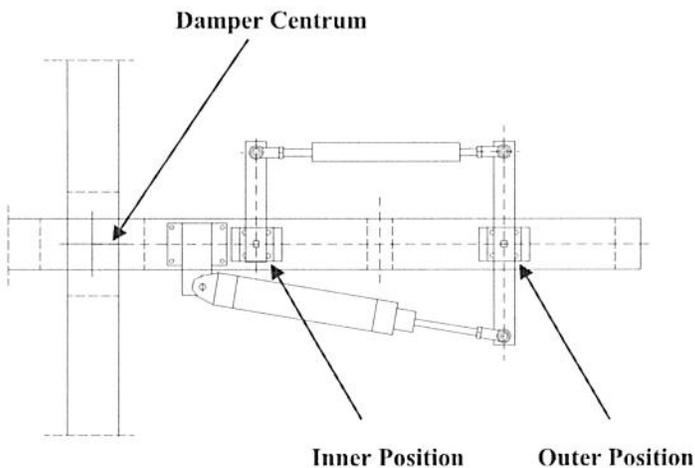
3.2 Replacing the bearings

(For details see drawings below)

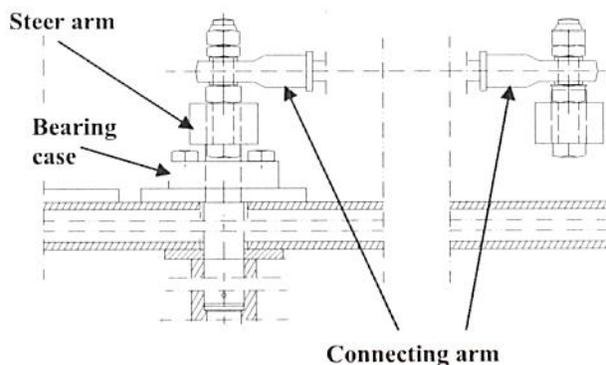
Top View: (Outer Position): Loosen the nuts holding the cylinder then Remove the cylinder. Loosen the stop screw that holds link arm and remove it (if necessary, loosen the connecting arm). Loosen the bolts that hold bearing case and remove it. Replace the stock and re-assemble the parts.

Top View: (Inner Position): Loosen the nuts holding connecting arm. Remove the draft arm. Loosen the stop screw that holds link arm and remove it. Loosen the bolts that hold bearing case and remove it. Replace the stock and re-assemble the parts.

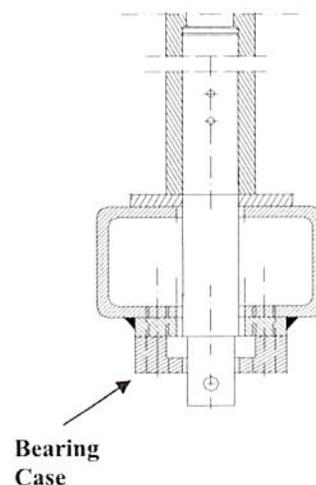
Bottom View: (Both): Loosen the bolts that hold bearing case and remove it. Replace the stock and re-assemble the parts.



Top View – Inner position



Bottom View



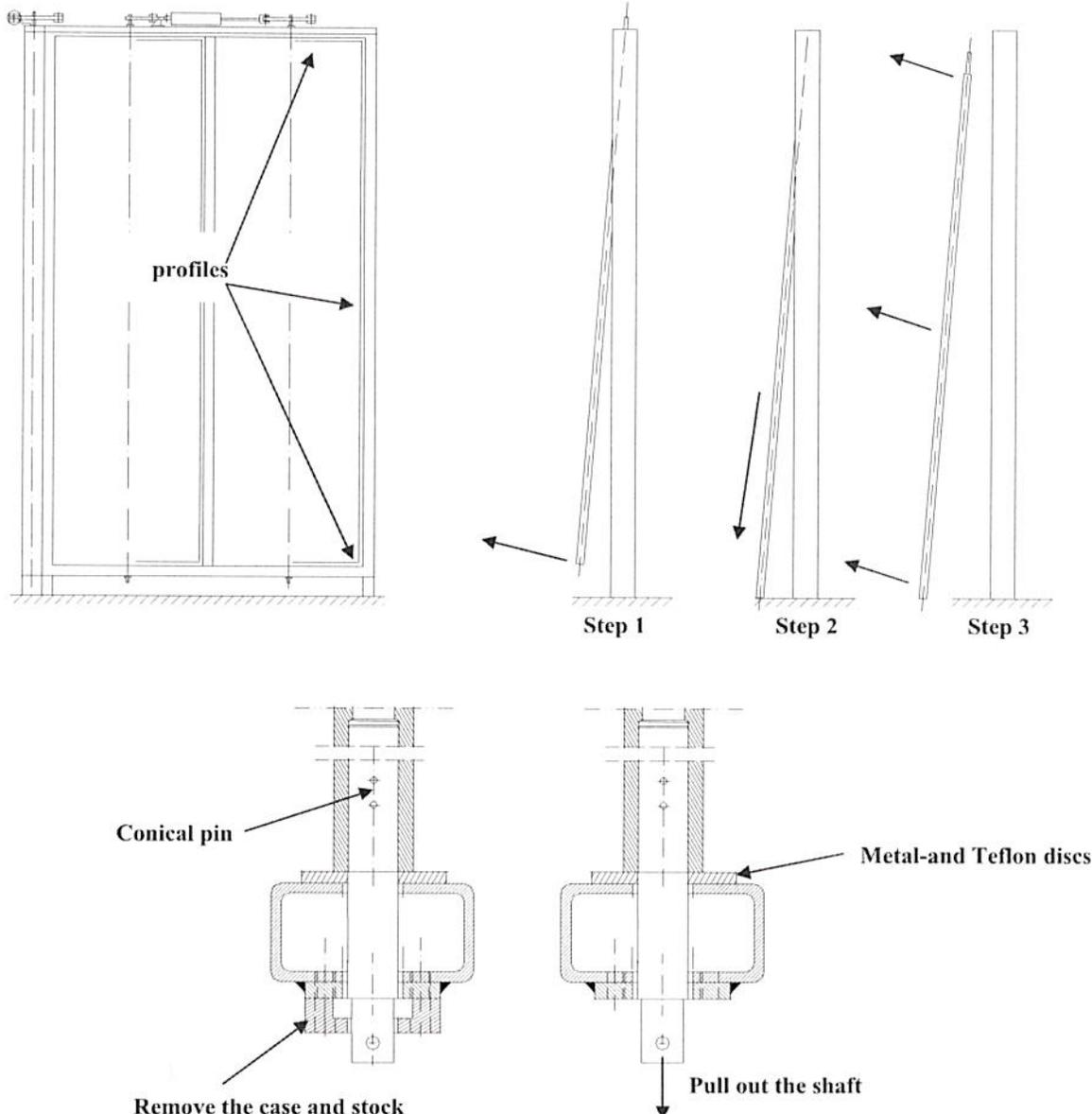
3.3 Disassembly of the damper blades

(For details see drawings below)

(Note damper blades weight 80-100kg)

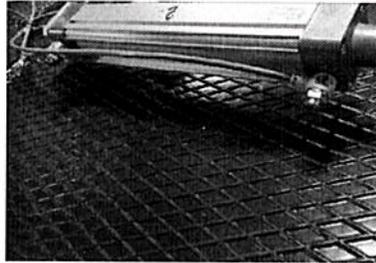
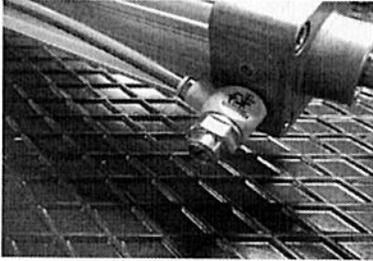
Loosen and remove the profiles which seal against the damper blade on the side where you want to remove the damper blade towards. Remove sheet metal and any connections if necessary. Dismantle all parts stuck in the upper and lower shaft including bearings and bearing case. Remove the tapered pins from the lower shaft. Pull out the lower shaft of the damper blade. If the axis is inert use the hole in the shaft to get the strength to pull it out. Tilt the throttle blade as the figure shows (step 1). Lower the blade down towards the floor until the upper shaft is free (step 2). Lift out the whole sheet (step 3). Alternatively, even the upper shaft can be pulled out after removal the tapered pins and the damper blade can be lifted right out. Be careful not lose the metal- and Teflon discs located between the throttle blade and frame.

Disassembly damper blade



Speed Adjustment of Cylinders

There are flow control valves in the pneumatic lines attached to the cylinders. To slow or speed up the actuation of the damper these need to be adjusted. To speed up or slow down the closing to the dampers, the flow control at the back of the cylinder must be opened up (speed up) or closed (slow down). To speed up or slow down the opening of the dampers, the flow control at the front of the cylinder must be opened up (speed up) or closed (slow down).



The flow controls limit air leaving the cylinder, and does not limit air entering the cylinder.

Profile cylinders, Series 523

Green series, 32–125 mm dia., magnetic piston, adjustable cushioning



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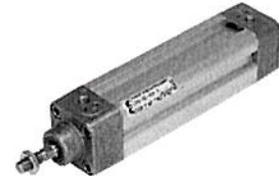


Technical Data

Standard	ISO 6431, VDMA 24562, NF E 49-003-1
Working pressure, max.	10 bar
Ambient temperature range	-20 °C to +70 °C
Medium	Compressed air, lubricated or non-lubricated

Materials	Piston rod	Stainless steel (BS 303 S 31)
	Piston rod bushing	Steel with a PVDF + PTFE bearing surface
	Cylinder barrel	Anodized aluminium
	End covers	Aluminium
	End cover screws	Zinc plated steel
	Nut	Surface-treated steel
	Wiper	Polyurethane
	Piston	32–63 mm dia. polyamide. 80–125 mm dia. Aluminium
	Cushioning screws	Stainless steel (BS 303 S 31)
	Seals	Nitrile rubber/Polyurethane

For use between -15 °C and -40 °C continuously, seals for low temperature are recommended. Please contact your nearest Bosch Rexroth office.



Application Area

The cylinder series is suitable for use when large masses are to be moved or where the stroke frequency is high: The packaging industry where high frequency and long service life is required, etc. Approved by automotive manufacturers.

Technical Information

Piston dia.	[mm]	32	40	50	63	80	100	125
Theoretical piston force at 6 bar	push stroke [N]	483	754	1178	1870	3016	4712	7363
	pull stroke [N]	415	633	990	1682	2721	4418	6881
Cushioning length	[mm]	11,5	15,0	17,0	16,5	19,5	19,5	22,0
Cushioning energy ¹⁾	[Nm]	4,8	9,0	15,0	27,0	54,0	88,0	140,0
Weight	0 mm stroke [kg]	0,45	0,76	1,10	1,17	2,50	3,70	6,90
	add. per 100 mm [kg]	0,20	0,29	0,45	0,49	0,78	1,00	1,31

¹⁾ Cushioning diagram, see section 15.

Code No.

Piston dia.	32	40	50	63	80
Piston rod thread	M 10 x 1,25	M 12 x 1,25	M 16 x 1,5	M 16 x 1,5	M 20 x 1,5
Threaded port	G 1/8	G 1/4	G 1/4	G 3/8	G 3/8
Stroke ³⁾					
25	523-007-005-0	523-107-005-0	523-207-005-0	523-307-005-0	523-407-005-0
50	523-007-010-0	523-107-010-0	523-207-010-0	523-307-010-0	523-407-010-0
80	523-007-016-0	523-107-016-0	523-207-016-0	523-307-016-0	523-407-016-0
100	523-007-020-0	523-107-020-0	523-207-020-0	523-307-020-0	523-407-020-0
125	523-007-025-0	523-107-025-0	523-207-025-0	523-307-025-0	523-407-025-0
160	523-007-032-0	523-107-032-0	523-207-032-0	523-307-032-0	523-407-032-0
200	523-007-040-0	523-107-040-0	523-207-040-0	523-307-040-0	523-407-040-0
250	523-007-050-0	523-107-050-0	523-207-050-0	523-307-050-0	523-407-050-0
320	523-007-064-0	523-107-064-0	523-207-064-0	523-307-064-0	523-407-064-0
400	523-007-080-0	523-107-080-0	523-207-080-0	523-307-080-0	523-407-080-0
500	523-007-100-0	523-107-100-0	523-207-100-0	523-307-100-0	523-407-100-0
Rec. max. stroke ²⁾	1600	1900	2300	2500	2800
Piston dia.	100	125			
Piston rod thread	M 20 x 1,5	M 27 x 2			
Threaded port	G 1/2	G 1/2			
Stroke ³⁾					
25	523-507-005-0	523-607-005-0			
50	523-507-010-0	523-607-010-0			
80	523-507-016-0	523-607-016-0			
100	523-507-020-0	523-607-020-0			
125	523-507-025-0	523-607-025-0			
160	523-507-032-0	523-607-032-0			
200	523-507-040-0	523-607-040-0			
250	523-507-050-0	523-607-050-0			
320	523-507-064-0	523-607-064-0			
400	523-507-080-0	523-607-080-0			
500	523-507-100-0	523-607-100-0			
Rec. max. stroke ²⁾	2800	2750			

Optional strokes: see Ordering system for cylinders in optional design. ²⁾ Longer strokes on request.

³⁾ Intermediate strokes in steps of 5 mm may be delivered. See Ordering system for cylinders in optional design.

Profile cylinders, Series 523

Green series, 32–125 mm dia., magnetic piston, adjustable cushioning

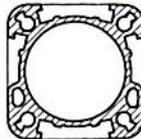
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▲ Accessories (to be ordered separately)

Symbol	Type	32	40	50	63
	Piston dia.				
	Front or rear flange (MF1/MF2)	523-000-601-2	523-100-601-2	523-200-601-2	523-300-601-2
	Angle brackets (MS1)	523-000-050-2	523-100-050-2	523-200-050-2	523-300-050-2
	Central male trunnion (MT4)	279-500-032-0	279-500-040-0	279-500-050-0	279-500-063-0
	Front or rear pivoted mounting (MT 5/MT 6)	523-081-690-2	523-181-690-2	523-281-690-2	523-381-690-2
	Rear end cover clevis (MP0)	523-000-343-2	523-100-343-2	523-200-343-2	523-300-343-2
	Rear eye with PTFE bushing (MP4)	523-000-341-2	523-100-341-2	523-200-341-2	523-300-341-2
	Rear clevis (MP2)	523-000-340-2	523-100-340-2	523-200-340-2	523-300-340-2
	Rear eye with rubber bushing (M32)	368-320-300-0	368-320-400-0	368-320-500-0	368-320-600-0
	Rear eye with ball joint (M36)	368-360-300-0	368-360-400-0	368-360-500-0	368-360-600-0
	Piston dia.	80	100	125	
	Front or rear flange (MF1/MF2)	523 400 601 2	523 500 601 2	523 600 601 2	
	Angle brackets (MS1)	523 400 050 2	523 500 050 2	523 600 050 2	
	Central male trunnion (MT4)	523 400 690 2	523 500 690 2	523 600 690 2	
	Front or rear pivoted mounting (MT 5/MT 6)	523 481 690 2	523 581 690 2	523 681 690 2	
	Rear end cover clevis (MP0)	523 400 343 2	523 500 343 2	523 600 343 2	
	Rear eye with PTFE bushing (MP4)	523 400 341 2	523 500 341 2	523 680 341 2	
	Rear clevis (MP2)	523-400-340-2	523-500-340-2	523 680 340 2	
	Rear eye with rubber bushing (M32)	368 320 800 0	368 321 000 0	–	
Rear eye with ball joint (M36)	368 360 800 0	368 361 000 0	523-600-345-2		
	Piston dia.	32–125			
	Sensor with 2,5 m cable, Reed	275-013-231-0			
	Sensor with 2,5 m cable, PNP	275-013-111-0			
	Piston dia.	32	40	50	63
	Rod clevis (P1)	895-801-900-2	895-801-910-2	895-801-920-2	895-801-920-2
	Rod clevis in stainless steel (P2)	359-050-200-0	359-050-400-0	359-050-500-0	359-050-500-0
	Mounting plate (P3)	523-081-600-2	523-181-600-2	523-281-600-2	523-281-600-2
	Ball eye rod end (P4)	895-820-760-2	895-820-770-2	895-820-780-2	895-820-780-2
	Flexible coupling (P5)	895-820-873-2	895-820-874-2	895-820-875-2	895-820-875-2
	Piston dia.	80	100	125	
	Rod clevis (P1)	895-801-930-2	895-801-930-2	895-802-270-2	
	Rod clevis in stainless steel (P2)	359-050-800-0	359-050-800-0	–	
	Mounting plate (P3)	523-481-600-2	523-481-600-2	523-681-600-2	
	Ball eye rod end (P4)	895-820-790-2	895-820-790-2	895-820-805-2	
	Flexible coupling (P5)	895-820-876-2	895-820-876-2	895-820-877-2	

▲ Seal kit

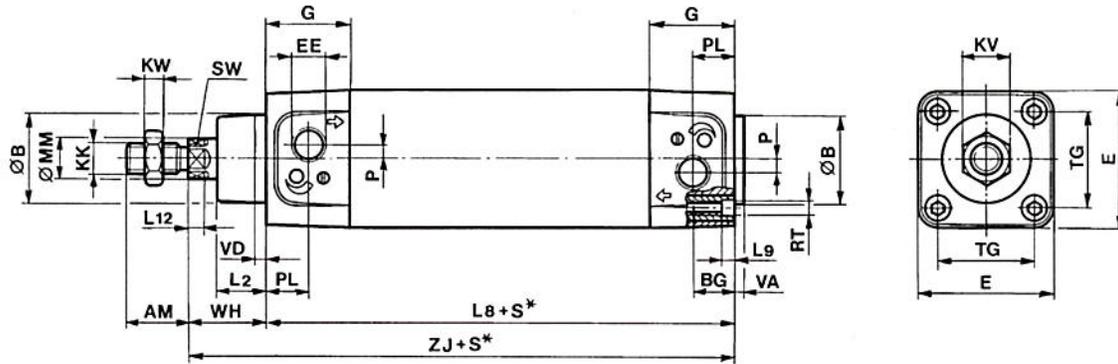
Symbol	Piston dia.	32	40	50	63	80	100	125
	Code no.	049-039-430-3	049-039-440-0	049-039-450-8	049-039-460-5	049-039-470-2	271-553-400-0	271-563-400-0



Profile cylinders, Series 523

Green series, 32–125 mm dia., magnetic piston, adjustable cushioning

Rexroth
Bosch Group



S* = Stroke

Tolerance Ø 32–50 mm = +2/-0, Ø 63–125 mm = +2,5/-0

Piston dia.	B e 11	E	G	L2	L8	L9	L12	P	EE	KK	MM g 8
32	30	49,5	28	15	94 ±0,4	5	6,0	4,0	G 1/8	M 10x1,25	12
40	35	54,5	33	19	105 ±0,7	5	6,5	5,0	G 1/4	M 12x1,25	16
50	45	67,0	31	24	106 ±0,7	6	8,0	7,5	G 1/4	M 16x1,5	20
63	45	78,0	38	24	121 ±0,8	6	8,0	11,0	G 3/8	M 16x1,5	20
80	45	100,0	38	30	128 ±0,8	–	10,0	11,0	G 3/8	M 20x1,5	25
100	55	120,0	42	35	138 ±1,0	–	10,0	17,0	G 1/2	M 20x1,5	25
125	60	145,0	54	45	160 ±1,0	–	13,0	27,5	G 1/2	M 27x2	32

Piston dia.	AM	BG min.	KV	KW	PL	RT	SW	TG	VA	VD	WH	ZJ
32	22	16	17	5,0	16	M 6	10	32,5 ±0,5	3,5	4	26	120
40	24	16	18	8,0	17	M 6	13	38,0 ±0,5	3,5	4	30	135
50	32	16	24	8,0	16	M 8	17	46,5 ±0,6	4,0	4	37	143
63	32	16	24	8,0	19	M 8	17	56,5 ±0,7	4,0	4	37	158
80	40	19	30	10,0	19	M 10	22	72,0 ±0,7	4,0	4	46	174
100	40	19	30	10,0	19	M 10	22	89,0 ±0,7	4,0	4	51	189
125	54	23	41	13,5	20	M 12	27	110 ±1,1	6,0	6	65	225



START-UP CHECK SHEET

Unit Model Number: _____ Unit Serial Number: _____

Owner: _____ Owner Phone #: _____

Address: _____

Installing Contractor: _____ Start-up Mechanic: _____

Voltage:

Incoming Voltage (3 phase Units) L1 _____ L2 _____ L3 _____

Running Voltage (3 phase units) L1 _____ L2 _____ L3 _____

Incoming Voltage (1 Phase units) L1-L2 _____ Running Voltage L1-L2 _____

Secondary Voltage _____

Amperage:

Supply Air motor: Rating Plate voltage: _____
Rated amps: _____ Measured amps: L1 _____ L2 _____ L3 _____

Return Air motor: Rating Plate voltage: _____
Rated amps: _____ Measured amps: L1 _____ L2 _____ L3 _____

Check Points:

- ___ Check and tighten all setscrews for blowers
- ___ Check tightness of drive belts
- ___ Verify fan rotation
- ___ Check set-screws and damper linkage tightness in main damper section
- ___ Verify damper blades switchover is smooth (Use S1 switch)
- ___ Verify damper blades close tightly
- ___ Verify heat exchangers have been installed correctly (length of heat-exchanger in direction of airflow)

After 48 hours of operation:

- ___ Check and tighten all setscrews for blowers
- ___ Check tightness of drive belts
- ___ Check set-screws and damper linkage tightness in main damper section
- ___ Verify damper blades switchover is smooth (Use S1 switch)
- ___ Verify damper blades close tightly

Auxiliary devices:

- ___ Check per device manufacturers recommendations