



# **Installation Operation Maintenance Instructions**

## **160 Series Centrifugal Blowers / Exhausters & Gas Boosters**

Serial Number

Site Location

Installation Date

GAS COMPRESSORS / BOOSTERS • GAS & AIR MIXING SYSTEMS • AIR BLOWERS & VACUUM PUMPS

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### **Warning**

Read the installation and maintenance information before commencing work on this equipment. Your attention is drawn to the health and safety information on page 4. Until the equipment into which the machine has been incorporated and the said equipment declared to be in conformity with the Machinery Directive, they must not be put into service.

### **Foreword**

The 160 series centrifugal gas booster has been developed based on many years of experience in the booster industry. Using modern design techniques and production methods coupled with rigorous testing and high quality standards ensure this series of machines have a long, efficient and reliable service life.

These operating instructions have been written for all personnel who have responsibility to the machine, it contains all the necessary information required for the machine to have a long trouble free service life. This manual must be stored near the machine and read before attempting any work on it.

Ensure that all operation and maintenance is only performed by competent and trained personnel and any repairs use only original parts from the manufacturer.

## General

The normal routine of running the machine is very simple. If it is carried out strictly at all times, many years of trouble free service can be expected.

We emphasise two points of paramount importance-

1. Filtration of incoming air of gas
2. Lubrication

If possible provide a logbook so that the operator can enter daily readings. After several months a record will show whether the machine is performing as it did originally. If readings are to be taken the following are all that is required. Inlet and outlet air temperatures, suction conditions and grease level.

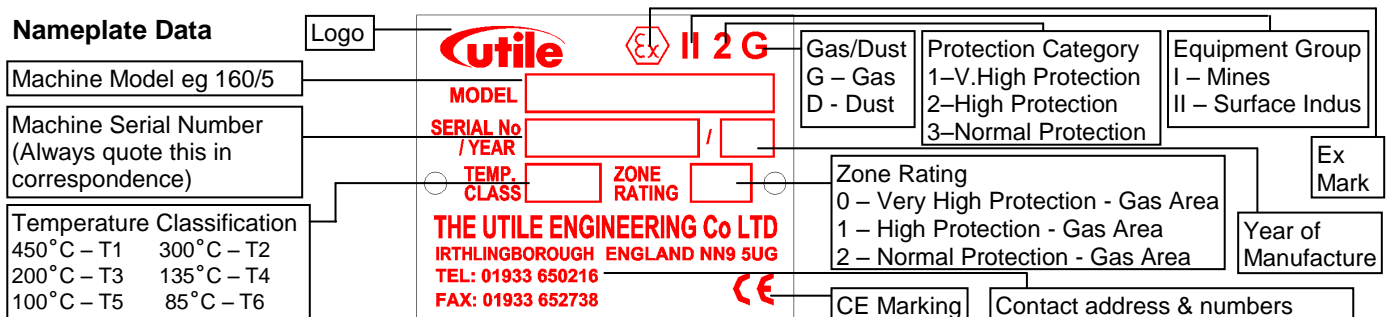
A typical layout for the log book is shown in the table below.

Machine Log Book				
Date	Inlet Gas Temp.	Discharge Gas Temp.	Inlet Conditions	Grease Level.

## Technical Specification

The model, machine serial number, year of manufacture, temperature class and zone rating for the machine appear on the machine data plate, other machine data can be found in the following table.

### Nameplate Data



	Units	3 stage	4 stage	5 stage	6 stage	7 stage	8 stage
Maximum Pressure (Air)	mbar	410	450	660	830	900	1000
Speed - Maximum	R.P.M.	4500	4500	4500	4500	4500	4500
Speed - Minimum	R.P.M.	2900	2900	2900	2900	2900	2900
Volume at 200 mbar, Max. Speed (Air)	m3/hr	2800	2950	3150	3250	3300	3300
Volume at 200 mbar, Max. Speed (Nat Gas (SG=0.6))	m3/hr	2300	2400	2900	2950	3000	3100
Absorbed Power at 200 mbar at Max. Speed (Air)	kW	44.0	50.0	73.0	93.0	101.0	112.0
Absorbed Power at 200 mbar at Max. Speed (Nat Gas)	kW	27.0	30.0	44.0	56.0	61.0	67.0
Maximum Ambient Temperature	°C	40	40	40	40	40	40
Surface Temp. at Max. Press. at Max. Speed (Air)	°C						
Moment of Inertia	kg m2						
Noise Level at 1 metre	db (A)	78-83	78-83	78-83	78-83	78-83	78-83
Weight (Bareshaft Unit)	kg	260	305	346	386	440	480

Note: Machine must not be used on any other gas than originally specified. Utile Engineering must be consulted if traces of any other gas are introduced into the machine.

Read the installation and operating instructions carefully.

Rotating machinery and pressurised components, which may contain toxic, flammable or otherwise hazardous media are potentially dangerous equipment if not operated and maintained correctly. It is imperative that all users of such equipment fully educate themselves to the potential dangers and satisfy themselves that the personnel responsible for installing, testing, commissioning, operating and maintaining the plant are competent to do so. Instruction manuals are provided for guidance but must assume some basic level of competence by users. If there are any doubts or ambiguities concerning correct procedures, ask Utile Engineering. **DO NOT TAKE RISKS.**

Certain machinery can generate high levels of noise which can be harmful if exposed to it for lengthy periods of time. Various codes of practice are in existence and users must ensure that adequate precautions are taken to prevent a health hazard to employees or third party.

Equipment with internal pressures above or below ambient pressures can create a hazard. Before attempting to investigate problems, service or maintain equipment, it must be safely depressurised or pressurised to ambient conditions. Also since the gaseous medium may be flammable, toxic, corrosive or otherwise hazardous it may be necessary to purge the installation with an inert gas, such as nitrogen. Special precautions are necessary for certain gases and the user must ensure that adequate procedures are implemented.

Moving parts of machinery must not be touched and all such parts must be adequately guarded. Suitable guards are provided and must be securely retained in position at all times.

Before commencing maintenance, servicing or making other adjustments, the prime mover and other equipment must be isolated electrically or otherwise immobilised to prevent accidental start-up. In this vein, a fully qualified electrician should carry out all electrical work and all electrical equipment should be isolated before it is touched and pneumatic or hydraulic controls depressurised and made safe. Procedures must also exist to ensure that electrical or other inputs cannot be restored accidentally during the maintenance or service period.

Safety trips, emergency stop-buttons and other such devices (if fitted) are to be checked regularly to ensure that they continue to function correctly and will protect the installation and personnel in the event of an emergency.

NO attempt should be made to touch the machine whilst it is rotating. Particular care is needed when checking rotor clearances. Any movement of rotors may trap fingers.

Most machines, certain pipes and ancillaries become hot during operation whilst certain machines with sub-zero inlet temperatures may result in very cold surfaces. If it is possible for personnel to come into contact with such surfaces unknowingly or accidentally they should be guarded.

If severe vibration is observed, the cause of this should be immediately investigated and the situation rectified. Excessive vibration can lead to fatigue and other failures. Similarly, if during operation a significant change is noticed in the level of vibration, noise, temperature or any other parameter, the cause of such changes must be determined, and the cause rectified. Inlet filters must be inspected regularly so that liquid or debris is not allowed to enter the machine, which could cause damage and consequently injury to personnel.

During routine maintenance, coupling alignment should be checked for misalignment.

Only approved lubricants must be used and quantities, etc must be checked regularly.

Before restarting after servicing, all nuts, set screws, etc must be checked for tightness, check all joints, for leaks and carry out purging as necessary before introducing the process gas. Also, before start-up, check the machine inlet and outlet isolating valves are open both non-return valves (if fitted) are the correct orientation.

Adjacent pipework and equipment must not impose undue forces and moments on the machinery flanges.

All welding work must be carried out by an approved gas coded welder.

In order to prevent reverse rotation of machines, it is **ESSENTIAL** that a non-return valve be installed in the inlet pipework. Otherwise a hazardous situation can arise during a normal shutdown or if the prime mover power supply is interrupted for a period of time.

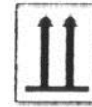
The environment around the installation may need to be monitored in order to detect gas leaks etc., and consideration must be given to the installation of gas detecting equipment, and the class of electric equipment.

All personnel working in or passing through the area should be adequately warned by signs and trained to exercise appropriate safety precautions. Ensure the correct personal protective equipment is worn at all times.

## Packaging

The packaging conforms to the relevant regulations. The symbols used on the packages are shown on the right. The machines are bolted down on a pallet and therefore should not move during transportation and either cased or shrink wrapped for general protection. The ancillary components are packed suitably within the case. The packaging and contents should be received in good condition. When unpacking do not remove the inlet/outlet protection covers.

The contents should be inspected against the advice note, notify Utile Engineering within 3 days of any items, which are damaged or are missing, followed by a written claim within seven days of the goods being delivered.



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Fragile

## Storage

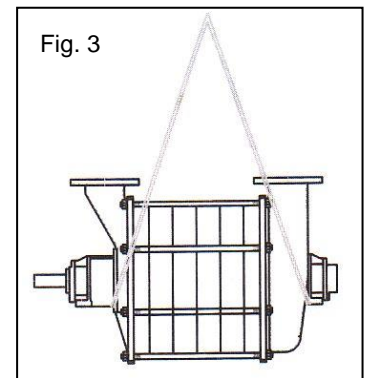
If the machine is not required for immediate installation, the machine should be stored in a clean, dry area protected from the weather. The intake and discharge port covers must remain in position until the machine is installed. We recommend that the shaft be turned a few revolutions by hand to ensure the machine is running free every month until the machine is installed.

The green protective coating on the shaft remains effective for approximately 1 year. If the machine is stored for a longer period of time, the coat must be renewed.

## Handling

Skilled personnel working in accordance with safe working practices must carry out the lifting of machines. Before lifting the correct equipment must be available. Cranes, jacks, slings, and lifting beams must be capable of carrying the weight of the machine to be lifted. The lifting eyebolt situated in the top of the cylinder and a crane hook must be used when lifting or moving the machine (see fig 3). Do not use the machine ports or the shaft extension for lifting or moving the machine.

For weights see above in Technical Specification.



## Installation

Before commencing installation, a site specific risk assessment, method statement and hazard identification list must be completed and adhered to. All work must be carried out in a safe area. Utile Engineering trained personnel or those trained to an equivalent standard should carry out installation, any claims for damage due to faulty installation will be void. The machine is delivered ready to be connected, with only the removal of the intake and discharge protection covers. All warning labels and instructions must be observed and retained with the machine. Before installation, ensure there is no damage to the machine and that it turns freely by hand.

Typical tools required for installation include: -

Set of spanners	Pipe Wrenches	Set of screwdrivers	Hacksaw
Hammer / mallet	Drill (low voltage)		

Typical bolt tightening torques are: -

Bolt Tightening Torques			
Size	Torque	Size	Torque
M4	4.00 Nm	M12	70.00 Nm
M5	6.00 Nm	M16	100.00 Nm
M6	10.00 Nm	M20	150.00 Nm
M8	18.00 Nm	M24	250.00 Nm
M10	40.00 Nm		

## Location

The machine should be installed in a clean, dry, well-ventilated area. Allow adequate space and facilities for service, inspection and future expansion. A minimum of 0.75m of working space around the machine is recommended. Adequate space around the motor and machine, particularly any fan inlets, is also necessary to facilitate cooling airflow. If several machines are installed in close proximity, care must be taken to ensure there is no recirculation of exhausted warm air.

## Foundation

Simple slab type foundations, designed for static loadings only are satisfactory. The foundations should raise the machine to a reasonable height above the floor for convenient service and inspection. The use of anti-vibration mounts between the base and foundation are recommended, these absorb the vibrations generated by the rotating parts of the machine and insulate it against any vibration in the surrounding environment. Ensure that the anti-vibration mounts are evenly loaded. Foundation bolts should fix the base.

## Electrical Supply and Connection

The voltage rating of the supply must be compatible with the motor and the fittings. All electrical installation must be carried out by a qualified electrician and in accordance with current regulations and within the framework of the Electricity of Work Regulation 1990. Ensure all electrical connections, plugs, sockets etc are secure before switching the supply on.

## Earthing

It is important that the motor enclosure is soundly earthed by metallic earth continuity conductor, or by separate earth bonding, but in all cases the installation must be made and tested and approved for this feature by a qualified installer before the supply is applied to the motor.

## Fitting Pulleys and Couplings

These should be bored to our standard limits (details supplied upon request) and fitted to the shaft with a screwing motion. On no account should they be driven on. Tapping of fittings onto the machine shaft with a hammer or mallet, causes bearing damage. This results in an increase in bearing noise and a significant reduction in bearing life. Attention should be paid to the guarding of all moving parts.

## Drive Alignment- Drive Belts

1. Remove any dirt, oil, etc. from all mating surfaces. Place bush in hub and match half holes on both shafts.
2. Mount assembly in desired position on shafts ensuring both shafts are parallel and in correct alignment, use a straight edge, a correctly aligned drive will contact both pulleys squarely (see fig. 4).
3. Fit driving belts. Measure span of belts between tangent points of the two pulleys. A deflection of 1.5mm is obtained for every 100mm of the measured span. Compare the deflection force required with the table. If the force required is according to the table then the tension is suitable. Too little force indicates under-tension and visa-versa.
4. The belts should be tensioned towards the high side, to allow for the tension drop after the belts have been run-in. Belt tension should be checked daily in the first week after installation/renewal.

Belt Section	Force Required to deflect belt 1.5mm per 100mm span (kgf)
SPZ	0.5 to 0.8
SPA	1.0 to 1.5
SPB	2.0 to 3.1

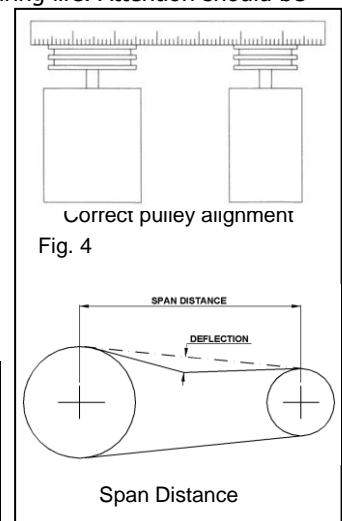


Fig. 4

## Warning:

Excessive tension on the pulleys will damage the bearings and lead to a probable shaft rupture. Belts, which become charged electrostatically, must not be used in hazardous atmospheres.

## Pipework

- The connecting pipework must be completely clean, dry and free from internal rust or scale.
- The intake and discharge pipework must be adequately supported and that it is properly aligned to prevent excessive strain being placed upon the machine, flexible pipe should be placed in the pipeline to remove this strain.
- During installation ensure that no foreign matter enters the machine or serious damage may result.
- An intake filter with diameter at least the same size as the compressor intake, should be fitted into the intake side to prevent any particles from entering the machine.
- Use P.T.F.E. tape only as a jointing medium since surplus from jointing compounds will damage the machine.
- It is essential to fit a non-return valve in the pipework, preferably on the discharge side to prevent the machine from running in reverse on shutdown.
- Arrange both the intake and discharge pipework so that any condensate flows away from the machine.
- If user is installing their own protective devices and switches these must be suitable for operation in the zone classified.
- All pipework and fittings must comply with IGE/UP/2 or the national standard for the country of installation.

### **Pre Start-up Checks**

Before starting the machine for the first time after installation, maintenance or after a long downtime, make the following checks: -

- ✓ Ensure all the anchor bolts for the machine, base and motor are securely fastened.
- ✓ Check that the machine is free running by turning the shaft by hand through a few revolutions.
- ✓ Flick start the motor to check that the direction of rotation agrees with the arrow on top of the machine cylinder. Note this should be completed with the coupling/drive belts removed.
- ✓ Recheck coupling/drive alignment and retension (see page 6).
- ✓ Ensure all equipment is installed and earthed in accordance with current legislation.
- ✓ Check all piping connections.
- ✓ If the system is to be pressure tested, all gauges and pressure switches must be isolated or removed. Maximum purge or pressure test is 1.50 times the working pressure.
- ✓ Check all protective devices ensuring they are working correctly.
- ✓ Ensure personnel are adequately protected from accidental contact with all dangerous equipment.
- ✓ Instruct the operating personnel that the machine is operational.

### **Protective Devices**

All pressure and temperature switches must be set and tested at the desired set point by simulating the set point in actual operation.

With the machine running at the duty pressure after warming up, adjust the discharge temperature switch downwards to actuate and stop the machine. Reset the switch at the cut out temperature plus 10°C - 15°C in order to avoid false tripping from small and reasonable increases above normal levels.

Adjust the high pressure cut out switch in the same manner and reset at working pressure plus 10%.

After the first 50 running hours, remove the cone shaped mesh strainer from the inlet, clean and replace. If a large amount of debris has been collected run for a further 50 hour period repeating the process until the filter remains clean.

### **Start-up**

**Outlet Control Valve** - A valve is fitted on the booster outlet, designed to prevent overload conditions on startup. When first started this valve should be closed until full speed is reached. Then slowly open the valve until full gas demand is achieved. The valve handle should then be locked off or removed to prevent settings being adjusted.

**Surge Control Bypass Valve** - In most circumstances this valve is installed between the booster inlet and outlet to prevent surging on low flow conditions. When first started this valve should be closed until full speed is reached.

High Gas Flow - Slowly open valve to the point when outlet pressure starts to reduce.

Low Gas Flow - To check the setting on high gas flow and test its operation on low gas flow conditions. Reduce the gas flow to minimum flow conditions and ensure that flow does not occur.

### **Operating Notes**

- After initial running in, re-check the belt tension. Belt squeal denotes a loose belt that requires tightening.
- Inspect the filter fitted to the inlet, regularly clean and renew the element when necessary. Excessive discharge temperature for normal operation as indicated by the rise in temperature shown in the log book indicates inadequate cooling, faulty lubrication or a dirty intake filter. The machine should be stopped and thoroughly inspected to identify the cause of the problem. The replacement time scale for filter elements cannot exactly be indicated as this is dependant on environmental and operational conditions, however a good indicator is replace the element when the pressure loss is 25-50mm WG above that of a new element.
- Regrease the bearings every 1500 hours using one shot of a grease gun with SKF LGHP2 grease. When checking for bearing and seal wear, the old grease must be removed and replaced with new.
- Check the machine internally for wear every 10,000 running hours. (see Dismantle)
- If machine is on a standby service, run for a few minutes each week.

### **Stopping Procedure**

Proceed as follows: -

- i. Trip out or Stop the drive motor.

## Lubrication

The recommended grade of grease is SKF LGHP2 typical physical characteristics are shown right.

The quantity and relubrication times cannot be exactly specified as the grease consumption depends on the operating conditions of the machine and on the environmental conditions. In general the bearing housing volume should be filled up to 1/3 of the free volume.

Note: if lubrication is excessive, bearing self-heating takes place with an increasing bearing temperature over time. However, if the lubrication is correct after an initial increase the temperature decreases.

SKF LGHP2 Grease	LGHP2
Base Oil (type)	Mineral
NLGI Consistency	2-3
Base Oil Viscosity @ 40°C mm <sup>2</sup> /s approx. 100°C mm <sup>2</sup> /s approx. (DIN 51561)	96 10.5
Dropping Point °C	240 min
Maximum Operating Temperature °C	150
Minimum Operating Temperature °C	-40
Worked Penetration @ 60 strokes 0.1mm. (DIN ISO 2137)	245 to 275

## Maintenance

Fully trained and competent staff must carry out any maintenance work. Utile Engineering offers contract maintenance services if required contact our service department.

When carrying out any maintenance and inspections always follow the health and safety guidelines on page 4.

A regular correct maintenance plan is essential to good operational reliability and a long service life for your machine. As operating conditions vary, no exact timings can be specified for wear checks, repairs and inspections, however the following plan can be used as a guide until time scales to better suit the units environment are found.

The machine, ancillaries and surrounding area should be kept as clean as possible. Ensure all machines and associated pipework have cooled down sufficiently before touching and attempting any maintenance.

Ensure all items are properly held and supported during all aspects of maintenance as not to pose a problem for health and safety. Observe all lifting points and apply care when handling the equipment.

Typical bolt tightening torques can be seen on page 5. Typical tools required for maintenance include: -

Set of spanners	Pipe Wrenches	Circlip Pliers	Set of screwdrivers	Hammer / mallet
Vernier Gauge / Micrometer	Two-leg Pulley drawer		Set of Allen Keys	Feeler Gauges

New gaskets must be fitted every time the machine is dismantled.

Bearings and seals are recommended to be replaced after 15000 operating hours or 2 years whichever is sooner.

After maintenance the machine and equipment must be treated, as new and all pre-commissioning checks should be made.

Install all protective devices and controls properly after completion of work. Ensure all cabling, unions and guards are correct, secure and in place. Dispose of any used oil and cleaning solutions as prescribed by law.

MAINTENANCE PLAN			
DAILY CHECKS		QUARTERLY CHECKS	
TASK	CHECK	TASK	CHECK
Check Belt condition/Tension (Hourly for running in period).		Check machines and motors for excessive vibration and damage.	
Drain all vessels, condensate traps, outlet filters manually		Check control panel for wiring, cleanliness and function of all panel features. (if applicable)	
Clean inlet filters (Daily for 1 <sup>st</sup> week).		Check function of emergency stop button	
Check tightness of foundation bolts		Check function of local motor isolator	
WEEKLY CHECKS		Check function of pressure gauges	
Check belt condition / tension		Check function of non-return valves	
Clean inlet filters (After for 1 <sup>st</sup> week).		Clean fins on motors	
Run Standby machine for a few minutes.		Check function of pressure relief valves	
MONTHLY CHECKS		YEARLY CHECKS	
Check function and operation of all valves.		Check flanges and joints for leaks.	
Check differential pressure across filters (clean and replace if necessary).		Clean internally vessels, condensate traps, filters (including elements).	
Check function and operation of autodrain / condensate lines.		Inspect machine internally (at least once a year)	



### Troubleshooting

The following table shows some typical problems and the remedies.

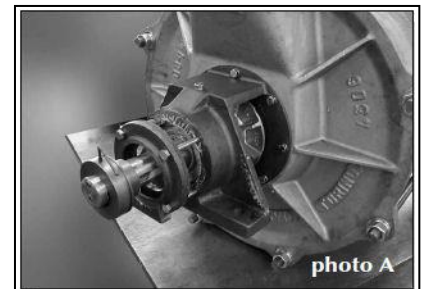
Note: If assistance is required in determining and correcting the fault then contact our service department.

SYMPTOMS	CAUSES	REMEDIES
Excessive loss of lubrication	Faulty Seal	Replace Seal
Wrong direction of machine	Incorrect connection of motor terminal	Re-arrange terminal connection
Discharge air / gas temperature excessive	1. Machine operating at higher duty than specified. 2. Blocked intake filter. 3. Insufficient or wrong lubrication. 4. Unloading valve is not fully open 5. High inlet temperature	1. Check rating. 2. Clean intake filter. 3. Use correct lubrication and feed rates. 4. Open unloading valve 5. Reduce inlet temperature.
Abnormal noise, vibration or periodic knocking	1. Worn bearing. 2. Insufficient lubrication 3. Impeller contacting housing 4. Drive misalignment 5. Excessive liquid carryover. 6. Impeller blade damaged. 7. Foreign matter attached to impeller blade 8. Impeller loose.	1. Replace bearing. 2. Increase lubrication rate 3. Check internal clearances 4. Realign and retension drive. 5. Drain all points. 6. Repair and rebalance, or replace impeller. 7. Remove foreign object, repair impeller & rebalance, or replace impeller. 8. Tighten impeller.
Pressure cannot be built up or only up to a certain extent.	1. Slow speed. 2. Improper belt tension. 3. Sticking relief valve. 4. Dirty inlet filter 5. Impeller blade damaged. 6. Leak in pipework.	1. Correct speed. 2. Adjust belt tension. 3. Clean and replace. 4. Clean and replace. 5. Repair and rebalance, or replace impeller. 6. Repair pipework.
Slipping of belts	1. Improper belt tension. 2. Worn belt.	1. Adjust belt tension. 2. Replace with new ones.
Overheating of electric motor	1. Overloading of motor due to excessive working pressure. 2. Worn bearings 3. Poor ventilation 4. Unbalanced voltage supply. 5. Starting too frequently.	1. Lower working pressure. 2. Replace bearings. 3. Check motor vent openings. 4. Check voltage and current. 5. Reduce amount of starts.
Machine does not start	1. Breakdown of electric current 2. Malfunction of motor. 3. Wrong motor connections. 4. Motor fuse blown 5. Motor tripped on overload.	1. Contact power company. 2. Check motor. 3. Check electrical connections. 4. Replace fuse. 5. Reset overload.
Shaft partially or totally locked	1. Faulty bearing 2. Foreign particles in machine. 3. Machine seized.	1. Replace bearing. 2. Dismantle machine, remove foreign particles. 3. Repair machine.

### 1. Bearing Replacement – Drive End

Remove the pulley and key then proceed as follows:

- 1.1 Unscrew the socket grub screw (1) and remove the inlet side lid (2) (see photo A).
- 1.2 Unscrew the four hex head screws (3) pull out the inlet side grease lid (4) (see photo A).
- 1.3 Remove the protective case (6) by unscrewing four hex head screws.



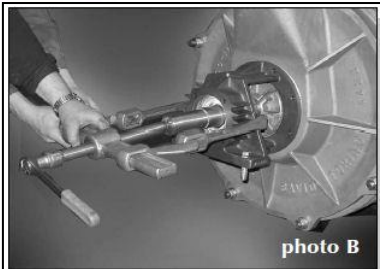


photo B

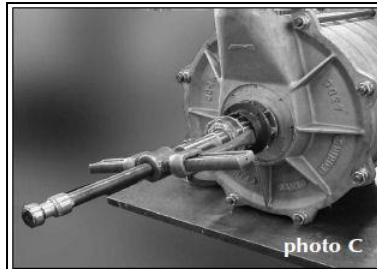


photo C



photo D

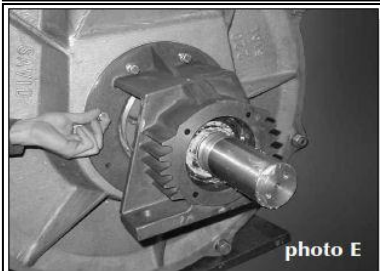


photo E

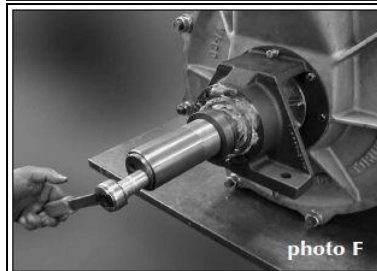


photo F

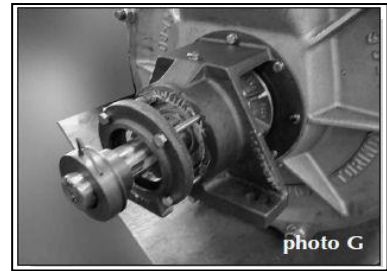


photo G

- 1.4 Unscrew the eight hex head screws (8), and pull out using the extractor, the support (5) (see photo B).
- 1.5 Move the inlet side support lid (11), so that you can insert the extractor, and pull out the ball bearing (9) (see photo C).
- 1.6 Clean the mechanical parts carefully.
- 1.7 Change the felt (10) of the inlet side support lid (11) (see photo D), and refit it on to the shaft.
- 1.8 Fit the support (5) on the intake casing (19), and refit the eight screws (8) (see photo E).
- 1.9 Refit any shims in their original position.
- 1.10 Fit the ball bearing (9), making it slide on the shaft with a bushing operated by two screws screwed onto the head of the shaft (see photo F). Now grease the bearing.
- 1.11 Insert the inlet side grease lid (4), and screw four hex head screws (3) in position. Ensure there are no gaps.
- 1.12 Refit the protective case (6), and screw the four hex head screws in position.
- 1.13 Fit the inlet side lid (2), and shut it tightly. Screw the socket grub screw (1) in position (see photo G).

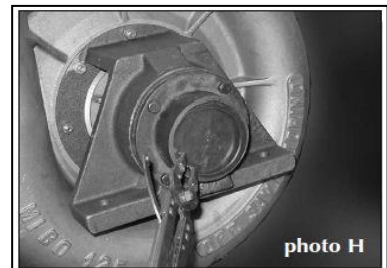


photo H



photo I

## 2: Replacing Bearing – Rear End

Proceed as follows:

- 2.1 Remove the snap ring (58), and the protective plate (57) (photo H).
- 2.2 Remove the protective case (49) by removing four hex head screws.
- 2.3 Remove the screw (56) of the outlet side lid (54) (see photo I).
- 2.4 Unscrew the four screws (55) of the outlet side grease lid (53), and eight nuts (51) that connect the support (50) to the outlet casing (38).
- 2.5 Insert the extractor to pull out the support (50) (see photo B).
- 2.6 Again, using the extractor pull out the ball bearing (47) and the outlet side support lid (45) (see photo C).
- 2.7 Clean all the mechanical parts and grease. Change the felt (44) of the outlet side support lid (45) (see photo D).
- 2.8 Refit the support (50) on the outlet casing (38), and screw the eight nuts (51). Refit any shims in their original position.
- 2.9 Refit ball bearing (47) making it slide on the shaft with a bushing operated by two screws screwed onto the head of the shaft (34) (photo J).



photo j

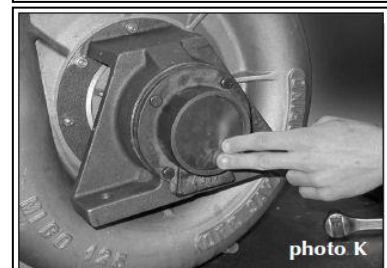


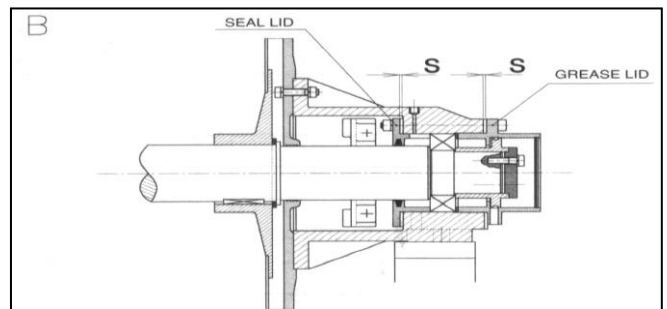
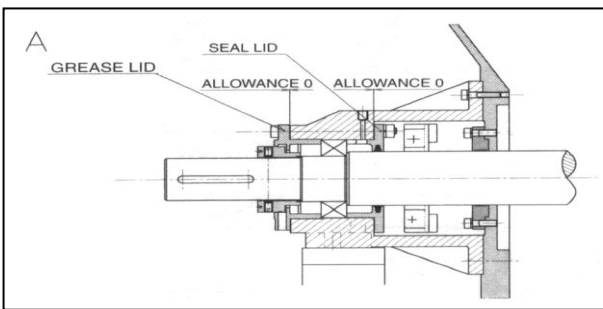
photo K

- 2.10 Fasten the outlet side grease lid (53) with four screws (55). Insert the outlet side lid (54). Tighten the screw (56).
- 2.11 Position the protective case (49) and refit the four hex head screws.
- 2.12 Insert the protective plate (57), and snap ring (58) (see photo K).

Before re-starting, check, by manually rotating the shaft, that there is no rubbing of the impellers (no scraping noise should be heard).

**Pulley Side Support:** The ball bearing with one ball ring shall be locked by grease lid and seal lid (fig 3).

**Rear Side Support:** It is important that during the replacement of the rear end bearing the original clearances S are complied with (fig 4). This clearance is essential for expansion and sliding of the bearing unit.

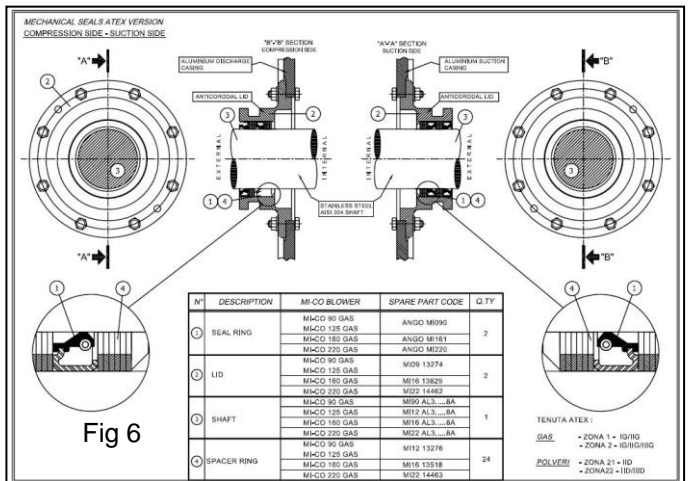
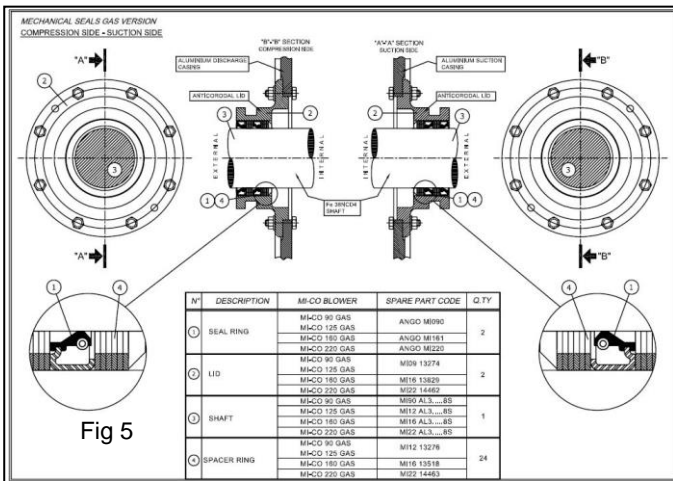
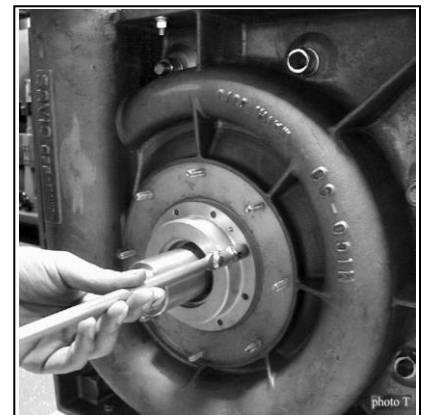


### 3: Replacing Gas Seal Lid – Gas Boosters Only

Proceed as follows:

- 3.1 Unscrew eight hex head screws so that the gas seal lid can be removed (see photo T).
- 3.2 Completely remove gas seal lid.
- 3.3 Insert a bush with the hole diameter corresponding to the last shaft shoulder.
- 3.4 Insert the new gas seal lid by means of a rubber hammer.
- 3.5 Refit the eight hex head screws.

Note: The sealing arrangement in the gas seal lids are different, these must be installed in the correct position (see figs 5 & 6).



#### 4. Spare Parts

A stock of the main wearing parts at the installation site is important to the constant availability and smooth running of the machine. We recommend the following parts and quantities to be kept in stock at the installation site.

Description	Part Number	Quantity
Ball Bearing – Drive End – (Suction Side)	CUSF6311	1
Ball Bearing – Drive End – (Compression Side)	CUSF2310	1
Felt Seal	GZFL8x8	2
Viton Seal (Biogas Booster only)	M12 OS27743	4
Coating Ring (Biogas Booster only)	M12 OS99269	2
Drive Belt		1 set

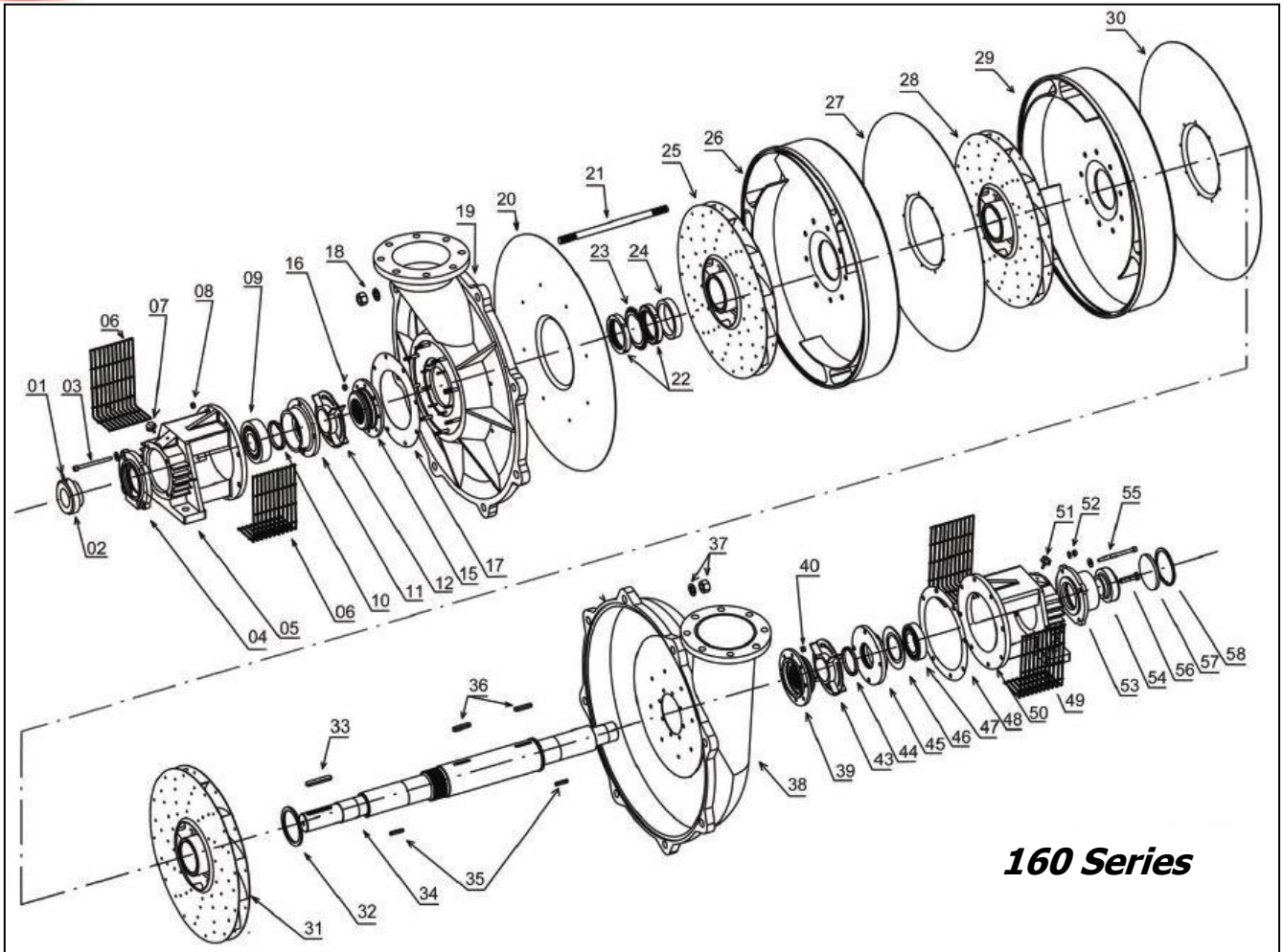
Always quote the machine serial number when ordering spare parts.

#### After Sales Service

Contact the address or telephone number shown at the bottom of each page or our local distributor, for any after sales service, maintenance or service problems.

Contract maintenance, service exchange machines or a site visit by a Utile Engineering Service Engineer can also be arranged in the same manner.

Utile Engineering can also provide Training Programs for all your requirements, from maintenance repair to operator and supervisor training. They are structured to give specialist knowledge of our products and procedures including use of authorised spares. The enacting of the Health and Safety at Work Act focused attention on the responsibility of all parties, manufacturers, users and repairers on the repair of equipment. We strongly recommend that repairs should be carried out to the original specification using authorised replacement parts where necessary.



**160 Series**

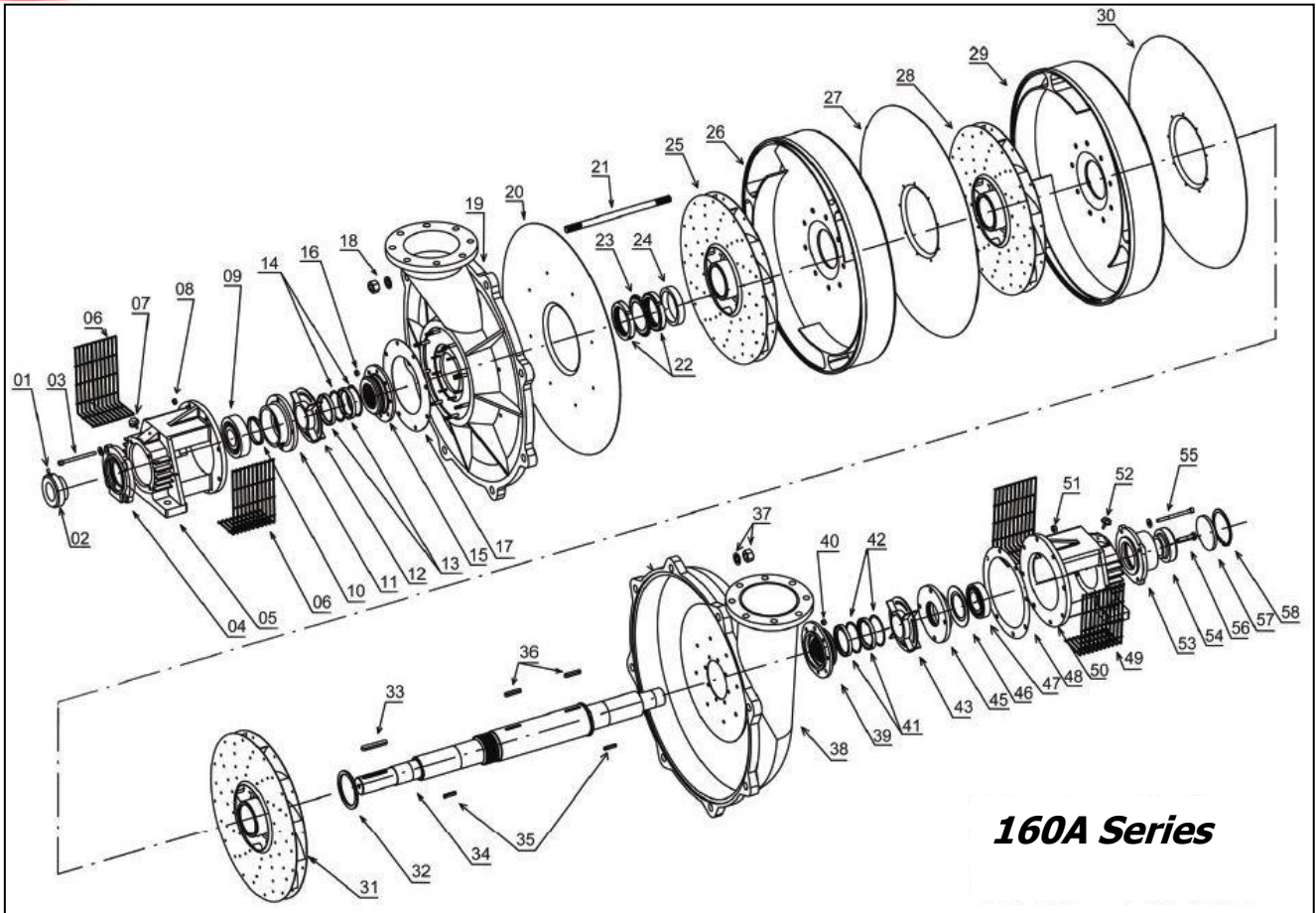
ITEM	DESCRIPTION
1	Grub Screw – M6 x 10
2	Inlet Side Lid
3	Hex Head Screw – M10 x 110
4	Inlet Side Grease Lid
5	Support
6	Protection Case
7	Lubricator
8	Hex Nut – M10
9	Ball Bearing – 6311E-C3
10	Felt Seal
11	Inlet Side Support Lid
12	Cooling Fan
15	Inlet Side Lid Seal
16	Hex Nut – M6
17	Gasket
18	Hex Nut – M20
19	Inlet Casing
20	Inlet Casing Wall
21	Tie Rod – M20

ITEM	DESCRIPTION
22	Ring Nut – KM17
23	Safety Washer – MB17
24	Sealing Ring
25	Impeller
26	Drum
27	Drum Wall
28	Impeller
29	Drum
30	Drum Wall
31	Impeller – Reduced Hub
32	Spacer
33	Key – 14 x 80 x H7
34	Shaft
35	Key – 06 x 25 x H7
36	Key – 10 x 50 x H7
37	Hex Nut – M20
38	Outlet Casing
39	Outlet Side Lid Seal
40	Hex Nut – M6

ITEM	DESCRIPTION
43	Cooling Fan
44	Felt Seal
45	Outlet Side Support Lid
46	Compensator Ring
47	Ball Bearing – 2310E-C3
48	Gasket
49	Protection Case
50	Support
51	Lubricator
52	Hex Nut – M8
53	Outlet Side Grease Lid
54	Outlet Side Lid
55	Hex Head Screw – M10 x 110
56	Hex Head Screw – M12 x 35
57	Protection Disc
58	Snap Ring

Additional Items for Biogas, item nos. shown in Figs 5 & 6 on page 12. (Total QTY for suction and compression side)

ITEM	DESCRIPTION	PART No.	QTY	ITEM	DESCRIPTION	PART No.	QTY
1	Viton Seals	Ango MI161	2	3	Shaft	MI16 AL3.....8S	1
2	Lid	MI16 13829	2	4	Spacer Ring	MI12 13518	24



**160A Series**

ITEM	DESCRIPTION
1	Grub Screw – M6 x 10
2	Inlet Side Lid
3	Hex Head Screw – M10 x 110
4	Inlet Side Grease Lid
5	Support
6	Protection Case
7	Lubricator
8	Hex Nut – M10
9	Ball Bearing – 6311E-C3
10	Felt Seal
11	Inlet Side Support Lid
12	Cooling Fan
13	Gas Seal Ring
14	Spacer Ring
15	Inlet Side Lid Seal
16	Hex Nut – M6
17	Gasket
18	Hex Nut – M20
19	Inlet Casing
20	Inlet Casing Wall

ITEM	DESCRIPTION
21	Tie Rod – M20
22	Ring Nut – KM17
23	Safety Washer – MB17
24	Sealing Ring
25	Impeller
26	Drum
27	Drum Wall
28	Impeller
29	Drum
30	Drum Wall
31	Impeller – Reduced Hub
32	Spacer
33	Key – 14 x 80 x H7
34	Shaft
35	Key – 06 x 25 x H7
36	Key – 10 x 50 x H7
37	Hex Nut – M20
38	Outlet Casing
39	Outlet Side Lid Seal
40	Hex Nut – M6

ITEM	DESCRIPTION
41	Gas Seal Ring
42	Spacer Ring
43	Cooling Fan
44	Felt Seal
45	Outlet Side Support Lid
46	Compensator Ring
47	Ball Bearing – 2310E-C3
48	Gasket
49	Protection Case
50	Support
51	Lubricator
52	Hex Nut – M8
53	Outlet Side Grease Lid
54	Outlet Side Lid
55	Hex Head Screw – M10 x 110
56	Hex Head Screw – M12 x 35
57	Protection Disc
58	Snap Ring

Additional Items for Biogas, item nos. shown in Figs 5 & 6 on page 12. (Total QTY for suction and compression side)

ITEM	DESCRIPTION	PART No.	QTY	ITEM	DESCRIPTION	PART No.	QTY
1	Viton Seals	Ango MI161	2	3	Shaft	MI16 AL3.....8A	1
2	Lid	MI16 13829	2	4	Spacer Ring	MI12 13518	24



## Warranty

### Warranty Claim Conditions

Utile offers a 12-month warranty against faulty parts and workmanship. This does not include components used in the production of packages, where the appropriate manufacturers warranty applies.

1. The warranty period commences from the first day that the operator receives the machine.
2. The warranty covers defective parts or workmanship used in the manufacture of the machine.
3. The operator must notify the company promptly of any failure (using the appropriate procedure – indicated below).

Please note: The company is not liable for any claim where: -

1. Damages or delay or any other consequential cost associated with the alleged defect, are incurred.
2. Malfunction caused by fair wear and tear, abnormal conditions of use, accident, neglect or misuse of equipment, or improper storage.
3. Deviation from operating specifications or other special terms of sale.
4. Improper operation, maintenance or repair.
5. Damage resulting during shipment or installation by other than company authorised personnel.
6. Freight charges for goods returned to the company's premises.

No allowances will be made for repairs or alterations carried out without the company's written consent or approval.

### Claim form

To make a claim complete the form below and send, phone, fax or email us at the address at the bottom of the page.

Warranty Claim Form				
Your Details				
Name:				
Company Name:				
Company Address:				
Telephone:				
Fax:				
E-mail:				
Machine Details				
Serial Number:				
Model:				
Site Location:				
Supplier Name:				
Installers Name:				
Date Commissioned:				
Name of Person responsible for Maintenance:				
Operating Hours a Day:				
Duty Details				
Speed:		Gas Flow:		Pressure:
Further Information				