

# INSTRUCTION MANUAL FOR INSTALLATION, OPERATION AND MAINTENANCE.

## HM<sup>®</sup> MIXERS

This manual should be available to personnel responsible for the installation, operation and maintenance of this equipment.

### TRANSLATION OF THE ORIGINAL MANUAL

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#### Other Countries:

Please visit our website to find our local representatives.

[www.miltonroymixing.com](http://www.miltonroymixing.com)

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## DECLARATION D'INCORPORATION DECLARATION OF INCORPORATION

Nous MILTON ROY Europe déclarons sous notre propre responsabilité que les agitateurs des séries :

*We MILTON ROY Europe declare under our own responsibility, that mixers of the following series:*

- HELISEM
- HELIMIX
- HM
- ELAT type H et F
- ROBIN type A, B, C, D, E, F, G, H

Satisfont aux exigences essentielles listées dans l'annexe I de la Directive 2006/42/CE suivantes:

*Comply with the following essential requirements listed in the annex I of the 2006/42/EC Directive :*

- |   |   |
|---|---|
| • 1.1   | • 1.1   |
| • 1.3 pour les éléments au-dessus du plan de pose                                   | • 1.3 for parts above the setting plan  |
| • 1.4 pour les éléments au-dessus du plan de pose                                   | • 1.4 for parts above the setting plan  |
| • 1.5 excepté 1.5.13, 1.5.14 et 1.5.15 en raison de l'absence de fourniture de cuve | • 1.5 except 1.5.13, 1.5.14 and 1.5.15 due to the lack of supply for the tank |
| • 1.6   | • 1.6   |
| • 1.7   | • 1.7   |

MILTON ROY Europe s'engage, sur demande des autorités nationales, à leur transmettre la documentation technique concernant la quasi-machine qui a été constituée conformément à l'annexe VII-partie B.

*MILTON ROY Europe undertakes, at the request of national authorities, to send the technical documentation regarding the partly completed machinery which has been established in accordance with the Annex VII part B.*

La mise en service est interdite avant que la machine, dans laquelle notre matériel doit être incorporé, soit déclarée conforme aux dispositions de la Directive 2006/42/CE.

*The startup is prohibited before the machinery, in which our material is incorporated, complies with the requirements of the 2006/42/EC Directive.*

Pont Saint Pierre

18/02/2021  
Manager

DEPARTEMENT QUALITE  
QUALITY DEPARTMENT  
Responsable Qualité / Quality

Emmanuel FONTAINE

# Essential health and safety requirements relating to the the design and construction of machinery

MACHINE TYPE OF MRM	HM	FR	HR	HD	HL	VD	VL	VR
<b>1-ESSENTIAL HEALTH AND SAFETY REQUIREMENTS</b>								
<b>1.1. GENERALITES</b>								
1.1.1. Definitions								Milton Roy Europe (MRE)
1.1.2. Principles of safety integration								Milton Roy Europe (MRE)
1.1.3. Materials and products								Milton Roy Europe (MRE)
1.1.4. Lighting								Milton Roy Europe (MRE)
1.1.5. Design of machinery to facilitate its handling								Milton Roy Europe (MRE)
1.1.6. Ergonomics								N/A
1.1.7. Operating positions								N/A
1.1.8. Seating								N/A
<b>1.2. CONTROL SYSTEMS</b>								
1.2.1. Safety and reliability of control systems								Integrator's responsibility
1.2.2. Control devices								Integrator's responsibility
1.2.3. Starting								Integrator's responsibility
1.2.4. Stopping								Integrator's responsibility
1.2.4.1. Normal stop								Integrator's responsibility
1.2.4.2. Operational stop								Integrator's responsibility
1.2.4.3. Emergency stop								Integrator's responsibility
1.2.4.4. Assembly of machinery								Integrator's responsibility
1.2.5. Selection of control or operating modes								Integrator's responsibility
1.2.6. Failure of the power supply								Integrator's responsibility
<b>1.3. PROTECTION AGAINST MECHANICAL HAZARDS</b>								
1.3.1. Risk of loss of stability								Milton Roy Europe (MRE)
1.3.2. Risk of break-up during operation								Milton Roy Europe (MRE)
1.3.3. Risks due to falling or ejected objects								Milton Roy Europe (MRE)
1.3.4. Risks due to surfaces, edges or angles								Milton Roy Europe (MRE)
1.3.5. Risks related to combined machinery								N/A
1.3.6. Risks related to variations in operating conditions								Milton Roy Europe (MRE)
1.3.7. Risks related to moving parts								Above the base plate : MRE / Below the base plate : Integrator
1.3.8. Choice of protection against risks arising from moving parts								Above the base plate : MRE / Below the base plate : Integrator
1.3.9. Risks of uncontrolled movements								Above the base plate : MRE / Below the base plate : Integrator
<b>1.4. REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTIVE DEVICES</b>								
1.4.1. General requirements								Above the base plate : MRE / Below the base plate : Integrator
1.4.2. Special requirements for guards								Above the base plate : MRE / Below the base plate : Integrator
1.4.3. Special requirements for protective devices								Above the base plate : MRE / Below the base plate : Integrator
<b>1.5. RISKS DUE TO OTHER HAZARDS</b>								
1.5.1. Electricity supply								Milton Roy Europe (MRE)
1.5.2. Static electricity								Milton Roy Europe (MRE)
1.5.3. Energy supply other than electricity								N/A
1.5.4. Errors offitting								Milton Roy Europe (MRE)
1.5.5. Extreme temperatures								Milton Roy Europe (MRE)
1.5.6. Fire								Milton Roy Europe (MRE)
1.5.7. Explosion								Milton Roy Europe (MRE)
1.5.8. Noise								Milton Roy Europe (MRE)
1.5.9. Vibrations								Milton Roy Europe (MRE)
1.5.10. Radiation								N/A
1.5.11. External radiation								N/A
1.5.12. Laser radiation								N/A
1.5.13. Emissions of hazardous materials and substances								N/A
1.5.14. Risk of being trapped in a machine								N/A
1.5.15. Risk of slipping, tripping or falling								N/A
1.5.16. Lightning								N/A
<b>1.6. MAINTENANCE</b>								
1.6.1. Machinery maintenance								Milton Roy Europe (MRE)
1.6.2. Access to operating positions and servicing points								Milton Roy Europe (MRE)
1.6.3. Isolation of energy sources								Milton Roy Europe (MRE)
1.6.4. Operator intervention								Milton Roy Europe (MRE)
1.6.5. Cleaning of internal parts								Milton Roy Europe (MRE)
<b>1.7. INFORMATION</b>								
1.7.1. Information and warnings on the machinery								Milton Roy Europe (MRE)
1.7.2. Warning of residual risks								Milton Roy Europe (MRE)
1.7.3. Marking of machinery								Milton Roy Europe (MRE)
1.7.4. Instructions								Milton Roy Europe (MRE)

## 1.7.4.2. Informations on residual risks

Even if the machine was designed with safety in mind, the conception of the controls and the tank is not in MRE's responsibility. We inform the integrator that residual risks linked to the controls (paragraph 1.2) and mobiles parts (Paragraphes 1.3.7, 1.3.8, 1.3.9). still remain. It is necessary to take the risks into account in the design of the complete facility.



## Check List

*List of checks to be made prior to start up for better installation of the mixer.*

- Read the manual.....
- Check that the parcel is in good condition upon receipt.....
- Check the correct horizontal position of the support.....
- Check the direction of assembly of the impeller on the shaft (blowing or sucking position).....
- Check that the impeller is correctly positioned on the shaft.....
- Check that the lock nuts are installed.....
- Check that the following have been fastened correctly:
  - mixer on its support.....
  - shaft with the coupling.....
  - impeller on the shaft.....
- Check the tightening torques.....
- Check the voltage conformity.....
- Check that unused electric cable inlets are blanked.....
- Check the amperage.....
- Check the electrical connections .....
- Check the mixer's direction of rotation .....
- Check that the mixer does not produce any noise or overheats .....

<b>Carried out by:</b>	<b>Checked by:</b>	<b>Date:</b>
<b>Authorization to start up the device:</b>		
<input type="checkbox"/> <b>YES</b>	<input type="checkbox"/> <b>NO</b>	

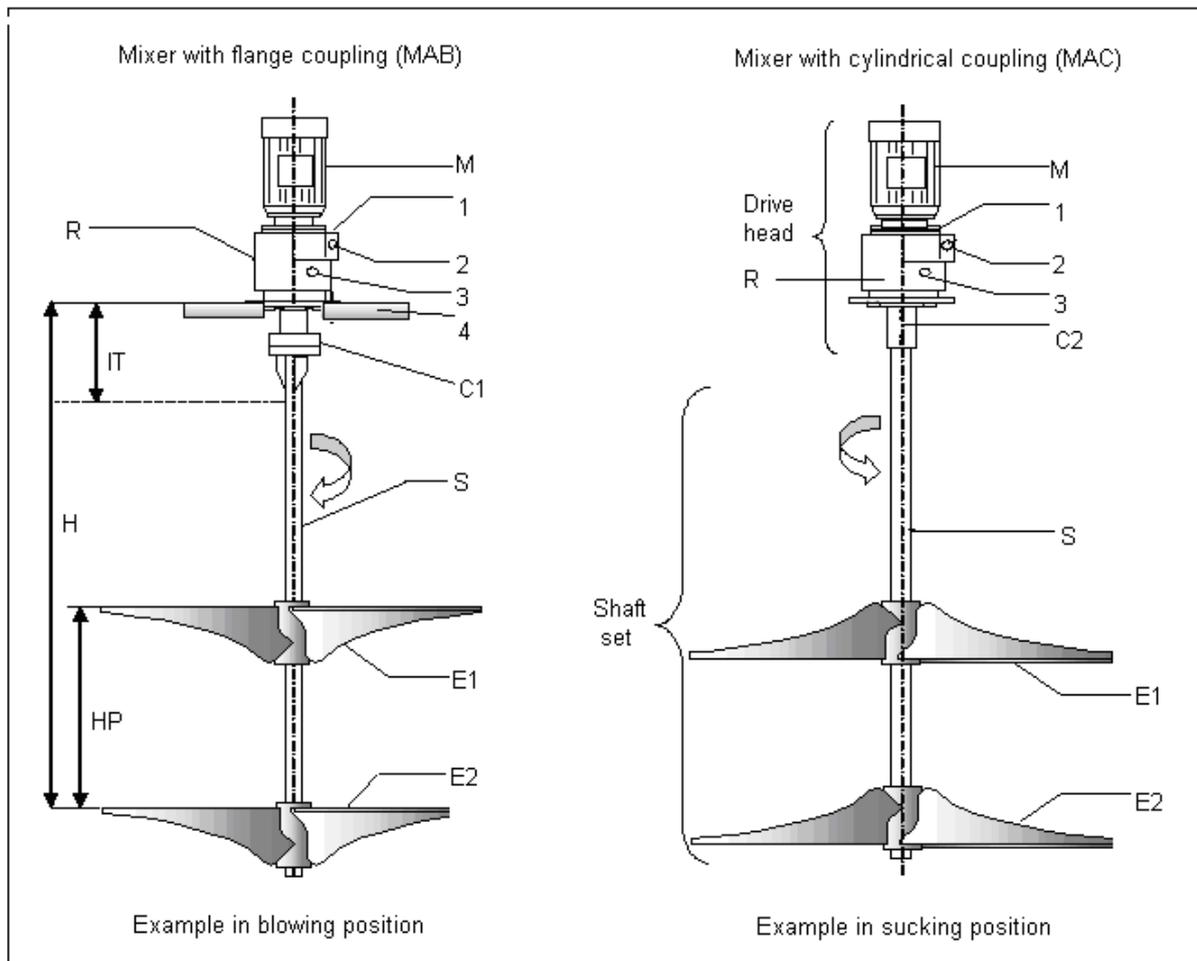
## SKETCH OF THE MIXER

See [Figure 15: mixer dimensional and technical characteristics](#) (tables on page 63).

The mixer comprises the following items:

- A driving device consisting of a motor [M].
- A reduction gear [R], which reduces the speed between the motor and mixer shaft. It is splash-lubricated by an oil bath.
- A mixing device, including a shaft [S] and an impeller [E] (one or more rows of impellers). It is connected to the output shaft of the reduction gear via a coupling [C].

**Figure 1: Mixer general layout drawing**



<b>M</b>	<b>Motor/Variable speed drive</b>	<b>**C2</b>	<b>Cylindrical coupling</b>
<b>1</b>	<b>Filler plug (vent)</b>	<b>*IT</b>	<b>Max. liquid level</b>
<b>R</b>	<b>Reduction gear</b>	<b>S</b>	<b>Shaft</b>
<b>2</b>	<b>Level plug</b>	<b>*H</b>	<b>Lower impeller height</b>
<b>3</b>	<b>Drain plug</b>	<b>*HP</b>	<b>Distance between impellers</b>
<b>4</b>	<b>Support</b>	<b>**E1</b>	<b>Upper impeller (according to option)</b>
<b>**C1</b>	<b>Flange coupling</b>	<b>**E2</b>	<b>Lower impeller (according to option)</b>

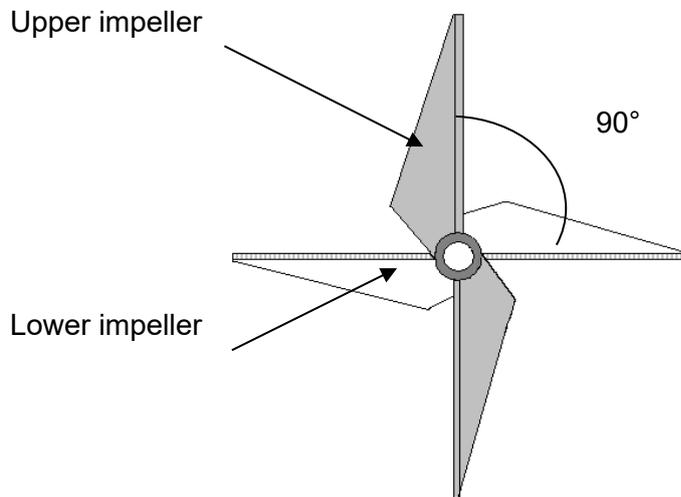
\*See general layout drawing provided when the order was placed.

\*\* Depending on the model (the impeller is not necessarily double; the coupling depends on the mounting).

Position of the two impellers in relation to one another (according to option):

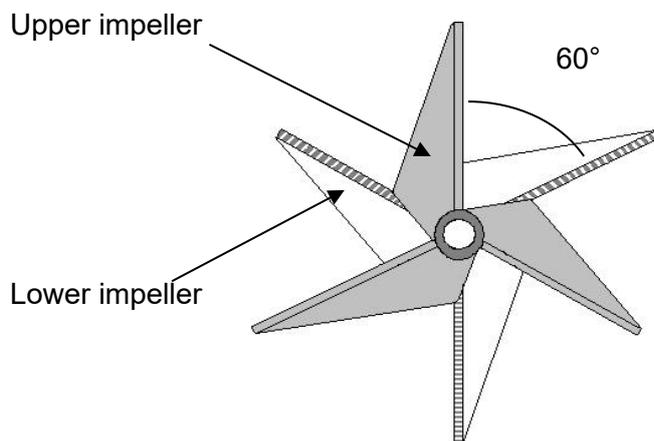
**Bottom view:**

**Option with 2 blades**



The position for fastening impellers with 2- blades must be 90° between each blade.

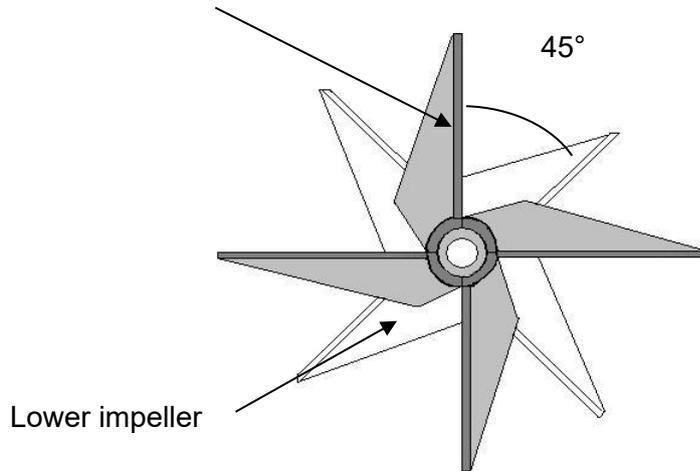
**Option with 3 blades**



The position for fastening impellers with 3- blades must be 60° between each blade.

**Option with 4 blades**

Upper impeller



Lower impeller

The position for fastening impellers with 4- blades must be 45° between each blade.

## PART I – WARNINGS

### I - 1: PREAMBLE



People responsible for the installation, operation and maintenance of this mixer must take the recommendations in this manual into consideration to avoid any danger to the person and harm to the environment while ensuring best use of the equipment. Special attention must be given to the advice and instructions in this manual. Lastly, the safety data sheets (SDS) for chemicals must be followed for any mixing.

### Important notions

Please read the table below regarding the various terms used in this manual.

SAFETY TERMS	Consequences if the recommendations are ignored
<b>CAUTION</b>	Risk of serious injury or death if danger ignored.
<i>Warning</i>	Risk may occur (minor injury) if danger ignored.
<i>Caution</i>	Risk of equipment damage if danger ignored.
<b>Note</b>	Comments necessary for better use of the mixer.
	Risk for the environment.
<b>LOTO</b>	“Lockout – Tagout” is a safety procedure to ensure that dangerous machines are switched off correctly and not started up again prior to the completion of maintenance or servicing work.

## **ATEX regulations**

If the mixer supplied is ATEX-compliant (use in potentially explosive atmospheres), maintenance must be carried out in accordance with the applicable legislation by personnel qualified (approved) for this type of work. Contact your After-Sales Service. Any work on the machine by a non-certified body will result in cancellation of the ATEX certification.

## **I – 2: NORMAL USE OF THE MACHINE**

### **Conditions and limits of use:**

- Mixer assembled and all tightening torques in accordance with the user manual.
- Mixer fastened to the tank on a support designed to withstand dynamic loads.
- Electrical connection in accordance with the motor's nameplate.
- Shaft inside the tank
- Impeller inside the tank
- For FRF / FR2F / VDA / VD2A / VLA / VL2A / VRG / VR2G / VRP / VR2P / VRT / VR2T mixers
  - Max. product density = 1.1/max. product viscosity = 100 mPas
  - Max. product T° < 65°C/atmospheric pressure
  - Max. external T° in accordance with the instruction manual
  - Product to be mixed compatible with the material of the shaft and impeller.
- For HM mixers
  - Max. product density and viscosity in accordance with the MILTON ROY MIXING quote.
  - Max. product T° and tank internal pressure in accordance with the MILTON ROY MIXING quote.
  - Max. external T° in accordance with the instruction manual
  - Product to be mixed compatible with the material of the shaft and impeller.
- Rotation speed in accordance with the user manual's specifications
- Mixing operation in accordance with the MILTON ROY MIXING quote.
- Volume of product to be mixed in accordance with the MILTON ROY MIXING quote.

### **General operating procedure:**

- 1- Stop the mixer
- 2- Add the product(s) to be mixed
- 3- Start up the mixer
- 4- Mixing operation
- 5- Stop the mixer
- 6- Drain the product(s)

### **Maintenance:**

- Mixer switched off and locked out.
- Replacement of components in accordance with the maintenance plan

### **Cleaning/Inspection:**

- Mixer switched off and locked out. Reasonably foreseeable misuse

## **I – 3: INCORRECT USE/WHEN NOT TO USE**

Reasonably foreseeable misuse is considered when a mixer is in operation.

Reasonably foreseeable misuse	IMPACT ON:		
	Equipment	Health and safety of people	Environment
Non-compliant tightening torques	- Generation of vibrations - Detachment of a component that may result in significant damage	Detachment of a component that may result in significant damage	Detachment of a component that may result in significant damage
Mixer used outside of the tank		Risk that driving by the rotating shaft or impeller could cause a serious accident or even death.	
Undersized mixer support	Mixer oscillation could cause the support or mixer to break	Risk related to broken parts	Risk related to broken parts
Unsuitable wiring equipment	- Partial damage of the electrical installation - Fire	Risk related to fire	Risk related to fire
Product density and viscosity above the specified value	- Mechanical breakage - Risk for the installation depending on the product and/or process	Risk related to broken parts	- Excessive power consumption - Risk related to broken parts
Product T° and/or pressure in the tank other than as specified	- Mechanical breakage - Risk for the installation depending on the product and/or process	Risk related to broken parts	Risk related to broken parts
External T° other than as specified	- Motor overheating - Partial damage of the electrical installation - Fire	Risk related to fire	Risk related to fire
Mixing operation other than as specified	- Degraded process performance - Mechanical breakage - Risk for the equipment/installation	Risk related to broken parts	Risk related to broken parts

Reasonably foreseeable misuse	IMPACT ON:		
	Equipment	Health and safety of people	Environment
Product other than as specified	<ul style="list-style-type: none"> <li>- Corrosion that could cause significant damage to the equipment/installation and/or product</li> <li>- Mixer service life</li> <li>- Breakage that could cause significant damage to the equipment/installation</li> </ul>	Risk related to broken parts	Risk related to broken parts
Use of tank other than as specified	Breakage that could cause significant damage to the equipment/installation	Risk related to broken parts	Risk related to broken parts
Mixing product volume other than as specified	Breakage that could cause significant damage to the equipment/installation	Risk related to broken parts	Risk related to broken parts
Adding a system that changes the rotation speed initially specified or non-compliance with the recommended speed range	Breakage that could cause significant damage to the equipment/installation	Risk related to broken parts	Risk related to broken parts
Adding or changing mixer components	Breakage that could cause significant damage to the equipment/installation	Risk related to broken parts	Risk related to broken parts
Trying to enter/work inside the tank (adding products, removing deposits, cleaning, etc.)		<ul style="list-style-type: none"> <li>- Risk that driving by the rotating shaft or impeller could cause a serious accident or even death.</li> <li>- Risk of electric shock or electrocution.</li> </ul>	
Guards removed		<ul style="list-style-type: none"> <li>- Risk that driving by the rotating shaft or impeller could cause a serious accident or even death.</li> <li>- Risk of electric shock or electrocution.</li> </ul>	

---

**READ CAREFULLY!**

*MILTON ROY EUROPE mixers are designed and manufactured to give complete user satisfaction in terms of mixing efficiency and mechanical reliability.*

*A mixer is subject to relatively high stresses, for which it is designed, and generates significant forces on its support and on the tank. It rotationally drives around one hundred tonnes of liquid for a 100-m<sup>3</sup> tank, for example. It is important to take the forces into account when designing the mixer's support and the tank, and to take care during its installation and maintenance in accordance with the procedures described in the user manual. The service life observed may be exceptional.*

1. Do not use the mixer under conditions not originally specified.
2. Never carry out work on a mixer when in rotation.
3. Do not carry or lift the mixer by the shaft or impeller.
4. Do not use bolting other than that provided or described in the manual.
5. It is strongly recommended to centre the mixer in the tank and equip it with baffles to prevent the rotation of liquid that could deform the rotating parts.
6. Follow the installation instructions and tightening torques.
7. Do not connect a frequency inverter without contacting MILTON ROY EUROPE (precautions need to be taken and the following values need to be checked: min. speed, max. speed, motor protection, etc.).
8. Follow the mixer assembly procedure strictly. In particular, make sure that the mixer support can withstand the static and dynamic forces generated by the mixing (see the mixer's characteristics). The mixer must be fastened in a perfectly vertical position (see allowed tolerances in the installation manual) on a perfectly horizontal support to avoid any additional stress on the mixer that could reduce its service life.
9. After dismantling, replace the bolting already used because it may have reached its elastic limit.
10. Do not remove guards from rotating parts, if any, and depending on the tank configuration, add a device to avoid any possible contact with rotating parts.
11. Do not try to modify the liquid flow when the mixer is in operation or decrease the rotation of the impellers with any device.
12. Do not change the characteristics of the substances mixed without informing MILTON ROY EUROPE in order to check the compatibility of the new mixture with the mixer's capabilities (possible power increase, additional forces that could adversely affect or even damage the equipment).
13. Do not change operating conditions, such as the temperature or pressure, without checking that the mixer is designed for this.
14. Do not assemble the mixer in a tank other than the original tank without consulting MILTON ROY EUROPE to check that both assemblies are compatible.
15. Do not operate direct motor-driven mixers empty, during filling or draining and with a variable speed drive.
16. Stop the mixer if any abnormal vibration, amperage higher than that of the motor, suspicious noise or excessive temperature is observed.
17. Regularly check the condition of the machine (signs of corrosion, parts worked loose, etc.) and stop the mixer if any anomaly is noted.
18. Do not replace original parts with other parts not supplied by MILTON ROY EUROPE in order to ensure their compatibility.
19. Do not change the position of the impeller on the shaft without checking the forces on the shaft.
20. Do not modify the impeller or add an impeller on the shaft.
21. Do not use the shaft or impeller on another mixer.
22. Do not attempt to rotate faster than the nominal speed because the power and forces will be drastically affected.
23. The temperature in line with the motor must be below 60°C.

## **I – 4: HEALTH AND SAFETY INSTRUCTIONS**

The personnel responsible for installation, operation and maintenance must read this manual and assimilate it in order to:

- avoid any possible risk to themselves or to third parties,
- ensure reliability of the equipment,
- avoid any error or pollution due to incorrect handling.



### **DANGER:**

- **Any work on this equipment must be carried out when it is stopped. Throughout the entire duration of the work, take the necessary measures to prevent any accidental start-up (e.g.: lock the switch, remove the power supply fuse).**
- **Any handling of all or part of the mixer must be carried out by a qualified and authorized person (e.g.: CACES (safe driving certificate), overhead crane operator/slinger, etc.).**
- **Any work on the electrical part must be carried out by a qualified and authorized person (e.g.: electrical qualification, etc.).**

Disconnect the power supply when anomalies are detected during operation: overheating or unusual noise.

In all cases, refer to the applicable legislation, safety rules and best practice for load handling and for electrical and mechanical work in the country and on the site where the mixer is installed.

You should comply with your company's safety procedures during maintenance or repair of any item of equipment. Make sure that you have understood all the procedures and instructions before starting work on the assembly.

Check that the location where the mixer is to be installed is not subject to any specific regulations. If this is the case, take these specific regulations into account when following the instructions in this manual to ensure full compliance with local regulations regarding health and safety instructions.

### **Environmental risk:**



Packaging used to protect the mixer (cardboard, padding, wood, etc.) must be disposed of in compliance with the selective sorting system applicable in your region.



During oil changes, used oil must be collected in a suitable container and disposed of in compliance with the applicable regulations in your region.



Any oil spillage that may arise must be removed using a degreasing agent appropriate to the operating conditions.

 Dirty cleaning rags must be placed in suitable containers and disposed of in compliance with the applicable regulations in your region.

 Oil, degreasing agents and any other chemical must be stored in compliance with the applicable regulations in your region.

 Any part of the mixer that has been in contact with chemicals must be decontaminated and the decontamination residues must be disposed of in compliance with the applicable regulations in your region.

 Any replaced part of the mixer must be subject to a reprocessing system in compliance with the applicable regulations in your region.

When handling chemicals we recommend having an accidental oil spill kit or emergency response kit nearby (with rolls, socks, protective gloves, protective goggles, recovery bags).

### **Health and safety risk:**



Gloves must be worn:  
 - during any handling to avoid any potential cuts.  
 - when handling any chemicals to prevent any chemical attack and potential burns.



Safety shoes must be worn during any handling to avoid any potential crushing.



Safety goggles must be worn during any work on the mixer to prevent any projection of any kind whatsoever.



Suitable work clothing (close to the body) must be worn during any work to prevent cuts, burns, chemical attacks, driving by rotating parts.



Depending on the installation, a helmet must be worn during any work to avoid any blow to the head



Depending on the installation, hearing protections must be worn in the event that the regulatory sound pressure threshold for your region is exceeded.



Depending on the installation and products used, breathing equipment must be worn in the event that the regulatory exposure limit value for your region is exceeded.





Depending on the installation, fall protection equipment must be worn as soon as there is a potential risk of falling from height. Personnel must be trained on working at height and aware of use of the harness.

### **Firefighting measures**



Suitable extinguishing means: Use foam, dry powder or carbon dioxide (CO<sub>2</sub>) to extinguish flames.

Personnel must be trained in firefighting measures. They must include a first responder or qualified staff member in accordance with the country's standards.

#### **- Unsuitable extinguishing means: Direct water jet**



Firefighting instructions: Evacuate the area. Prevent firefighting products running into drinking water systems and drains. Firefighters must use suitable protective equipment and in confined spaces wear self-contained breathing apparatus (SCBA).

A suitable extinguishing system should be used by trained personnel in compliance with the applicable standards and laws in the country where the equipment is installed.

## **I – 5: RESIDUAL RISKS**

Despite the fact that safety has been integrated into the design and that protective and preventive measures have been taken, the following residual risks still exist:

#### **- Mechanical risk:**

- For all handling, it is imperative that this handling is carried out by trained and qualified personnel. (E.g.: CACES (safe driving certificate), overhead crane operator/slinger, etc.).
- When carrying out any work in the vicinity of rotating parts, it is imperative that the mixer has been properly isolated and rendered inoperative (lockout-tagout) so as to prevent any unintended start-up.
- When carrying out any work on a pressurized system, it is imperative to remove the pressure and ensure that the inlet valve is inoperative to prevent any unintended repressurization.

#### **- Electrical risks:**



- For any work relating to the electrical power supply, it is imperative that this work is carried out by trained, qualified personnel equipped with adequate protective equipment. (E.g.: electrical qualification, etc.).
- Electrical installations must be rendered inoperative (lockout-tagout) and safety marking complied with.
- Suitable personal protective equipment must be worn.

#### **- Risk caused by materials and products:**

- When carrying out any work on a pressurized system, it is imperative to remove the pressure, drain off any product, ensure that the inlet valve is inoperative to prevent any unintended repressurization.
- Decontamination should be carried out prior to any work on a part of the machine that has been in contact with hazardous products.

- In the case of preventive maintenance by Milton Roy Europe, contact the After-Sales Service and send a decontamination log sheet before sending the machine for maintenance.



- Thermal risk:

- When operating the machine, restrict access to any part of the sealing system to prevent any potential burns.



- Risk caused by noise:

- When operating the entire installation including our machine, hearing protections must be worn in case the permitted noise threshold is exceeded.

- Risk caused by vibration:

- When operating the entire installation including our machine, suitable protective equipment must be worn in case the permitted threshold is exceeded.

## PART II: PRESENTATION

### II – 1: UNPACKING AND STORAGE

**Note:** The packaging of HM mixers depends on their destination and is examined and negotiated in the initial contract.

The packaging must be carefully examined on receipt of the parcel to ensure that the contents have not sustained any obvious damage. Open the packages with care. Examine the contents and check them off against the delivery slip to make sure nothing is missing. Check the conformity of the manufacturers' plates against the order.

If the parcel is in poor condition, a damage report should be written in the presence of the carrier, and then MILTON ROY EUROPE should be notified of this. In addition, in the case of missing parts, please inform MILTON ROY EUROPE within **7 days**.

There are 2 types of HM mixer:

1. With a solid shaft + one-piece impeller + MAC coupling (1 small parcel).
2. With tubular shaft on frame + impeller with 3 blades + MAB coupling (2 parcels).

#### In this parcel you will find:

**Note:** before unpacking, check that the parcel has not been damaged. Similarly, before starting to assemble, check that you have all of the parts.

#### **A) Mixer with cylindrical coupling (MAC):**

For a mixer with cylindrical coupling, the equipment is delivered in one parcel (see photo). In some cases, if the shaft is too long, it may come in 2 parcels. The parcels are always numbered.

All of the parcels are shrink-wrapped in plastic for better protection.



#### This parcel contains:

- The impeller (x1) (the impeller depends on the option chosen)



- The shaft (x1)



With grooves (Mark 1, Mark 2) at each end of the shaft:

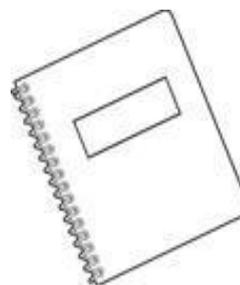
- First end, to assemble the shaft on the drive head. **Mark 1**
- Second end, to assemble the impeller on the shaft. **Mark 2**

(See page 29 → **C) PRINCIPLE OF IMMOBILIZING THE SHAFT IN THE TANK**).

- The drive head (x1)



- The instruction manual (x1)



The bolting is pre-assembled, however, the bolting for fastening the mixer to its support is not supplied. A set of Allen keys is necessary for assembling the mixer.

**B) Mixer with flange coupling (MAB):**



1/2



2/2

As the mixer is larger, the parcel is bulkier. There are usually 2 parcels (the first for the drive head and impeller and the second for the shaft). They are still marked with their package numbers (1/2; 2/2), and their contract number.

**The first parcel (numbered 1/2) contains:**

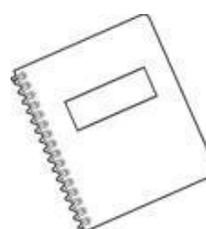
- The impeller (x1) (the impeller depends on the option chosen)



- The drive head (x1)



- The instruction manual (x1)



- The bolting

- Bolting for fastening the blades (x1).

- Bolting for fastening the MAB (x1).

- The vent plug\*.

\*see GLOSSARY page 64



**The second parcel (numbered 2/2) contains:**

- The tubular shaft (x1):



A set of standard open-ended wrenches and a set of standard tubular socket wrenches are necessary for assembling this mixer.

## **II – 2: STORAGE PRECAUTIONS**

On site, the cases should be stored protected from adverse weather conditions in clean premises.

Cases will not be open, except in cases of necessity for inspection or intervention during storage or if damaged during transportation or handling.

At this time, it is up to the recipient to ensure that the equipment is kept in perfect condition.

### ➤ **Storage for less than six months**

The equipment shall preferably be stored in its original packaging and protected from bad weather and impacts, and away from vibrating equipment, which can cause premature wear to bearings and mechanical bearings.

If it is necessary to remove the machine from its packing case, place it in a clean, dry, shock-proof location to prevent external damage.

All flanges and threaded connections should be left with a protective plate.

### ➤ **Storage for more than six months**

Storage for more than six months should be indicated or recommended when the order is placed.

Any prolonged storage before or after use in certain specific environmental conditions (humidity, direct exposure to sunlight, salinity, vibrations, corrosion) restricts application of the guarantee.

- Grease all visible unpainted elements. Rubber parts must be protected from sunlight and sudden temperature changes.
- Store the machine in its original packing. In addition, provide for packaging in heat-sealable plastic covering and desiccant bags. (The quantity of desiccant bags should be adapted to the storage period and to the packaging volume.)
- Protective covers are required for all flanges and threaded connections.
- Store protected from adverse weather conditions.

Machines should be stored in transport casings and placed in a dry, shock-free place, as vibrations can damage the motor and the machine.

After long storage, when the machine is to be installed, the grease and oil lubricated components should be cleaned of grease and replaced with new lubricating oil.

These preventive measures are necessary because the lubricant deteriorates over time under certain conditions.

Prior to installation, it is recommended that the machines be checked by a Milton Roy engineer.

### **Note:**

- The shaft must be stored in horizontal position.

## Summary of Part II

### ► **Unpacking and storage**

1. Check the parcel is in good condition.
2. Check the contents of the parcels upon receipt using the delivery slip.
3. Check the conformity of the manufacture and manufacturer plates.
4. Check the content of the MAC parcel (1 parcel):
  - the impeller,
  - the shaft,
  - the drive head,
  - the instruction manual.
5. Check the content of the MAB parcel (2 parcels):
  - the impeller,
  - the drive head,
  - the instruction manual,
  - the bolting,
  - the shaft.
6. Storage precautions:
  - storage in the original packaging,
  - storage protected from bad weather and impacts,
  - storage away from vibrating devices,
  - storage for more than 6 months, consult MILTON ROY MIXING.

### ► **Description**

1. Composition of the mixer:
  - a driving device consisting of a motor,
  - a reduction gear,
  - a mixing device consisting of a shaft and an impeller.
2. Position of the double impellers:
  - option with 2 blades: 90° fastening position between each blade,
  - option with 3 blades: 60° fastening position between each blade,
  - option with 4 blades: 45° fastening position between each blade.

### ► **Health and safety instructions**

1. Assimilation of procedures and the manual's instructions.
2. Switch off the device before any work.
3. Take measures to prevent any accidental start-up.
4. Indicate when work is taking place.
5. Check that health and safety instructions are followed.

## PART III – INSTALLATION



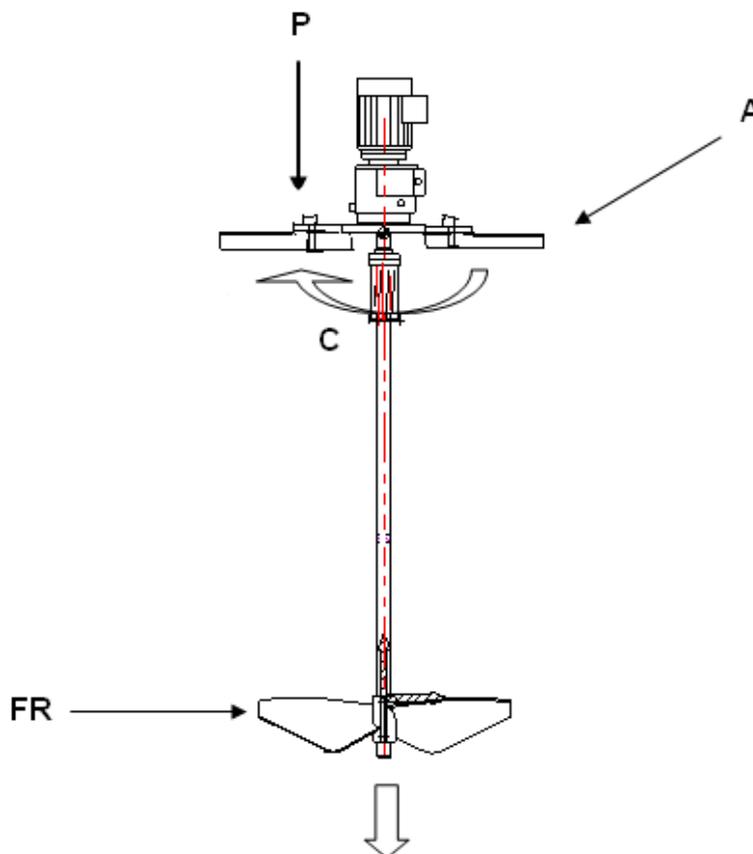
The equipment must be installed by personnel with a sufficient level of mechanical and electrical skill in order to be in strict compliance with the instruction manual.

### III – 1: HANDLING

Select lifting equipment compatible with the weight of the components to be handled (see [PART VI – TECHNICAL CHARACTERISTICS](#) (Figure 15 “mixer dimensional and technical characteristics”, customized drawing, provided by our Engineering & Design Department).

**Note:** Make sure that the support can withstand the static load and forces generated by the mixer. (See **Load**, **FR**, **C** columns of the customized drawing supplied by our Engineering & Design Department).

**Figure 2: Handling**



<b>P</b>	<b>Load (weight + axial force)</b>
<b>A</b>	<b>Mixer support (not supplied)</b>
<b>C</b>	<b>Maximum tightening torque that tends to shear the mixer's fastening bolting</b>
<b>FR</b>	<b>Radial force</b>

The weight of the parts to be handled does not require any particular precautions. However, utmost care will be paid when handling it to avoid damaging the shaft, and in particular, to avoid bending it.



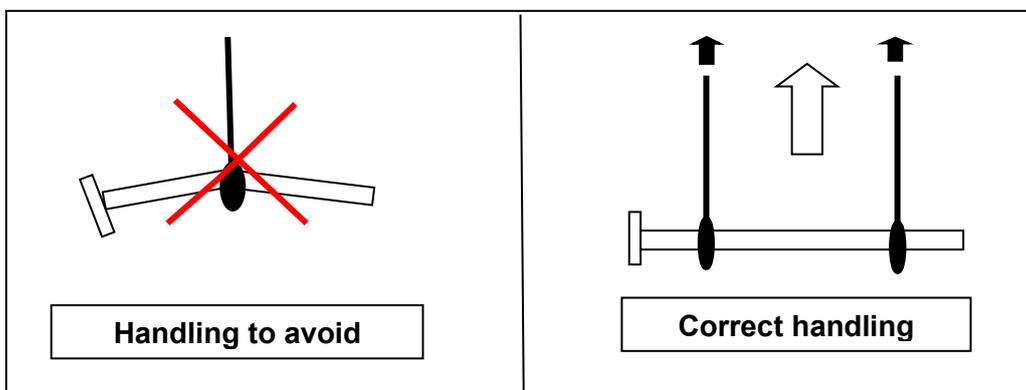
**Caution:** Take care not to damage the paint! Mechanical damage (scratches), chemical damage (acids, detergents) or thermal damage (sparks, weld spatter, heat) cause corrosion and prevent the protection from performing its function. Any damage may result in cancellation of the warranty.

**Handling requires the following precautions:**

➤ **Mixing shaft**

See [Figure 3 “Installing the sling”](#) on the next page.

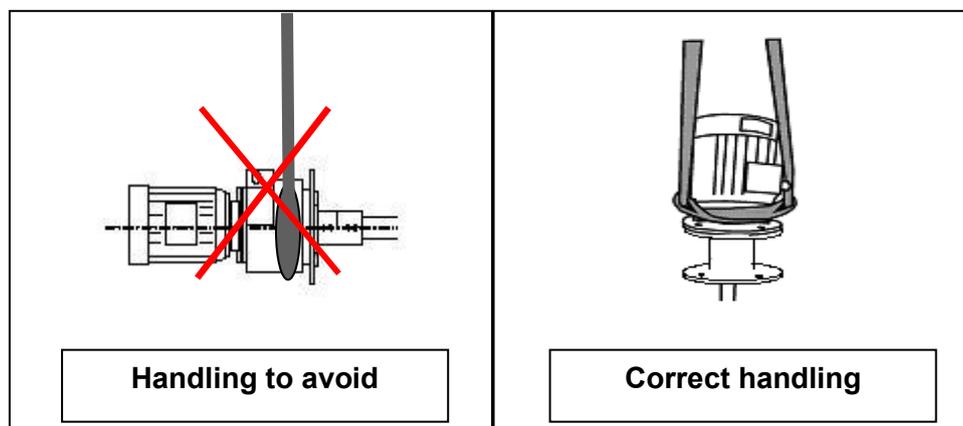
- Pass the sling around the shaft taking care not to damage the machined and/or painted surfaces.



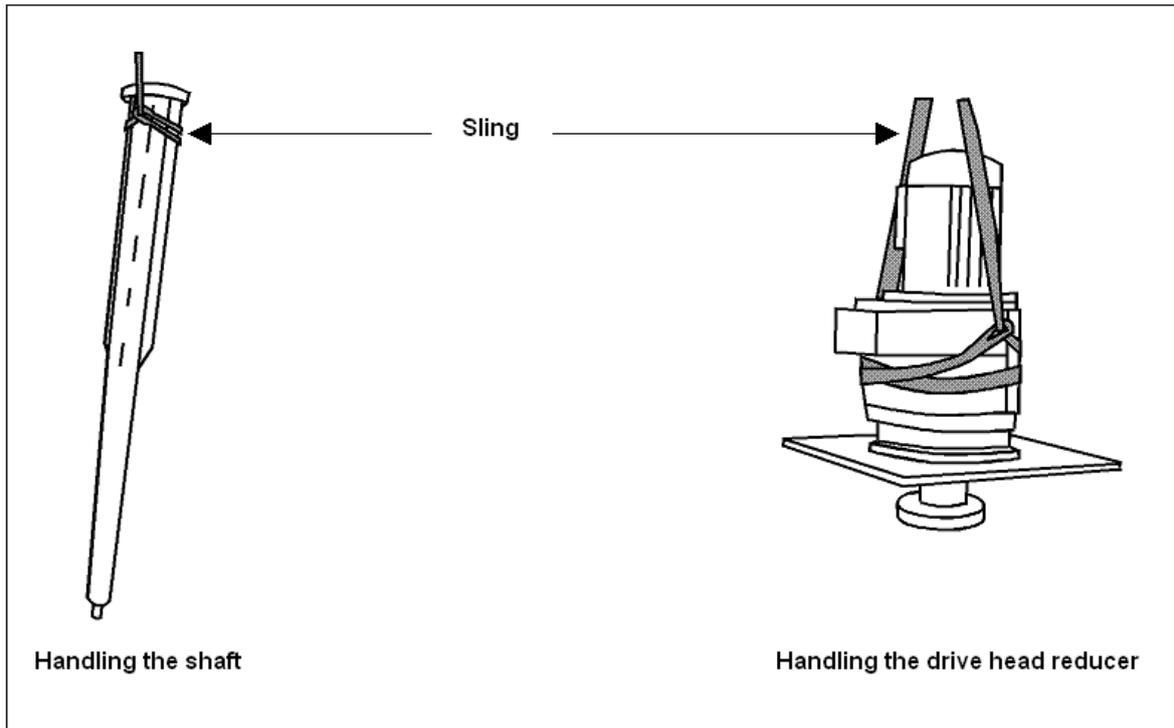
➤ **Reduction gear**

See [Figure 3 “Installing the sling”](#) on the next page.

- Pass the sling around the reduction gear taking care not to damage the terminal box and the machined surfaces.
- Make sure that the assembly is correctly balanced before starting to move it.
- Proceed with its installation (see [III – 2: SETTING UP](#), page 28).



**Figure 3: Installing the sling Figure 3: Handling**



## III – 2: SETTING UP

Carefully clean the surfaces that will be in contact after assembling (coupling flange centring faces). Make sure that there are no traces of impact and grease these faces. Bring together the parts to be assembled and check with the bill of materials to make sure that no parts are missing during assembly. Check that these parts are in good condition.

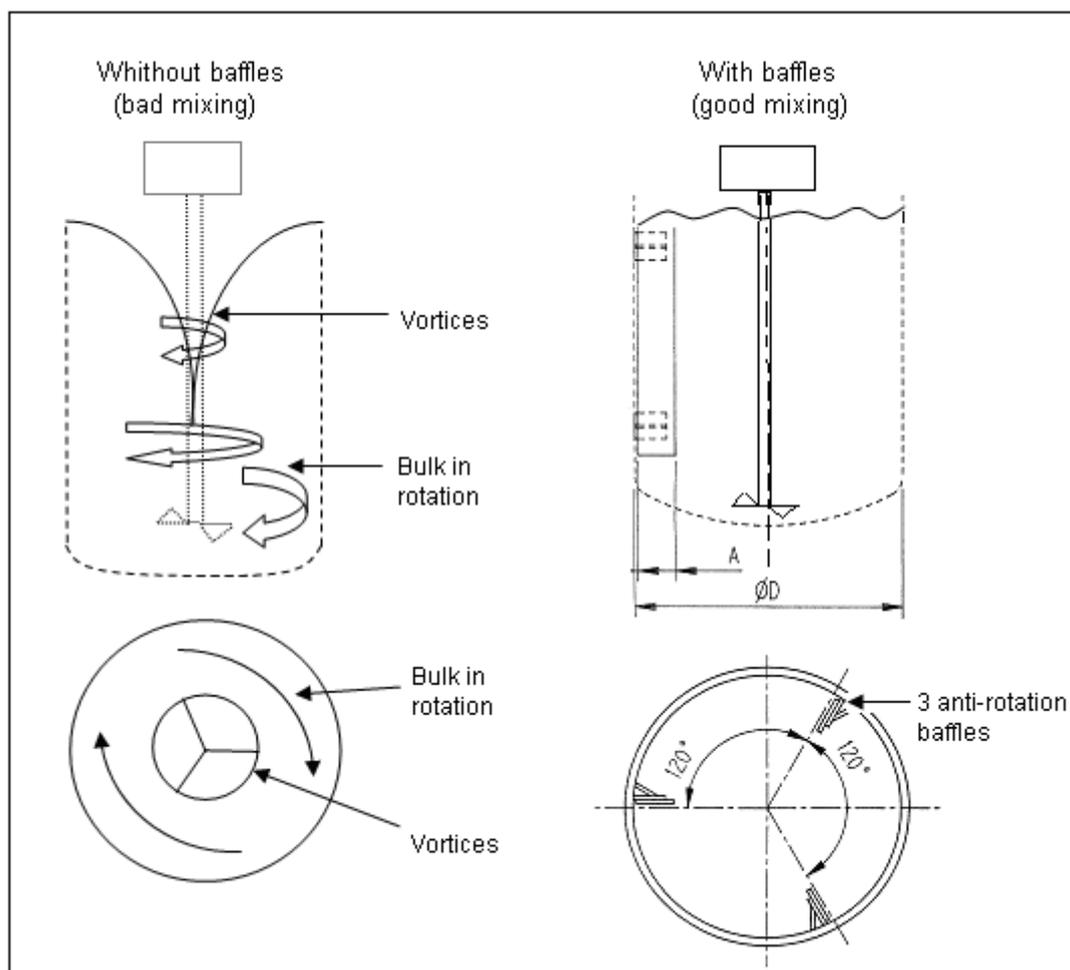
### A) IMPORTANCE OF BAFFLES

As any mixer must be installed in the centre of the cylindrical tank, it is strongly recommended to add baffles in accordance with the schematic diagram in the figure below. Baffles are used to:

- prevent block rotation of the fluid,
- prevent the formation of **vortices\*** which are dangerous for the shaft and introduce air,
- obtain a satisfactory mixing quality.

\* see glossary (p.64).

Figure 4: Baffles



ØD	A	ØD	A	ØD	A
100	8	1,000	80	4,500	360
200	16	1,200	96	5,000	400
300	24	1,600	128	6,000	480
400	32	2,000	160	7,500	600
500	40	2,500	200	10,000	800
600	48	3,000	240	12,000	960
800	64	4,000	320		

Dimensions expressed in mm.

In some particular cases, the mixer may be assembled off-centre in relation to the tank axis. Therefore, this generates additional mechanical forces and must be defined before placing the order.

### **B) TOOLS REQUIRED FOR ASSEMBLY**

Before assembling, it is useful to have the following equipment:

- Lifting equipment able to lift the total weight of the mixer.
  - Slings, hooks, shackles and ropes.
  - Standard tool kit up to No. 28 open-ended wrench.
  - A level adjuster.
  - **A torque wrench\*** with sockets corresponding to the tightening torques indicated on the general layout drawing.
  - PTFE spray or molybdenum disulphide grease if compatible with the products in the tank for stainless steel bolting.
  - **Beams\***.
- \* see Glossary (p. 64).

### **C) PRINCIPLE OF IMMOBILIZING THE SHAFT IN THE TANK**

**Note:** In the case of a coated mixer, the mixer shaft flange may be pierced with blind holes: assembly is carried out using **studs\*** previously fastened on the mixing shaft plate.

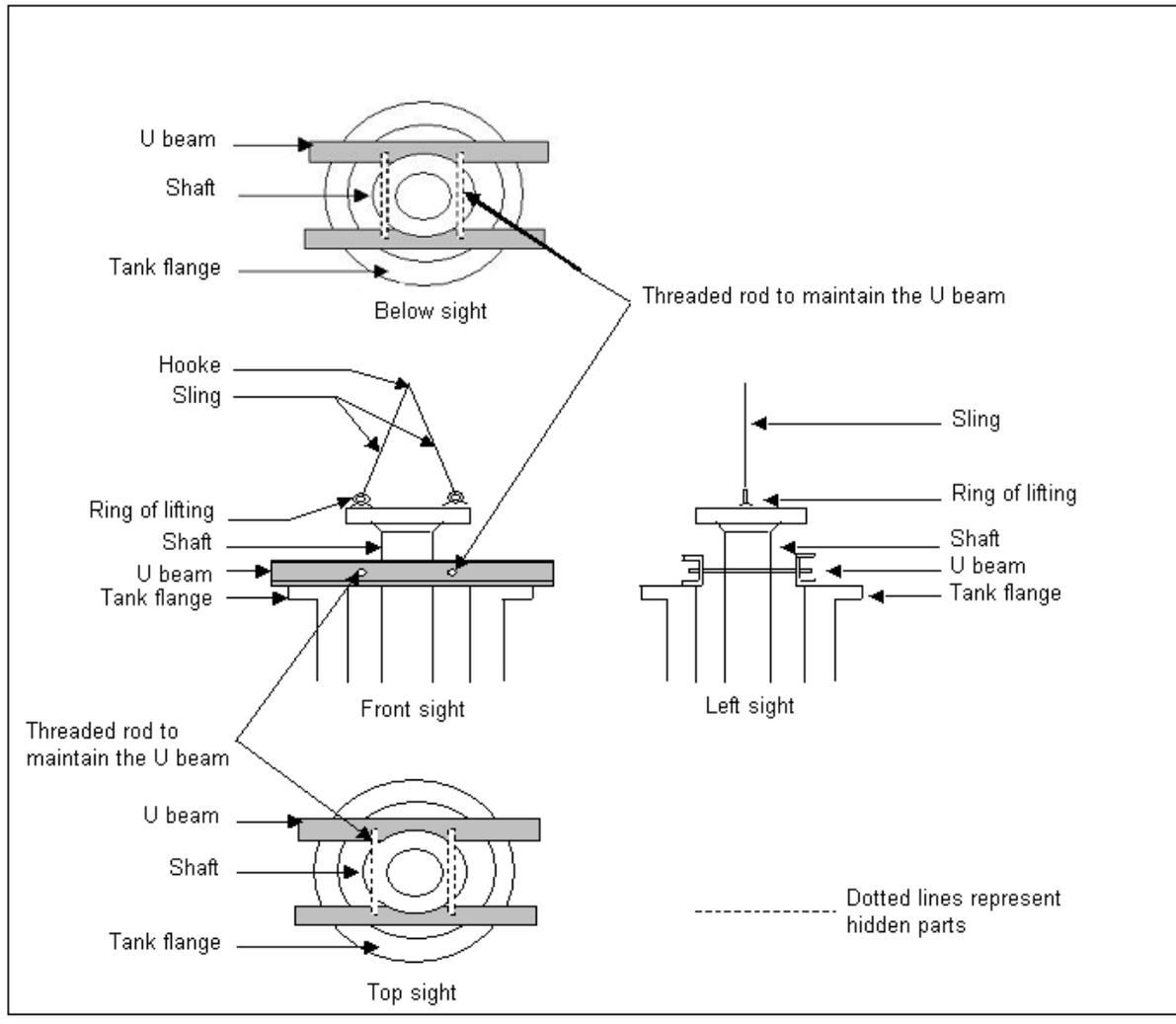
\* see Glossary (p. 64).

Then, fasten the shaft using slings and mount the U sections or beams needed to secure the shaft on the tank (as shown in the following diagram).

Place the tank seal, if necessary, on the U sections (not supplied by MILTON ROY EUROPE unless indicated on the bill of materials).

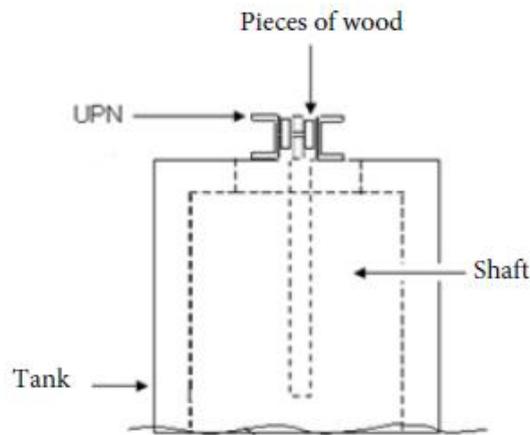
**Caution:** Place a guard between the U sections and the tank flange to avoid damaging it.

Fasten the lifting eyes on the lower shaft plate.



For a MAC assembly with a heavier and/or longer shaft, assemble as follows:

- Suspend the drive head using slings (same process as in step 1 on page 33).
- Assemble the impeller on the shaft (same process as in step 2 on page 33).
- Insert the shaft into the tank and secure it using UPNs (U sections) and pieces of wood (see Step 1 on page 33).



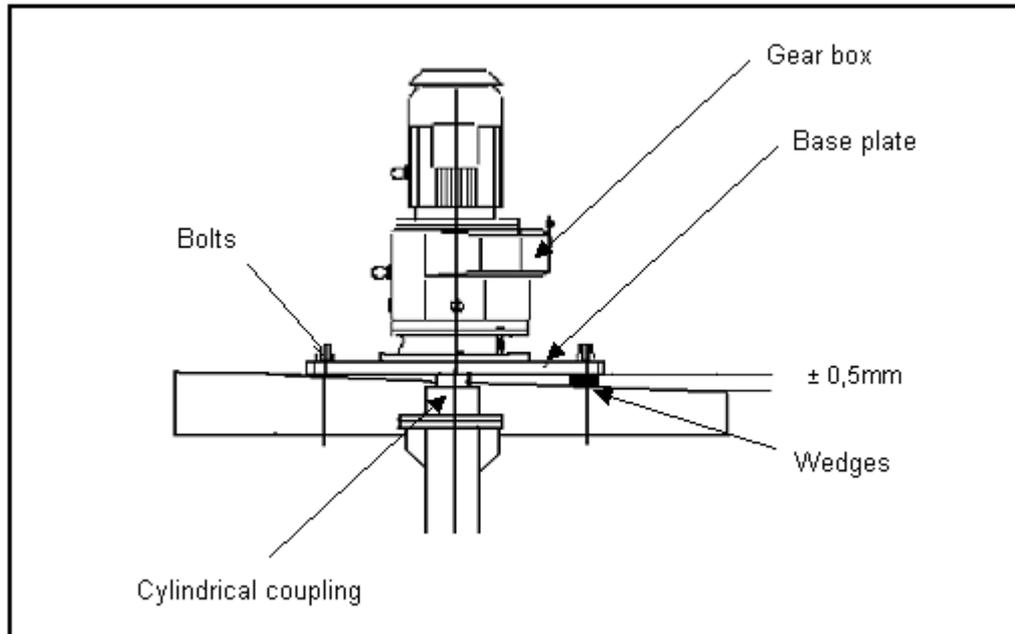
#### **D) PRINCIPLE OF ASSEMBLING THE MIXER ON ITS SUPPORT.**

Check the horizontal position of the mixing support (installation surface). For this, it is necessary to:

- Position the mixer on the support.
- Correct the flatness using wedges (see [Figure 6](#), below), to avoid deforming the base plate.
- The support (concrete) must be perfectly level in relation to the base plate. The max. acceptable errors must not exceed 0.5 mm. Any differences greater than this measurement must be eliminated by placing steel wedges in the gap. This wedging must be carried out under fastening points and should be carried out before adjusting the horizontal position of the base plate. Adjusting the horizontal position is also very important for the mixer's operation because it determines the vertical position of the impeller shaft (max. permissible fault tolerance, 2 mm/m)

Assemble and lock applying the tightening torque indicated in the table (page 44).

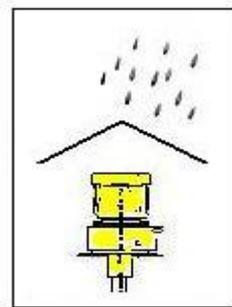
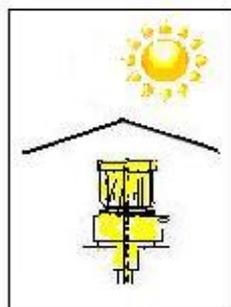
**Figure 6: Fastening the base plate on the support**



The tightening torque depends on the quality of the bolting materials used by the customer. The recommended bolting material is steel 8.8. Chemical anchors can also be used that are able to withstand the tensile force produced by the tightening torque of the bolting cl. 8.8.

When fastening the mixer to a concrete slab already in place, we recommend using transverse stainless steel bolting (not supplied by Milton Roy Europe). Similarly, when casting the slab, we recommend using sealed studs.

**Caution:** It is advisable to place a rain cover over equipment installed outside.



### E) PRINCIPLE OF ASSEMBLING THE COUPLING ON THE SHAFT

After checking the support, remove the drive head and carry out the following assembly:

**Caution:** the mixer must be assembled in vertical position.

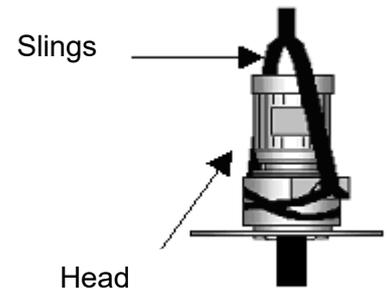
See drawing (Figure 15, supplied by our Engineering & Design Department). The mixing shaft [S] is connected to the reduction gear output shaft using two types of coupling [C]:

a) **Steps for assembling the mixer**

➤ **Cylindrical coupling (MAC):**

#### STEP 1

Suspend the drive head using slings.  
 Secure the head in vertical position.  
 See [III – 1: HANDLING](#), page 25.

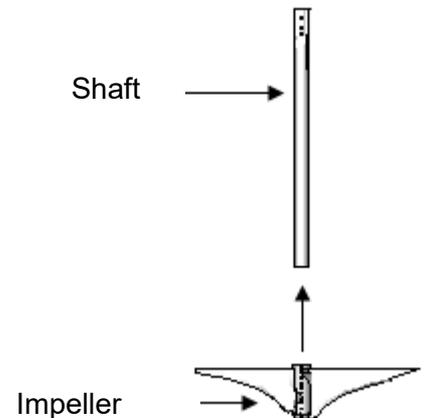


#### STEP 2

Assemble the impeller on the shaft.

See Part II -2:

**F) ASSEMBLING THE IMPELLER ON THE MIXING SHAFT**  
 on page 39.

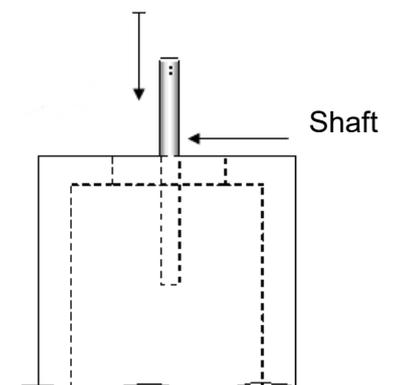


#### STEP 3

Hold the shaft manually in order to assemble it in the tank. (To assemble the shaft in the tank, see

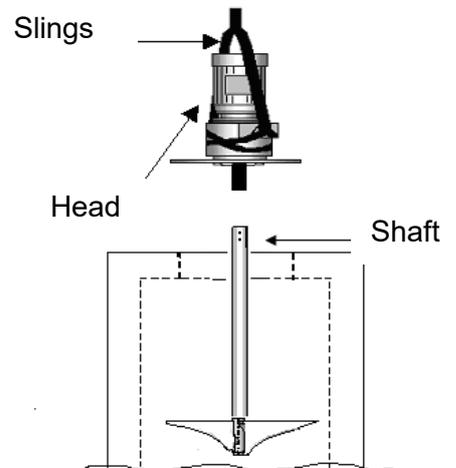
Part III – 2:

**C) PRINCIPLE OF IMMOBILIZING THE SHAFT IN THE TANK**  
 on page 29).



### STEP 4

Finally, bring the drive head close to the shaft and tighten the whole as specified on the [next page](#).



#### ➤ Flange coupling (MAB):

After correctly following the assembly in [Figure 6](#) (page 32), follow the steps indicated below:

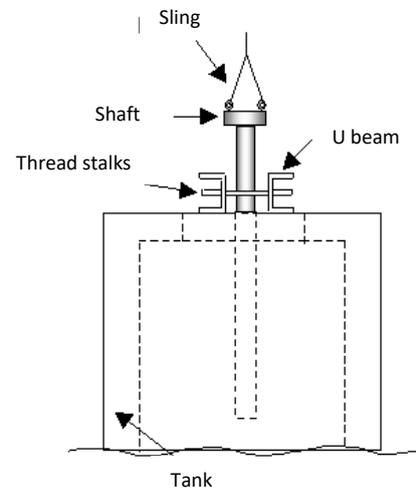
### STEP 1

Insert the lower shaft into the tank and position it on the 2 U sections or beams, depending on the load to be supported, position on the installation surface.

Secure the 2 U sections or beams against the shaft using threaded rods and nuts.

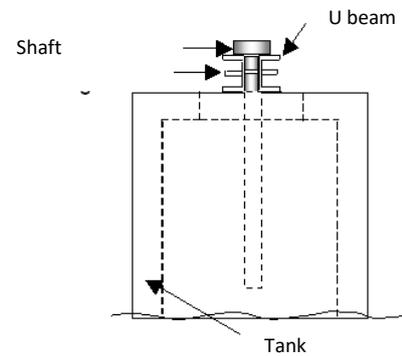


Make sure that the equipment cannot fall.



### STEP 2

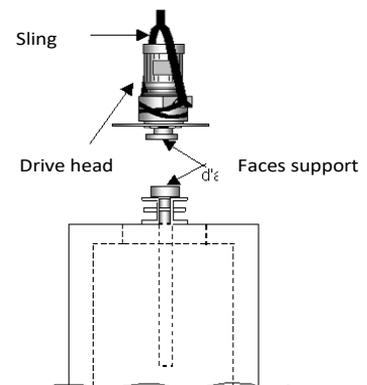
Take out the slings and lifting eyes.



### STEP 3

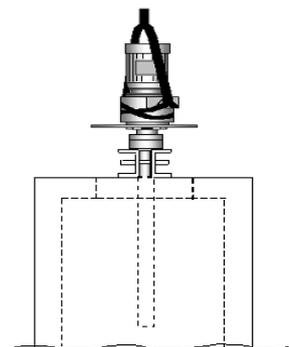
Raise the mixing head above the tank,  
Adjust the slings to keep the head in vertical position.

Clean the flange bearing surfaces.



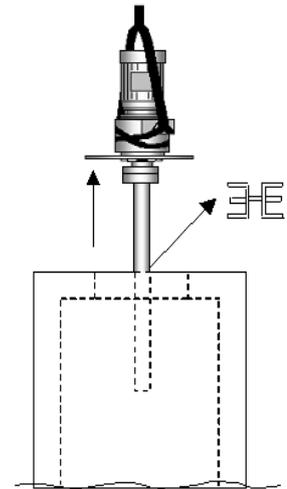
### STEP 4

Assemble the 2 coupling flanges with  
2 bolts minimum diametrically opposite with  
lock nuts or lockplates and tighten.



**STEP 5**

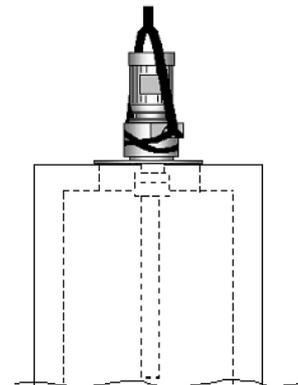
Raise the whole mixer slightly and remove the 2 U sections or beams.



Finish assembling the bolts or screws (with their lock nuts) on the two flanges, taking the tightening torque into account ([Figure 7](#), page 42).  
Clean the tank and mixer installation surface.

**STEP 6**

Lower the whole carefully positioning the fastening flange or (depending on option) the base plate correctly on the tank.

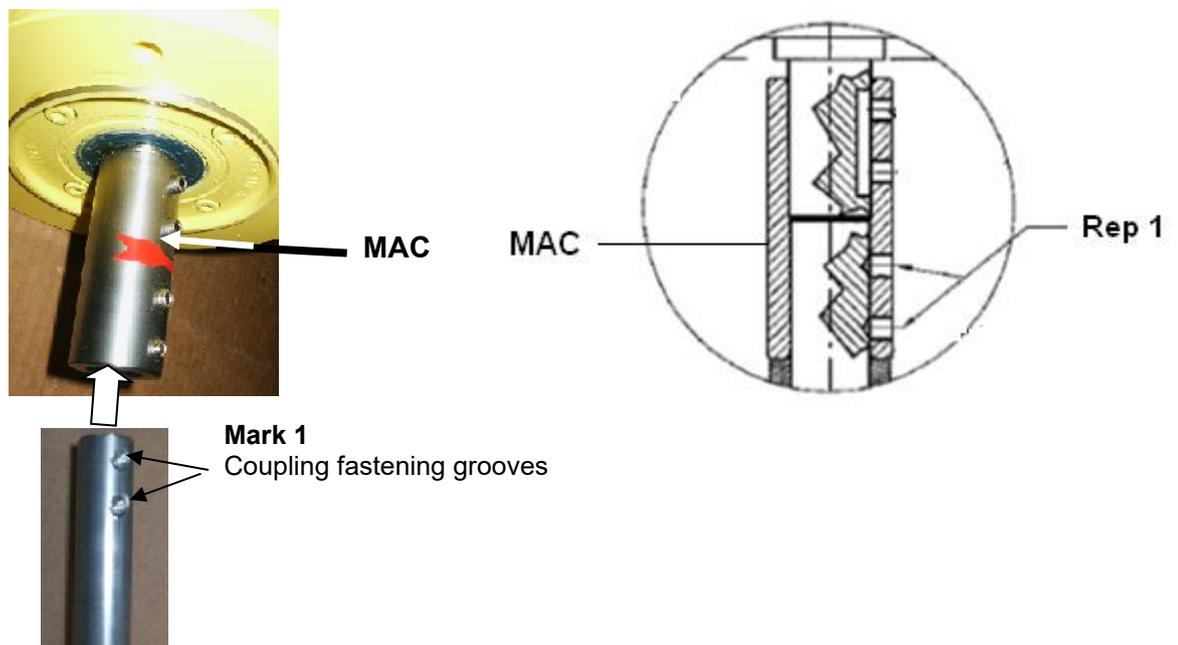


b) Assembling the coupling

➤ **Cylindrical coupling (MAC):**

The cylindrical coupling is pre-assembled on the reduction gear output shaft in the workshop. To finish the assembly on the shaft with the cylindrical coupling, it is necessary to:

- **Firstly**, hold the shaft securely and insert it into the coupling (MAC).
- **Secondly**, position it so that the screws fit into the grooves (**Mark 1**) on the shaft (to assemble the impeller on the mixing shaft, see page 39).
- **Thirdly**, assemble and screw the set screws applying the tightening torque indicated in the table (Figure 7: table of tightening torques, page 42).



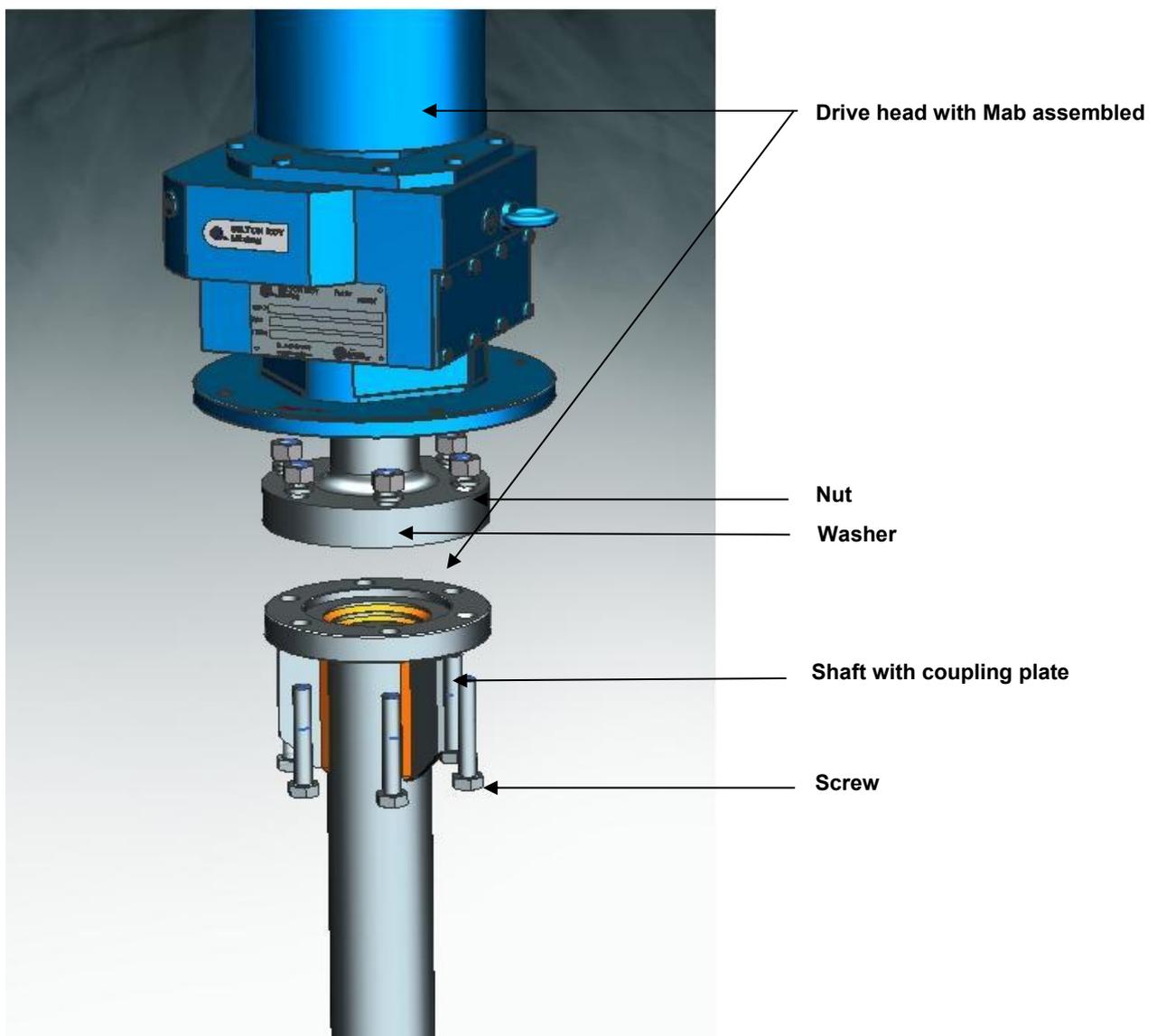
➤ **Flange coupling (MAB):**

**Caution:** the mixer must be assembled in vertical position.

In this configuration, one end of the mixing shaft is equipped with a coupling flange. The reduction gear is equipped with a flange coupling assembled on the reduction gear shaft. This flange coupling (MAB) is pre-assembled on the drive head using H screws.

To finish the assembly on the shaft with the flange coupling, it is necessary to:

- **Firstly**, bring the shaft close to the drive head taking care to align the holes in the shaft coupling plate with the flange coupling located on the drive head,
- **Secondly**, assemble the screws. Insert the screws into the shaft coupling plate then into the flange coupling assembled on the drive head. Then, place a washer on each screw.
- **Thirdly**, screw everything using nuts supplied by Milton Roy Europe.



## F) ASSEMBLING THE IMPELLER ON THE MIXING SHAFT

Fitting the impeller on the mixing shaft can be facilitated by assembling it at the bottom of the tank (depending on the dimensions and/or location of these elements).

When the impeller is located too far from the bottom, use scaffolding.

See Figure 1 (page 8) and the [general layout drawing](#) supplied with the mixer to position the impeller(s) [E] on the shaft [S]. Check the direction of assembly (blowing or sucking position).

In general, place the impeller a few centimetres from the tip of the shaft.

Label attached to the impeller indicating its direction of rotation using the letter mentioned in the top left-hand corner of each drawing.

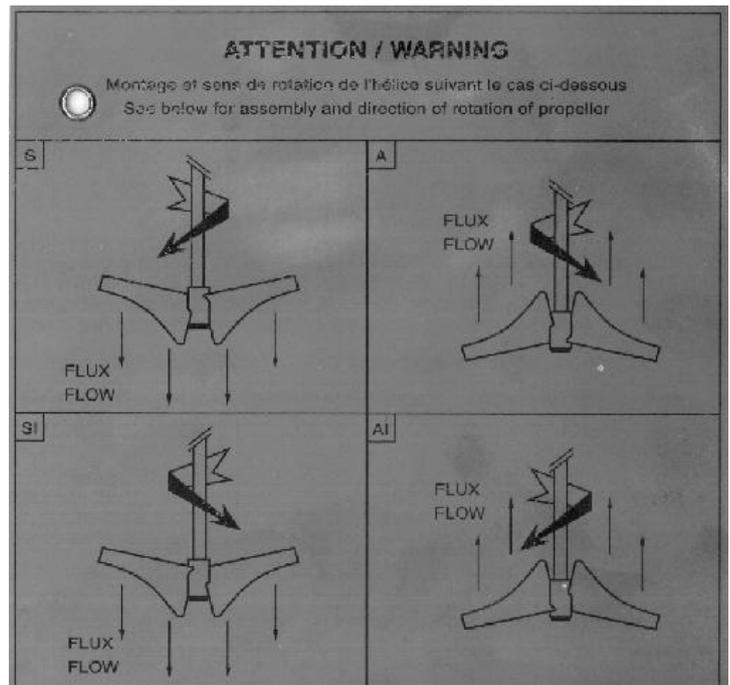
Each letter indicates:

S → blowing

A → sucking

SI → reverse blowing

AI → reverse sucking



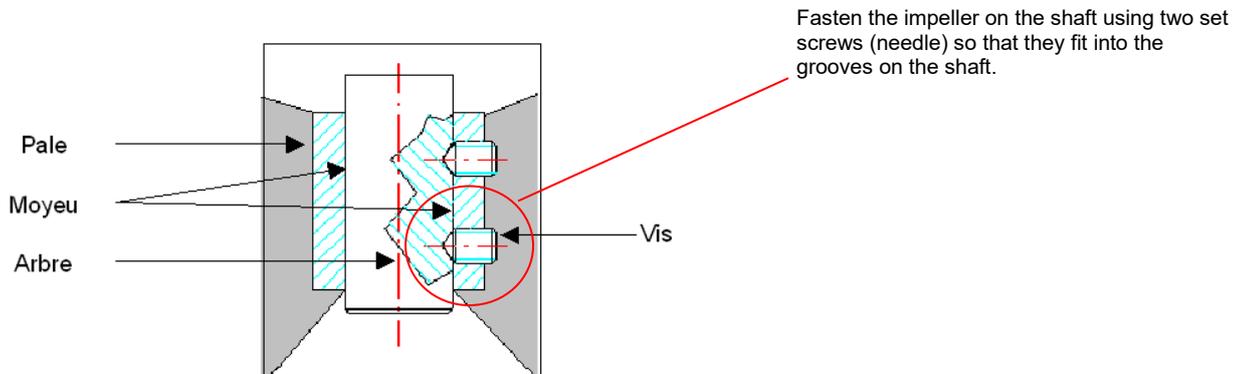
Check the impeller position in relation to the bottom and walls of the tank.

Mark on the manufacturer's drawing, the height position of each impeller and the sucking or blowing direction of flow, so that the blades in the assembly are shown in the right place and the right position. The flow generated by a sucking impeller is directed towards the liquid interface whereas the flow of a blowing impeller is directed towards the bottom of the tank.

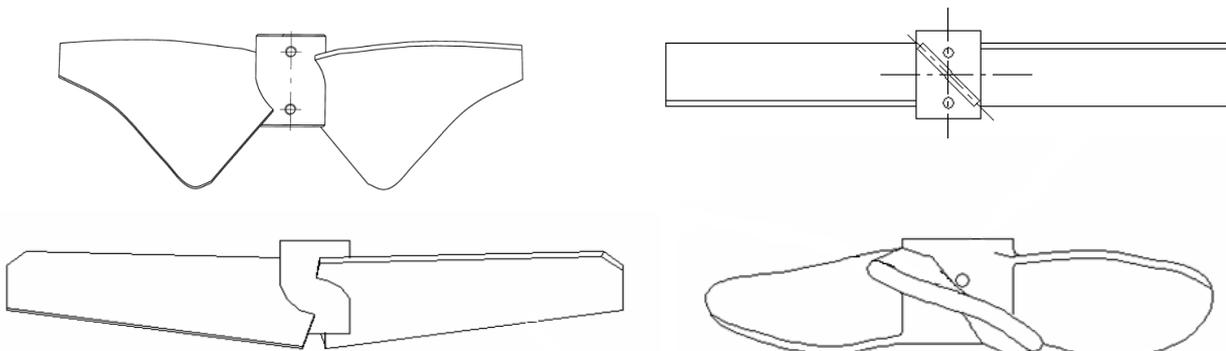
**Note:** The final tightening of the impeller fastening bolts is **a very important operation that determines correct subsequent operation of the mixer.** This operation is explained in detail ([Figure 7 "tightening torque"](#), page 42) and must be respected.

➤ **Impellers assembled on one-piece hubs:**

They are fastened on the shaft using one or two set screws. Position the impeller so that the screw fits into the groove on the shaft.



Impellers assembled on one-piece hubs depending on the impellers chosen.

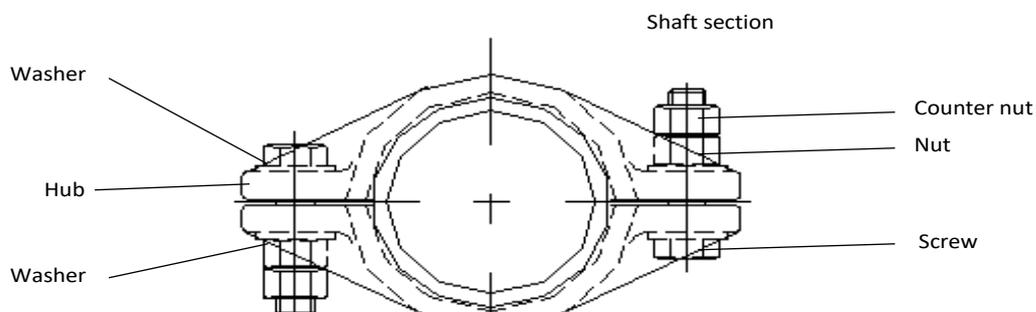


➤ **Impellers assembled on two- or three-piece hubs:**

Fastening of blades for tubular shaft models equipped with Sabre® impellers.

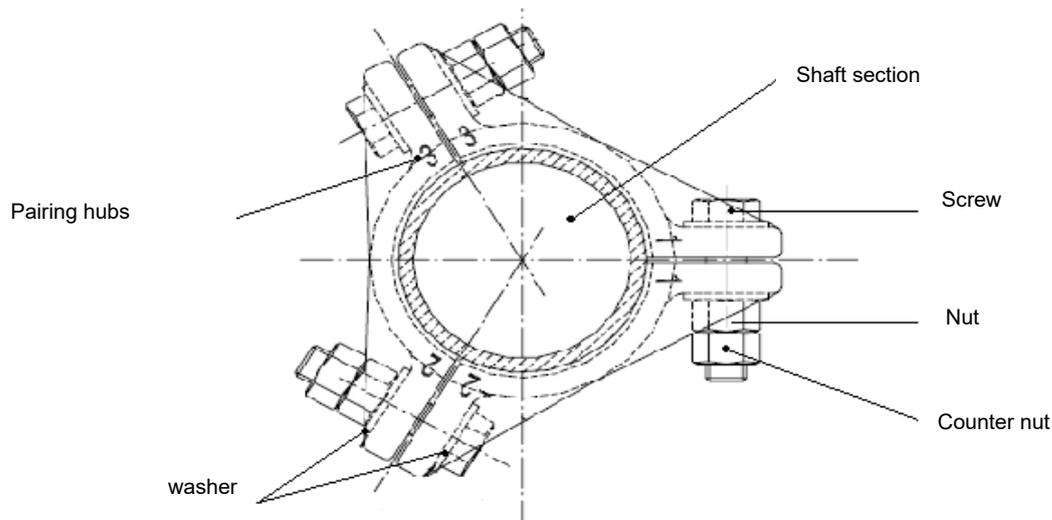
They are fastened on the shaft by assembling the elements of the hub together using bolts (screw, nut and lock nut). In this case, do not forget the lock nuts.

Example with a 2-piece hub



Note: It is important to have equal spaces between each hub, which indicates correct assembly.

**Example with a 3-piece hub**

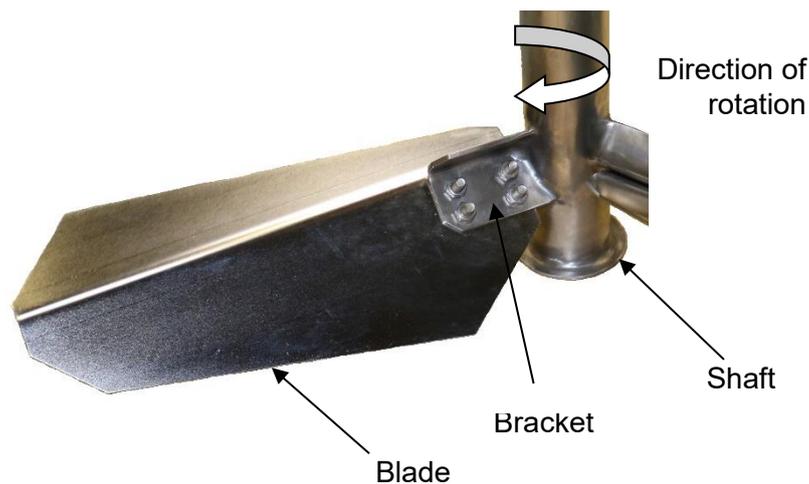


Install the 4 or 6 screws with their 2 washers and nuts. The bolts must be clean and lubricated (there may be a difference of 30% on the tightening torque between a lubricated bolt and a dry bolt). It is necessary to have a similar distance between each hub (~ 5 to 10 mm). If there are very significant visual differences either radially or laterally, then the bolts are most certainly unevenly tightened. This sign must be considered as a warning of incorrect assembly. Progressively tighten each part of the hub to have correct distribution of the tightening stress. Lock applying the tightening torque, indicated in the table opposite, to the nut and lock nut.

➤ **Impellers assembled on brackets:**

Fastening of blades for tubular shaft models equipped with impellers other than Sabre® impellers.

The blade must be assembled under the bracket. The screw heads must be on the blade side and the nuts and lock nuts on the bracket side.



Lock applying the tightening torque, indicated in the table opposite, to the nut and lock nut.

**Note:** In the case of coated mixers, the impellers are permanently welded to the shaft.

**TIGHTENING TORQUES** (the tightening torques specified must be respected).  
The values indicated in the table below are defined for new and lubricated screws or bolts.

**Figure 7: Table of tightening torques**

Dimensions	Tightening torques		
	Fastening bolts made of stainless steel A4-70	Fastening bolts made of steel Class 8.8	Fastening screws made of steel Class 8.8 or stainless steel A4-70, installed in material with elastic limit < 210 MPa
M6	6.5 m.N	9.5 m.N	3 m.N
M8	16 m.N	23 m.N	7.5 m.N
M10	32 m.N	46 m.N	15 m.N
M12	57 m.N	81 m.N	26.5 m.N
M14	90 m.N	128 m.N	42 m.N
M16	133.5 m.N	190 m.N	62 m.N
M18	183 m.N	260 m.N	85 m.N
M20	260 m.N	370 m.N	121.5 m.N
M24	250 m.N	650 m.N	213 m.N
M27	360 m.N	950 m.N	300 m.N
M30	500 m.N	1,200 m.N	370 m.N

1 daN = 10 N

The bolts for the coupling flanges and hubs are supplied with the equipment. To avoid reversing the bolting, please check the tables below.

Similarly, please measure the flange and shaft dimensions on your shaft.

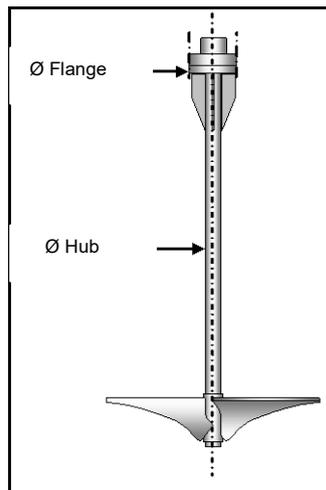
**Figure 7.a**

Flange coupling sleeve		
Ø flange	Number of screws	Bolts
125	4	H-M12x065/30
140	4	H-M12x065/30
175	6	H-M16x090/38
190 or 215	6	H-M16x090/38
220 or 225	6	H-M16x090/38
300 or 310	6	H-M24x120/54
425	8	H-M30x190/72

**Figure 7.b**

Hub			
Ø tube	Number of screws		Bolts
	2-piece hub	3-piece hub	
Ø 60.3	4	6	H-M12x55/55
Ø 88.9	4	6	H-M14x60/60
Ø 114.3	4	6	H-M16x70/70
Ø 141.3	4	6	H-M18x80/80
Ø 168.3	4	6	H-M20x90/46

**Figure 7.c**



## III – 3: ELECTRICAL INSTALLATION

### CONNECTING THE MOTOR



**Warning:** The connection must be carried out by a qualified person in accordance with the applicable safety regulations.

The nameplate data must be read.

The mains supply type of current, voltage and frequency must be checked before connecting the equipment.

The motor's electrical protection (fuse or thermal protection) must correspond to the motor's rated current.

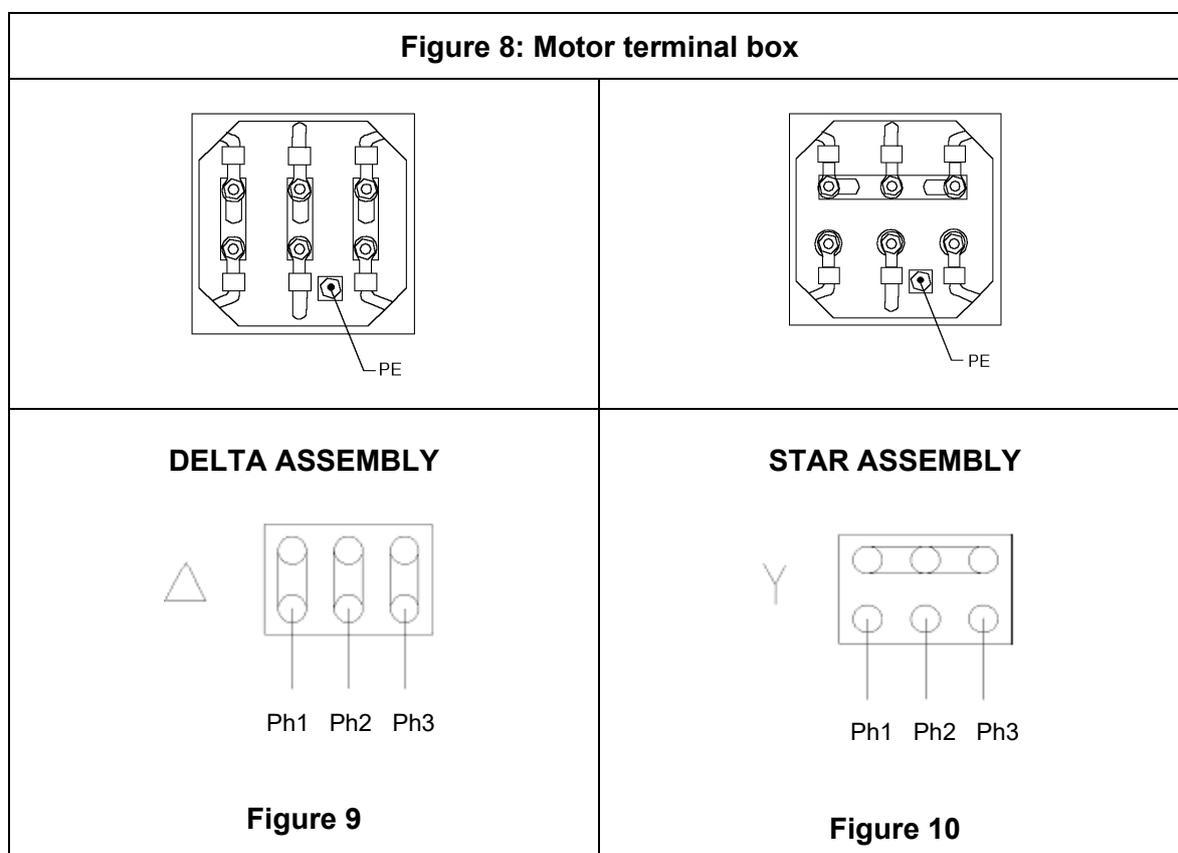
Connect the motor according to the indications located in the terminal box (Figure 8). Remember to connect the motor's earth terminal (PE) to the protective conductor.

For a 230/400-V motor, 230-V three-phase connection is carried out as a delta connection (Figure 9). For the 400-V three-phase connection, use the star connection Y (Figure 10).

For a 400/690-V motor, 400-V three-phase connection is carried out as a delta connection (Figure 9). For the 690-V three-phase connection, use the star connection Y (Figure 10).

Seal the unused cable inlets hermetically, without risk of distortion, to prevent any risk of penetration of dust and moisture.

**Caution:** After prolonged storage or stoppage, before starting up, get an authorized person to measure the insulation resistance of the coil, phase against phase and phase against earthing. Wet coils may produce leakage currents, arcing and breakdowns.



---

## **III – 4: INSTRUCTIONS REGARDING NOISE AND VIBRATION**

### **Noise:**

The sound pressure level weighted emission A at 1 m for HM series mixers is less than 80 dB(A) in the absence of other known values according to the specifications on the MILTON ROY quote.

In some resonance configurations between the mixer and the installation, this sound pressure level may be amplified.

In this case, we recommend:

- changing the installation's specific resonance frequency (e.g.: stiffening the structure, moving the structural element, etc.).
- or inserting damping devices between the mixer and its support.
- or creating an enclosure improving the soundproofing.

### **Vibration:**

HM series mixers generate vibrations < 4.5 mm/s in line with the reduction gear's flange in the absence of other known values according to the specifications in the MR quote.

In some resonance configurations between the mixer and the installation, this vibration level may be amplified.

In this case, we recommend:

- changing the installation's specific resonance frequency (e.g.: stiffening the structure, moving the structural element, etc.).
- or inserting damping devices between the mixer and its support. (Contact MILTON ROY)

## Summary of Part III

### ► Handling

1. Any damage to the paint may result in cancellation of the warranty.
2. The shaft must be handled in horizontal position.
3. Check that the balancing is correct before starting to move it.
4. The shaft and motor must be handled using a sling.

### ► Setting up

1. Check the cleanliness of the machine.
2. Check that the parts supplied are in good condition.
3. The mixer must be in the centre of the tank.
4. Baffles recommended in the tank.
5. Bring tools such as lifting equipment, slings, standard tool box, torque wrench, PTFE spray, beams.
6. Cylindrical coupling installation procedure:
  - insert the shaft into the MAC,
  - check the position of the screws with the grooves on the shaft,
  - check the tightening torque.
7. Flange coupling installation procedure:
  - align the shaft and the drive head,
  - insert the screws then the washers,
  - screw everything using nuts.
8. Use U sections to immobilize the shaft in the tank.
9. Check the correct horizontal position of the mixer support.
10. Check that the base plate is fastened to the support.
11. Check the direction of assembly of the impeller on the shaft (blowing or sucking).
12. Place the impeller preferably a few centimetres from the tip of the shaft.
13. Check the fastening of the impellers on single-piece hubs.
14. Check the fastening of the impellers on three-piece hubs.
15. Check the various dimensions of the mixer.

### ► Electrical installation

1. Check that the nameplate data has been read.
2. Check the amperage.
3. Check the electrical connections.
4. Check that unused electrical cables inlets are blanked.

## PART IV – START-UP

### IV – 1: PROCEDURES BEFORE INITIAL START-UP

**Caution:** To avoid any accidental start-up of the equipment, switch off the machine (disconnect) and indicate that work is taking place (e.g.: “operator making adjustments, do not connect the system”).

**Before initial start-up, make sure to:**

- Check the various fastening fittings and check the locking of screws (see [table of tightening torques](#). [Figure 7](#), page 42).
- Check that no obstacles are blocking the movement of the “shaft/impeller” assembly.
- Read the nameplate indications.
- Check that the motor's voltage and frequency are compatible with the mains supply values.
- Check that the direction of rotation is correct and that the rotation speed threshold is not exceeded when the variable speed drive is operating (depending on option).
- Check that the electrical connections are securely fitted and that monitoring devices have been connected in accordance with the instructions.
- Check that all additional devices, if any, are working properly.
- Check that the air inlets and cooling surfaces are clean.
- Check that protective measures have been taken: earthing.
- Check that the motor is fastened correctly.
- Check that the terminal box is closed and that the wire inlets have been correctly sealed.
- Install the **vent plug\*** in the place of the plug in the case of a mixer with reduction gear. The vent plug is supplied in the “bolting for fastening the MAG” box (see page 21).

\* see [glossary](#) (p. 64).

**Note:** If the mixer is used in a dusty area or where there is a risk of sandstorms, a special filter is required. Please consult us for this purpose.

- Check the oil level in the reduction gear [R]. For this, it is necessary to:
  - **Firstly**, unscrew the oil level plug and check that the oil reaches the plug bore level.
  - **Secondly**, top up if necessary, by unscrewing the filler plug, in order to obtain the recommended volume (to find out the recommended oil level, please refer to the manufacturer's plate).  
**Caution:** Clean up all spilled oil immediately using a degreasing agent suitable for the operating conditions.
  - **Thirdly**, screw the plug back up. 

**Note:** For ZF29 and DF29 reduction gears, there is no drain plug, and lubrication is adapted to the service life of the reducing box. Simply check the oil level and fill if necessary. However, oil can be extracted by suction drainage.

***Check the connection of the motor***

Start up the mixer to check the direction of rotation of the motor. The direction of rotation of the impeller must comply with the direction indicated by the arrow on the housing. To reverse the direction of rotation, stop the mixer and reverse Ph1 and Ph2 or Ph1 and Ph3 ([Figure 9 or 10](#) on page [44](#)).

**IV – 2: INITIAL START-UP**

- Once all the checks and procedures described in the previous chapter have been carried out, start the mixer. **(Do not run a VDA or VLA mixer without liquid).**
- For mixers used for the treatment of waste water in the presence of sludge, the mixer should be regularly operated in the reverse direction for a few moments.
- Carry out a visual and auditive check (in particular, check that there is no suspicious noise).
- Stop the mixer.
- Fill the tank up to its operating level and check that no foreign matter is present in the tank.
- Start up the mixer.

**DANGER**: Do not run the mixing device continuously if the impeller is partially submerged.

***Check the amperage***

Check the amperage of the 3 phases using a clamp ammeter when the liquid is in motion and compare it with the value indicated on the motor's nameplate.

**IV – 3: FAILURES ON INITIAL START-UP*****MOTOR PROBLEMS***

- **The motor runs with difficulty and overheats**
  - One phase is incorrectly connected.
  - The characteristics of the electrical power supply do not correspond to the motor's specifications.
  - The electrical connection (star or delta) chosen is not suitable.
- **Motor/reduction gear overheating**
  - The reduction gear housing does not contain enough oil: (see Part [IV – 1: PROCEDURES BEFORE INITIAL START-UP](#), page [47](#)).

## **IV – 4: OPERATION**

During operation, the following should be checked

- normal operating temperature.
- modification of noise.
- any oil leakage.
- **For mixers used for the treatment of waste water in the presence of sludge, the mixer should be regularly operated in the reverse direction for a few moments.**

These checks are described in [Part IV – 5: SCHEDULE OF CHECKS AND MAINTENANCE OPERATIONS](#) on the next page.

**Note:** Do not use the mixer when the liquid is below the impeller's minimum immersion level. The minimum and maximum levels are shown and indicated on the drawing of the mixer.

**If an anomaly is detected during the operation, stop the motor.**

To determine the cause of the malfunction, please refer to Part [V - 1 E\) TROUBLESHOOTING](#), page [57](#).

In the event of problems in determining the cause of the malfunction or repairing it, contact our Technical Support Service (see contact details at the beginning of this manual).

## **IV – 5: SCHEDULE OF CHECKS AND MAINTENANCE OPERATIONS**

The checks and maintenance operations are scheduled based on the equipment's operating conditions. For this reason, the frequencies indicated below are given only as a guide. Users should adapt these frequencies to their own operating conditions.

**Figure 11: Table of maintenance schedules**

<b>When</b>	<b>Check</b>	<b>Servicing action</b>	<b>See</b>
Every month	Auditive check (wear of bearings and gears) if unsatisfactory ->	Remove the reduction gear for repair	Part V - 2-B Page 61
	Check the extent of soiling of the motor's fan if necessary ->	Clean the motor's fan	Part V - 1- B Page 53
Every 3 months	Check the oil temperature (max.: Section IV - 4) if incorrect ->	Check - the date of the last oil change - the extent of oil contamination - if the motor's fan is clogged	Part V - 1- D Page 54
Every 2,500 hours	Check the oil level in the reduction gear housing - if incorrect ->	Trace the oil leak	Part V - 1- C Page 53
Every 5,000 hours		Change the reduction gear's oil	Part V - 1- D Page 54
At least once a year	Check the locking of all fastening		Part V - 1 -A Page 53

A model maintenance sheet is provided in [Figure 12](#) on the next page, to help you follow up your servicing operations (checking or maintenance).



## Summary of Part IV

### ► Procedures before start-up

With the mixer stopped:

1. Visual check of the mixer:
  - the fastening and locking of screws,
  - the direction of rotation,
  - the electrical connections,
  - the additional devices,
  - the air inlets and cooling surfaces,
  - the fastening of the motor,
  - the closing of the terminal box.
2. Installation of the vent plug.
3. Check of the oil level in the reduction gear.
4. Tank filling.
5. Check of electrical connections.

### ► Initial start-up

1. Start up the mixer (**except VDA, VLA mixer**).
2. Visual and auditive check.
3. Stop the mixer.
4. Tank filling.
5. Start up the mixer again.
6. Check the amperage.

### ► Failures on start-up

Motor problems:

- Check the phase connections.
- Check the motor characteristics.
- Check the electrical connection.
- Check the oil level in the reduction gear's housing.

### ► Operation

1. Check the operating temperature.
2. Check the modification of noise.
3. Check for any oil leakage.

### ► Schedule of checks and maintenance operations

1. Every month:
  - Auditive check of the mixer.
  - Check the extent of soiling of the motor's fan.
2. Every 3 months:
  - Check the oil temperature.
3. Every 2,500 hours:
  - Check the oil level in the reduction gear housing.
4. Every 5,000 hours:
  - Change the reduction gear's oil.
5. Once a year:
  - Check the locking of all fastening.

## PART V - MAINTENANCE



**Caution:** If your mixer has specific options that may modify the maintenance operations, e.g.: special motor, assembly on turnbuckle, variable speed drive, food compatible oil, etc., please refer to the additional instructions or contact Milton Roy Europe.

### V – 1: BASIC MAINTENANCE

#### **A) CHECKING THE LOCKING OF ALL FASTENING**



**DANGER:** Switch off the mixer. Make sure that the equipment cannot be started accidentally and indicate that work is taking place. (LOTO)

Check the mixer's various fastening fittings and check the locking of screws.

The tightening torque is indicated in the table in [Figure 7](#) of [III – 2: SETTING UP](#), page 42.

All defective fastening will be replaced with assemblies of the same class.

#### **B) CLEANING THE MOTOR'S FAN**

This maintenance operation ensures good heat dissipation.

- **Switch off the mixer. Make sure that the equipment cannot be started accidentally and indicate that work is taking place. (LOTO)**
- Remove any trace of dirt or dust. Do not use a high-pressure cleaning system or sharp tools.

#### **C) CHECKING THE OIL LEVEL IN THE GEAR REDUCING HOUSING**



**Caution:** Before carrying out any maintenance, the oil temperature must be taken into account. It must be back below 30°C. Even after a short operation, the oil must be left to resettle for a certain amount of time so that any air bubbles can be eliminated.

**Caution:** To prevent any risk of burns by hot oil, wear suitable personal protective equipment.



**Before carrying out this work, switch off the mixer. Make sure that the equipment cannot be started accidentally and indicate that work is taking place. (LOTO)**

To check the oil level in the reduction gear housing, it is necessary to:

- **Firstly**, unscrew the plug and check that the oil reaches the plug bore level.
  - **Secondly**, if necessary, fill the housing (with oil suitable for the operating conditions) with oil up to the plug bore level.
-  **Caution:** clean up all spilled oil immediately using a degreasing agent suitable for the operating conditions.
- **Thirdly**, check the condition of the seal ring and change it, if necessary.
  - **Fourthly**, screw the plug back up.

**Amount of oil needed (depending on option):**

TYPE	Mounting position M4 (Liters)	TYPE	Mounting position M4 (Liters)
ZF29	0.6	DF29	0.5
ZF39	0.95	DF39	0.85
ZF49	1.9	DF49	1.7
ZF59	1.9	DF59	1.8
ZF69	2.6	DF69	2.3
ZF79	3.9	DF79	3.6
ZF89	6.7	DF89	6
ZF109	11.3	DF109	10
ZF129	19.9	DF129	17.7
ZF149	32.5	DF149	28.5
ZF169	49.5	DF169	43.5
ZF189	80	DF189	77

## D) REDUCTION GEAR OIL CHANGE

\* except for models equipped with ZF38 reduction gears.



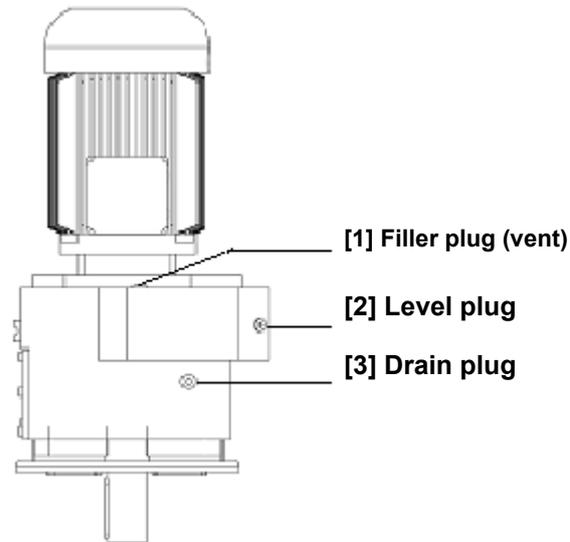
**Caution:** Before carrying out any maintenance, the oil temperature must be taken into account. It must be back below 30°C. Even after a short operation, the oil must be left to resettle for a certain amount of time so that any air bubbles can be eliminated.

However, it is preferable for the oil to be warm (approximately 30°) to facilitate its fluidity and correct draining. For this, allow the reduction gear to operate for 15 to 30 minutes to warm up.

Change the oil every 5,000 hours of operation. To prevent any risk of burns by hot oil, wear suitable personal protective equipment.



\* reduction gear oil harms our environment, please collect waste oil carefully and send it to a waste treatment centre. The same applies for oil-soiled cleaning rags.

**Figure 13: Reduction gear oil change**

**Before starting this operation, switch off the mixer. Make sure that the equipment cannot be started accidentally and indicate that work is taking place. (LOTO)**

### **Step 1: reduction gear oil change**

To change the reduction gear oil, it is necessary to:

- **Firstly**, position a suitable container under the drain plug [3].
- **Secondly**, unscrew the plug [3] and let all of the oil run into the container. The housing must be thoroughly cleaned of any oil residue or particles.
- **Thirdly**, screw the drain plug back up.

### **Step 2: filling up the reduction gear**

To fill up the reduction gear, it is necessary to:

- **Firstly**, unscrew the oil level plug [2] and the filler plug.
- **Secondly**, to fill up the housing, it is advisable to pour the new oil through a filling filter (with oil suitable for the operating conditions) until the oil reaches the bore level of the level plug [2].
- **Thirdly**, screw the level plug [2] and filler plug [1] back up.

**Caution:** clean up all spilled oil immediately using a degreasing agent suitable for the operating conditions.

For any additional information, please refer to the supplier manual

**Characteristics:**

- Quantity: see technical data sheet at the end of the manual.
- Original oil: see reduction gear plate
- Ambient temperature: depending on the type of oil
- Maximum temperature of the oil during operation: 90°C
- Waste oil and dirty rags must be collected in suitable containers.

**Standard oil:**

Type: CLP ISO VG220 (DIN 51502)

Ambient temperature: -10 to +40°C

Table of equivalences:

<b>BP</b>	ENERGOL GR-XP220
<b>ESSO</b>	SPARTAN EP220
<b>MOBIL</b>	MOBILGEAR 630
<b>SHELL</b>	OMALA OIL 220

**Synthetic oil:**

Type: CLP ISO PG VG220 (DIN 51502)

Ambient temperature: -20 to +50°C

Table of equivalences:

<b>BASF</b>	PLURASAFE GL PLUS 220
<b>CASTROL</b>	TRIBOL 1300 / 220
<b>FUCHS</b>	GEARMASTER PGP 220
<b>KLUBER</b>	KLUBERSYNTH GH 6 -220

**Non-toxic oil:**

Type: CLP ISO H1 VG460 (DIN 51502)

Ambient temperature: -30 to +40°C

Table of equivalences:

<b>BASF</b>	PLURASAFE GL FG 460
<b>CASTROL</b>	OPTILEB GT 1800 / 460
<b>FUCHS</b>	CASSIDA FLUID WG 460
<b>KLUBER</b>	KLUBERSYNTH UH 1 6 -460

## ***E) TROUBLESHOOTING***

### **MOTOR PROBLEMS**

#### ➤ **The motor does not run**

The thermal protection has tripped.

- Too much intensity, possible causes:
  - filaments
  - viscosity, density of the medium higher than expected
- The motor is defective.
- The wiring is defective.

#### ➤ **The motor is difficult to start up or runs with difficulty**

- The quality of the oil present in the reduction gear housing is not satisfactory (viscosity).

#### ➤ **The motor overheats**

- The motor's fan is clogged.
- There is not enough oil: trace the leak.
- Unsatisfactory oil quality. Check the date of the last oil change, the characteristics of the oil used and the extent of its contamination.
- The mixer is used in conditions it was not designed for.

### **PROBLEMS WITH NOISY MECHANISMS**

- There is too much clearance on the bearings or the bearings are worn (motor or reduction gear).
- The gears are worn.

#### **The following problems occur when the vent plug is not in place:**

- risk of overheating
- oil leakage

**F) ORDERING SPARE PARTS**

To make it easier to process your order for spare parts and ensure rapid delivery, please provide the following information:

- information about the mixer: type [1] and contract number [2]. This information is given on the nameplate fastened on the motor's hood (see [Figure 14](#) below).
- information about the spare part: reference, description and quantity. This information is shown on the spare parts list.

Contact MILTON ROY Europe to obtain the list of spare parts.

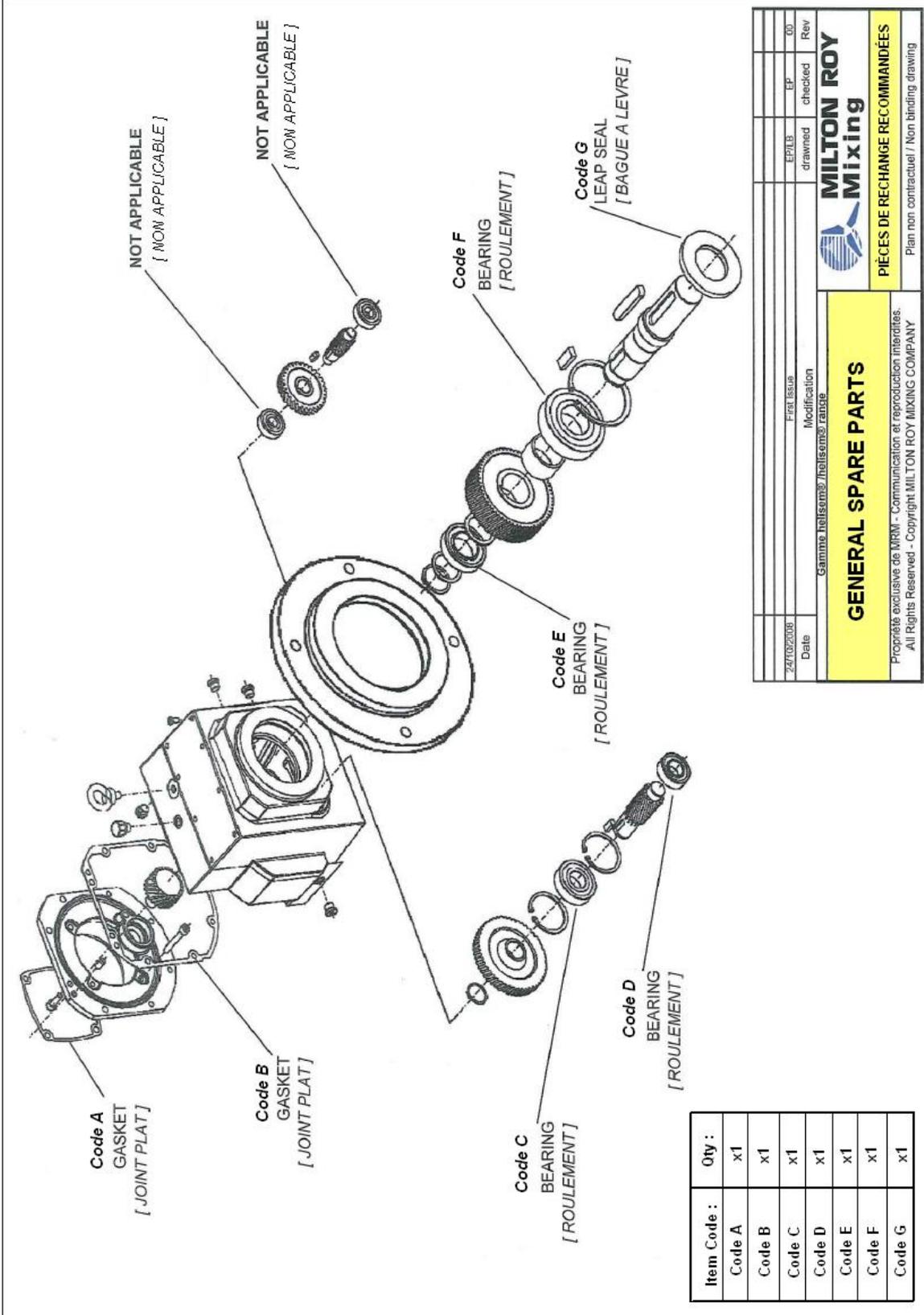
**Figure 14: Identification plate**

	<b>MILTON ROY</b> <b>Mixing</b>	10 rue du Bois Gasseau 77210 Samoreau - FRANCE TEL : +33 (0)1 60 74 95 20 <a href="http://www.miltonroymixing.com">www.miltonroymixing.com</a>
<b>TYPE</b>		
<b>S/N</b>		<b>Mfg</b> <span style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></span>
<b>ITEM</b>		
	 <b>Robin</b>	 <small>Filiale</small> <b>MILTON ROY</b>
	<b>HELISEM®</b>	

<b>1</b>	<b>TYPE: Mixer code</b>
<b>2</b>	<b>S/N: Contract No.</b>
<b>3</b>	<b>ITEM: your reference</b>
<b>4</b>	<b>Mfg: year of manufacture</b>

**After-Sales Service: Tel.: +33 (0)1 60 74 61 32/(0)1 60 74 95 33**

**G) RECOMMENDED SPARE PARTS**


**Code A**  
GASKET  
[ JOINT PLAT ]

**Code B**  
GASKET  
[ JOINT PLAT ]

**Code C**  
BEARING  
[ ROULEMENT ]

**Code D**  
BEARING  
[ ROULEMENT ]

**Code E**  
BEARING  
[ ROULEMENT ]

**Code F**  
BEARING  
[ ROULEMENT ]

**Code G**  
LEAP SEAL  
[ BAGUE A LEVRE ]

NOT APPLICABLE  
[ NON APPLICABLE ]

NOT APPLICABLE  
[ NON APPLICABLE ]

Item Code :	Qty :
Code A	x1
Code B	x1
Code C	x1
Code D	x1
Code E	x1
Code F	x1
Code G	x1

24/10/2008	Date	EPILB	EP	00
	First Issue		drawn	checked
	Modification			Rev
Gamme Hallsam®/Hallsam® range				
<b>MILTON ROY Mixing</b>				
<b>GENERAL SPARE PARTS</b>				
Pièces de rechange recommandées				
Propriété exclusive de MRM - Communication et reproduction interdites.				
All Rights Reserved - Copyright MILTON ROY MIXING COMPANY				
Plan non contractuel / Non binding drawing				

## **V – 2: CORRECTIVE MAINTENANCE**

### **A) MOTOR**

#### **GENERAL**

##### ➤ **Precautions**

Dry damp motors before starting up and have their insulation value checked by a specialist.

##### ➤ **Bearings**

The motor bearings are lubricated for life. Therefore, they do not require any servicing.

Unusual bearing noises and high temperatures on bearing seats indicate that the condition of the bearings is unsatisfactory.

#### **REMOVING THE MOTOR**

##### ➤ **REMOVING**

- **Switch off the mixer. Make sure that the equipment cannot be started accidentally and indicate that work is taking place. (LOTO)**
- Mark the motor's connection before disconnecting the wires from the terminal box.
- Install a sling to handle the motor (see [III – 1: HANDLING](#), page 25).
- Remove the motor.

##### ➤ **REASSEMBLING**

The tightening torques are indicated in Part [III – 2: SETTING UP](#), page 42.

- Reassemble the motor on the reduction gear. Assemble and lock by applying the tightening torque indicated in Part [III-2 Setting up](#), page 42.
- Connect the motor, complying with the marking made when it was removed.
- Check the connection of the motor, which must comply with the indication of the arrow on the housing (see [Part IV – I Paragraph “Checking the connection of the motor”](#), page 48).

## ***B) REDUCTION GEAR***

### **GENERAL**

The reduction gear requires reduced maintenance only. It is splash-lubricated by an oil bath.

### **REMOVING THE REDUCTION GEAR**

#### **➤ REMOVING**

- **Switch off the mixer. Make sure that the equipment cannot be started accidentally and indicate that work is taking place. (LOTO)**
- Mark the motor's connection before disconnecting the wires from the terminal box.
- Install a sling to handle the mixer (see [Part III – 1: HANDLING](#), page 25).
- Remove all fastening (mixer-support) and install a shaft holding device.
- Lift the mixer to gain access to the fastening screws and disconnect the mixer shaft (the coupling remains on the reduction gear shaft axis).
- If applicable, drain the reduction gear and separate the motor from the reduction gear (equipped with the coupling sleeve).

#### **➤ REASSEMBLING**

The tightening torques are indicated in [Part III – 2: SETTING UP](#), page 42.

- If applicable, assemble the motor with the reduction gear. Assemble and lock applying the tightening torque indicated in the table (page 42).
- Handle the motor as indicated in [Part III – 1: HANDLING](#) (page 25) and position it above its support.
- Fasten the shaft in the coupling sleeve (see page 33).
- Fasten the mixer on its support.
- If applicable, fill the reduction gear housing with oil (see paragraph on reduction gear lubrication).
- Connect the motor, complying with the marking made when it was removed.
- Check the connection of the motor, which must comply with the indication of the arrow on the housing (see [Part III – 3 Paragraph “Checking the connection of the motor”](#), page 48).

## Summary of Part V

- ▶ **Checking the locking of all fastening**
  1. Switch off the mixer and indicate that work is taking place. (LOTO)
  2. Check the mixer's various fastening fittings.
  3. Check that the mixer is locked.
  
- ▶ **Cleaning the fan**
  1. Switch off the mixer and indicate that work is taking place. (LOTO)
  2. Remove any trace of dirt or dust.
  
- ▶ **Checking the oil level in the reduction gear housing**
  1. Check the oil temperature before carrying out any work (30°).
  2. Switch off the mixer and indicate that work is taking place. (LOTO)
  3. Recommendation of wearing of protective gloves.
  4. Check the oil level in the reduction gear's housing.
  5. Check the condition of the seal ring.
  
- ▶ **Reduction gear oil change**
  1. Check the oil temperature before carrying out any work (30°).
  2. Switch off the mixer and indicate that work is taking place. (LOTO)
  3. Recommendation of wearing of protective gloves.
  4. Change the oil every 5,000 hours.
  5. Change the reduction gear oil.
  6. Fill up the reduction gear.
  7. Clean up all spilled oil.
  8. Check the recommended characteristics.
  
- ▶ **Troubleshooting**
  1. Motor problems:
    - Check the amperage.
    - Check the density.
    - Check the wiring.
    - Check the oil quality in the reduction gear housing.
    - Check the amount of oil in the reduction gear housing.
    - Check the cleanliness of the fan.
    - Check the mixer's operating conditions.
  
  2. Mechanical problems:
    - Check the bearings.
    - Check the gears.
    - Check that the vent plug is used correctly.
  
- ▶ **Ordering spare parts**
  1. Check all of the following information when ordering parts:
    - Type and contract number.
    - Reference, description and quantity.

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## **PART VI – TECHNICAL CHARACTERISTICS**

You have been provided with a customized drawing by our Engineering & Design Department.  
Please refer to it and insert a copy of this document to facilitate reading of this manual.

## GLOSSARY

**Vent plug:** a vent plug is a mechanical device that regulates the flow of fluids and lets air out during heating and in during cooling.



**Torque wrench:** a torque wrench is a tool that limits the tightening torque of the screws and nuts so that they are optimally tightened.



**Vortex:** a swirling flow where fluid particles rotate about an axis.

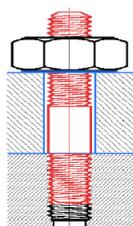
**Drive head:** the drive assembly that is located outside of the tank (motor, reduction gear, turnbuckle, etc.)



**Filament:** filament is the common name given to fibres that intertwine around the impeller hub to form a “ball” that increases the power or generates an imbalance.

**Beams:** pieces of wood used to support the shaft for installation of the mixer. They are used in the same way as U sections but are less effective.

**Stud:** partially threaded metal rod that can be used to create a “complete, rigid, removable” connection between two parts. For example, it may be embedded in the concrete on one side and used to screw in, lock parts on the other side. See diagram below.



## WARRANTY

The Seller guarantees the Goods for a period of twenty-four (24) months following the date of delivery of all of the Goods, except for mixers and spare parts for mixers that will be guaranteed for a period of twelve (12) months. Any claim shall be brought to the Seller's knowledge, in writing, within ten (10) working days of becoming aware of same and shall enclose the corresponding Purchase Invoice. Failing this, the Purchaser shall be deemed to have waived all right of recourse regarding the warranty obligation.

The Seller's warranty covers the replacement or repair of proven defective parts of the Goods that shall, at its sole option:

(a) be returned to the place of manufacture; or, (b) be returned to a distributor or a service centre authorized by the Purchaser; or, (c) in the case where the Seller gives its agreement on the fact that the Goods cannot be returned for financial or practical reasons, the defect or nonconformity shall be assessed on the Purchaser's site, at the Purchaser's expense. In such a case, the Purchaser shall issue an Order to cover the audit of the defect, for an amount determined on a case-by-case basis.

If the Seller's responsibility is established under the warranty, the Seller shall repair or replace the defective parts at its own expense, excluding any other costs (in particular: dismantling, reassembling and approach (including the emptying of tanks) and the transport costs.

The Seller reserves the right to modify all or part of its Goods to comply with its warranty obligation.

The replacement or repair of one or more parts for any reason whatsoever shall not extend the Seller's warranty obligation.

The warranty obligation shall not apply under the following circumstances: normal wear and tear, installation not compliant with Industry Practice and/or the Seller's instruction manual, lack of monitoring or maintenance, wilful act on the part of the Purchaser, its employees or Third Parties, accident, any modification to the operating conditions, chemical attack, corrosion or erosion.

The manufacturing equipment suggested by the Seller shall only constitute a recommendation and is subject in all cases to the acceptance of the Purchaser, whose liability in this respect cannot be excluded, whether in whole or in part. Neither the recommendations based on the Seller's experience, nor the information provided by the Seller to the Purchaser shall extend the warranty to wear and tear or chemical action.

The warranty shall automatically end: (a) if the storage of the Goods by the Purchaser fails to comply with the Seller's recommendations and with Industry Practices, or maintenance manuals; (b) in the event of the Goods being dismantled or repaired without the express written agreement of the Seller, or in the event of such repair being carried out by a person not expressly approved in writing by the Seller; (c) if original parts have been replaced by other parts non-supplied by the Seller.

Warranty claims shall not affect payment terms.

## **INTELLECTUAL PROPERTY**

Notwithstanding anything to the contrary and except an express licence is granted, each Party shall remain the exclusive owner of the Intellectual Property Rights that it owns, develops or uses, whether such ownership, development or usage arises before, during or after the Agreement.

The Seller guarantees to the Purchaser that the Goods do not constitute a breach of any pre-existing rights nor any other form of infringement of Intellectual Property Rights, and indemnifies it against any action or claim in this respect, provided that: (a) the Seller has been informed in advance and in writing of the existence of such a claim and within a reasonable timeframe for it to be able to prepare its defence, (b) payment has been received for the Goods, and (c) the Purchaser provides the Seller with the necessary opportunity, authority, information and assistance for it to be able to take on exclusive control of the defence against such claims or legal action, including arbitration, mediation, settlements and appeals.

This obligation does not apply in respect of any claims/infringement action resulting from the use of the specifications provided by the Purchaser or derived from the design created by the latter, or from changes or modifications to the Goods imposed by it.

Should the liability of the Seller be recognised by any jurisdiction, the Seller shall at its sole option: (1) obtain from the Purchaser the right to use the Goods under the conditions defined by the Agreement; or (2) replace it with reasonably equivalent Goods; or (3) modify the Goods to make them usable without contravening any Intellectual Property Rights of third parties; or (4) recall the Goods, refund the Purchase Price to the Purchaser less a percentage corresponding to obsolescence of the Goods.

Should the Goods supplied by the Seller to the Purchaser be produced in accordance with the Purchaser's samples, designs, models or instructions, or have been designed exclusively by the Purchaser or are combined with other Goods not supplied by the Seller, the Purchaser will have to guarantee and indemnify the Seller under equivalent conditions to those aforementioned.

## NOTES