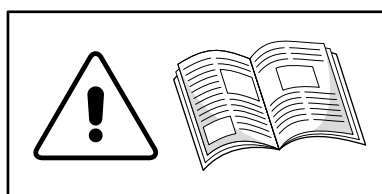
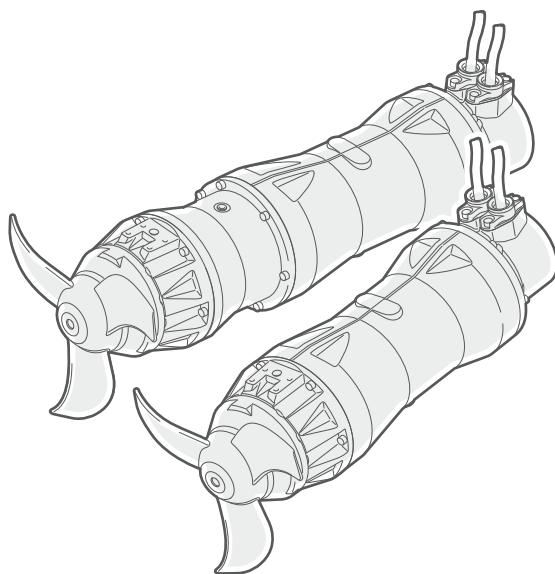




SERIES MMR

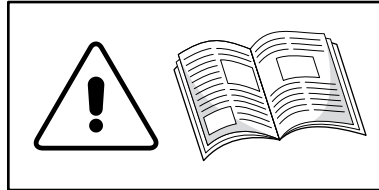
High efficiency mixer



First installation manual

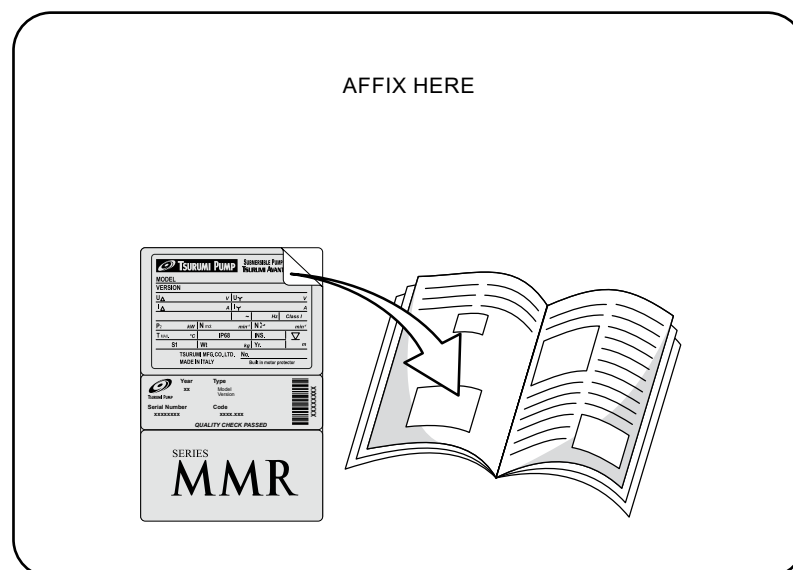
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*The images are indicative only and may not match the actual product. Details given here may differ from the actual product.
TSURUMI reserves the right to modify the product without prior warning.
For more information, consult the website www.tsurumi-avant.com.*

DATA LABEL



For correct installation and safe use of the product, read this manual carefully and keep it safe in a clean, easily accessible place for future reference.

1. GENERAL INFORMATION

1.1 Manufacturer's details

TSURUMI MANUFACTURING CO.,LTD

1.2 Key to the symbols used in the manual



Hazard for operators and product



Electrical risk



Very hot surfaces with burn hazard

WARNING! Important information to be read with special care



1.3 General safety regulations

- Equipment is not suitable for unskilled and/or incompetent persons; keep out of reach of children;
- Installation operations must be carried out by skilled technical staff capable of understanding the contents of the manual; the staff assigned to install and maintain the product must be trained in the inevitable residual risks related to electrical equipment;
- Make sure that persons cannot accidentally fall into the tank, e.g. by installing a cover or railing;
- During handling, installation or disinstallation operations the mixer must be disconnected from the power supply panel;
- Pay attention to the risks presented by gas and vapors in the work area;
- Do not swallow or inhale any component of the mixer;
- People and animals must not enter or come into contact with the liquid until the mixer has been removed from the tank;
- Do not allow the free end of the electric cable to come into contact with liquids of any kind;
- The electric system must have a ground connection in good working order;
- Before connecting the electricity supply, ensure that the mixer has been installed correctly and retire to a safe distance;
- Do not use the mixer for purposes other than those for which it was designed and constructed, since the manufacturer does not accept liability for injury or damage caused by the mixer if used in contravention of the instructions in the manual, or in the event of non-compliance with the maintenance and safety recommendations; for aggressive chemical environment, contact the manufacturer before use to check whether the materials are compatible with the environment concerned;
- Do not modify the mixer or any of its parts (connections, holes, finishes, etc.) for any reason;
- The user must comply with the relevant safety regulations in the country of use, as well as common-sense safety precautions, and ensure that regular cleaning and maintenance operations are carried out correctly;
- The installer is responsible for ensuring that the ambient conditions of use are suitable, to ensure health and safety;
- The customer is responsible for the staff authorised to use the mixer;
- Failure to comply with this requirement may put users at risk and lead to loss of warranty rights.

WARNING! The mixer must under no circumstances be used in potentially explosive environments.

1.4 Personal protective equipment (PPE) to be used

Wear regulation personal protective equipment when handling the mixer.

Safety gloves, safety footwear, protective goggles enclosed at the sides and leather aprons must be worn.

Before handling the product once installed, wash it with plenty of running water and/or detergents.



1.5 Residual risks

The product is designed and built to ensure safe, reliable use. However, since it is intended for use with liquids that constitute a health hazard, the installation and maintenance staff must take great care and always wear regulation personal protective equipment.

During all work on the product, users must take care not to drop the mixer and must not underestimate the risks of burns, electrocution, drowning and suffocation or poisoning due to the inhalation of toxic gases.



To reduce the risks associated with lightning, the user is required to install any necessary and adequate lightning protection measures.

1.6 Intended use

These products are intended for use in municipal and industrial wastewater treatment plants, industrial processes and agriculture. They are able to mix, homogenise and suspend liquids with medium to low viscosity (< 500 mPas), maximum density 1100 kg/m³.

1.7 Using the mixer in sludge tanks

In sludge tanks where the depth of the contents varies, the sludge may deposit on the mast, preventing correct dismantling of the mixer. It is therefore important to check, with the tank totally or partially empty, for deposits on the mast and motor bracket.

1.8 Warranty cover

TSURUMI undertakes to repair or replace the product if failures are due to design, manufacturing and assembly defects and are reported to TSURUMI during the warranty period. The warranty does not cover failures due to:

- normal wear and tear;
- improper handling, installation and use;
- use with incorrectly connected control systems;
- work done by unskilled staff;
- use of non-genuine spare parts.

WARNING! Any modifications made to the product without the manufacturer's authorisation may cause hazards and lead to a deterioration in performance and loss of warranty cover.

1.9 Technical data

The product's technical data and characteristics are provided in the technical data sheet.

1.10 Operating conditions

For correct use, comply with the following operating conditions:

- Liquid/Ambient temperature: $0 \div 40^{\circ}\text{C}$
- pH value: $6 \div 14$
- Duty service: S1 operation (continuous operation), the mixer must always operate fully submerged
- Starts per hour mode: maximum 20 for motor with rated power P2 up to 10 kW, 15 for P2 over 10 kW

1.11 Acoustic pressure level

The mixer's acoustic pressure level when in operation is below 70 dB.

However, in some systems this threshold may be exceeded. Check the permitted acoustic pressure level in the environment where the product is installed to avoid breaching local legal requirements.

1.12 Dataplate

TSURUMI PUMP		SUBMERSIBLE MIXER TSURUMI AVANT	
MODEL	①		
VERSION	②		
U Δ	③	V	U γ
I Δ	④	A	I γ
P ₂	⑤ kW	⑥	⑦ Hz
N _{mot}	⑧ min ⁻¹	⑨	⑩ mm
T _{AMB MAX.}	⑪ °C	⑫	⑬ kg
IEC 60034-1	⑭	Class I	⑮
TSURUMI MFG.CO.,LTD.	No. ⑯	Built in motor protector	
MADE IN ITALY			

- | | |
|--|----------------------------|
| ① Mixer model | ⑪ Motor rpm |
| ② Version | ⑫ Propeller rpm |
| ③ Voltage and current (delta connection) | ⑬ Propeller diameter |
| ④ Voltage and current (Y connection) | ⑭ Max ambient temperature |
| ⑤ Motor power output | ⑮ Weight |
| ⑥ Motor phases | ⑯ Year of manufacture |
| ⑦ Frequency | ⑰ Motor reference standard |
| ⑧ Duty type | ⑱ IEC protection class |
| ⑨ Enclosure protection rating | ⑲ Max immersion depth 20m |
| ⑩ Motor insulation class H | ⑳ Serial number |

1.13 Mixer model

MMR 2 1 N F 4 1.5 D -5

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

- | | |
|---|---|
| ① Name of the Series | ⑤ Material
F: Cast Iron
R: Stainless Steel |
| ② Propeller Diameter (mm)
2: Ø200
3: Ø300
4: Ø400
6: Ø650 | ⑥ Motor poles |
| ③ Type of Propeller
1, 2, 3, 4, 5 | ⑦ Rated Motor Output Power (kW) |
| ④ With or Without Guide Ring
N: Without
G: With | ⑧ Drive Type
D: Direct
Gxxx: Gear Drive + Ratio (G072= gear with 7.2 ratio) |
| | ⑨ Frequency
-5: 50Hz
-6: 60Hz |

2. TRANSPORT AND STORAGE

2.1 Visual inspection

Make a visual inspection of the packaging for damage. Record any significant damage to the product in the transport documents. Inspect the product to ensure that there are no damaged or missing parts. If articles are missing, contact TSURUMI (or its dealer) or the forwarders. Remove the packaging materials and dispose of them as required by law. Take special care not to injure yourself with sharp tools and not to damage to the product, especially the electrical wiring. Check that the data on the dataplate are the same as those of the product ordered.



2.2 Handling and lifting

The mixer must be lifted and handled using a chain or sling secured to the handle on top, with suitable machinery (crane, hoist, etc.). Before lifting, make a note of the weight of the product stated on the dataplate and use certified slings, chains and hooks of suitable load capacity. Ensure that the mixer is firmly secured and cannot fall, rotate or swing. Do not stand close to the mixer during handling. Always wear personal protective equipment.

WARNING! Before attempting to lift or otherwise handle the individual components of the mixer, observe any local regulations that set limits for the weight of the components to be lifted manually by individuals, i.e. handled without the use of lifting equipment.

WARNING! NEVER handle the product by means of the power supply or signalling cables.

2.3 Storage

During storage, the mixer must be kept in a suitable place, out of the reach of children or those with diminished responsibility, suitably secured against falling and protected from damp, vibrations, dust and extreme temperatures (below -20°C/-4°F and above +60°C/140°F).

WARNING! If the mixer should freeze, do not use flames to remove the ice; immerse it in the liquid in which it is to be installed until it thaws out.

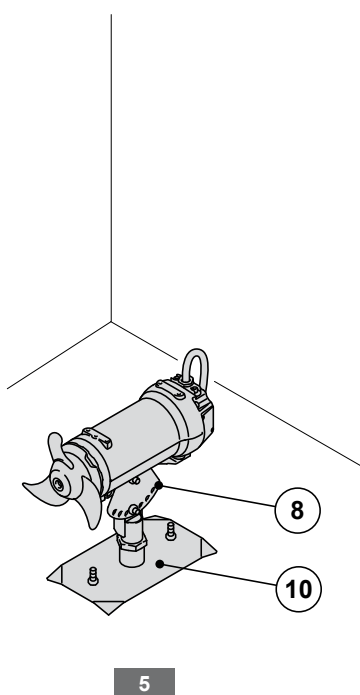
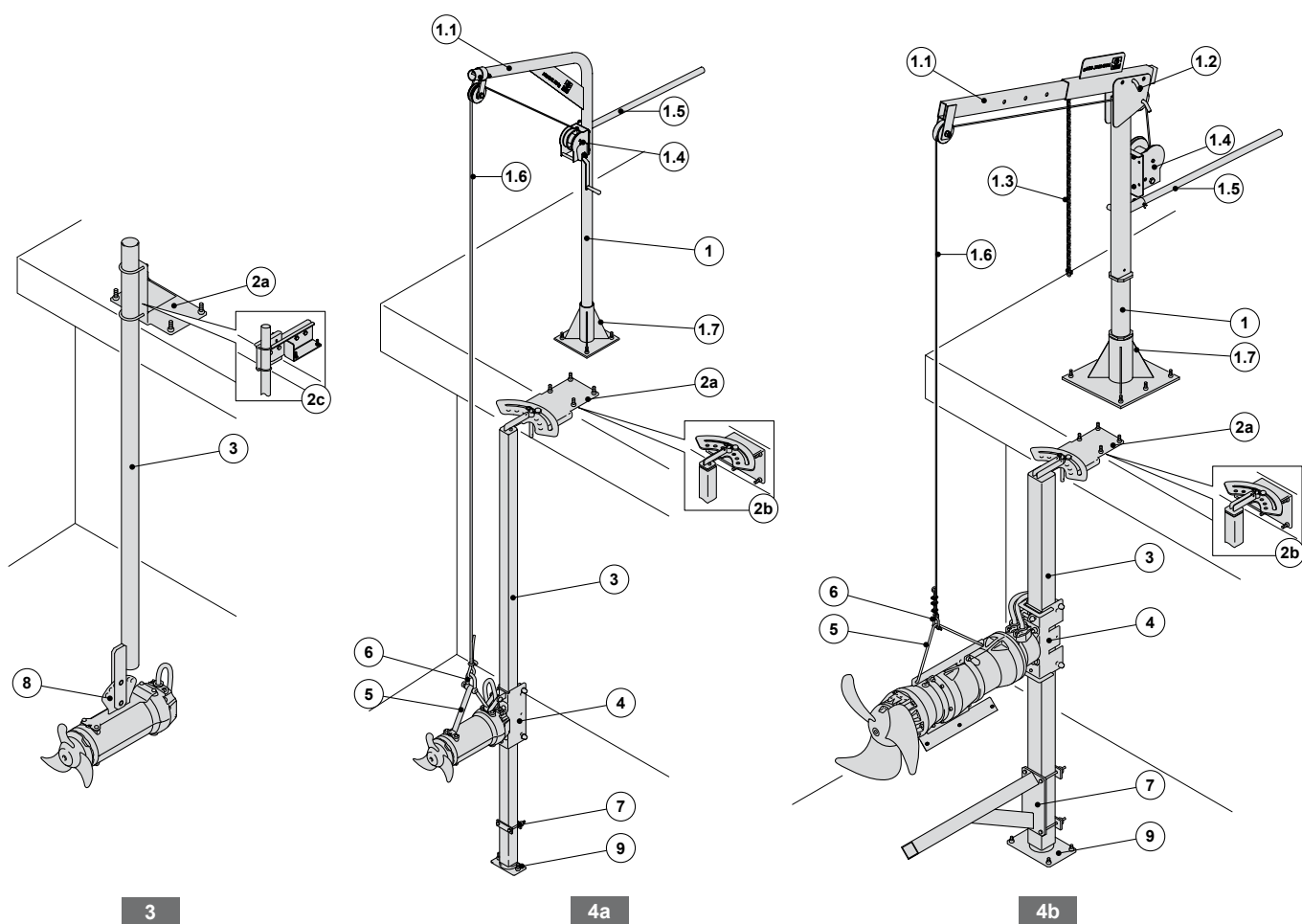
Turn the propeller by hand occasionally (at least every 2 months), to prevent the mechanical seals from sticking together. If the unit is stored in its original packaging, the pack will have to be opened to perform these rotations. If the unit is stored without the propeller, turn the shaft as instructed above.

WARNING! For storage periods longer than one year, the gearbox versions has to be filled completely with oil. The gearbox oil must be changed before using the stored machine.

2.4 Disposal

Properly dispose of the product by disassembling it, presorting the contents, and sending them to the waste material treatment site. Use the public or private waste collection service in accordance with the relevant local laws and regulations.

3. INSTALLATION DIAGRAM: PART NAMES



1	Crane
1.1	Crane arm
1.2	Fixing pivot of the crane arm
1.3	Service chain with hook
1.4	Winch
1.5	Rotation lever
1.6	Lifting cable
1.7	Crane basement
2a	Mast holder (for mounting on bridge)
2b	Mast holder (for mounting on wall)
2c	Inclinable mast holder (for mounting on bridge)
3	Mast
4	Motor bracket
5	Trap clamp
6	Shackle / Hook
7	Stop / Support fitting
8	Fan bracket
9	Bottom guide for mast
10	Base for bottom installation

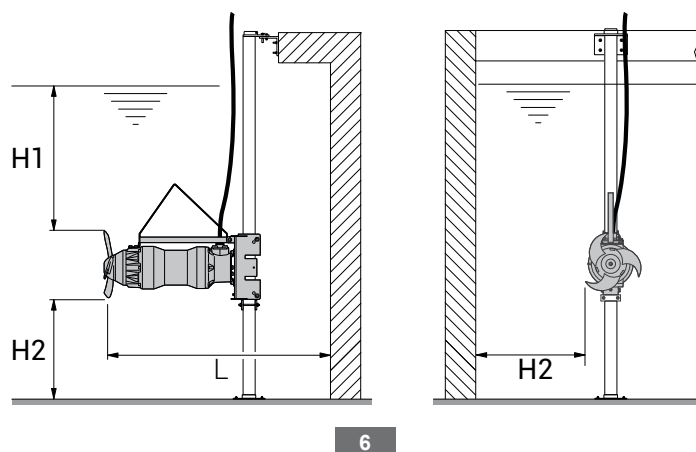
4. POSITIONING AND INSTALLATION



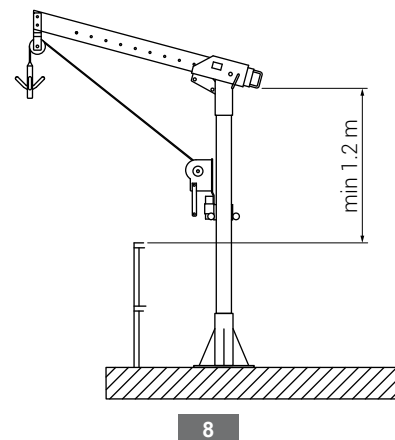
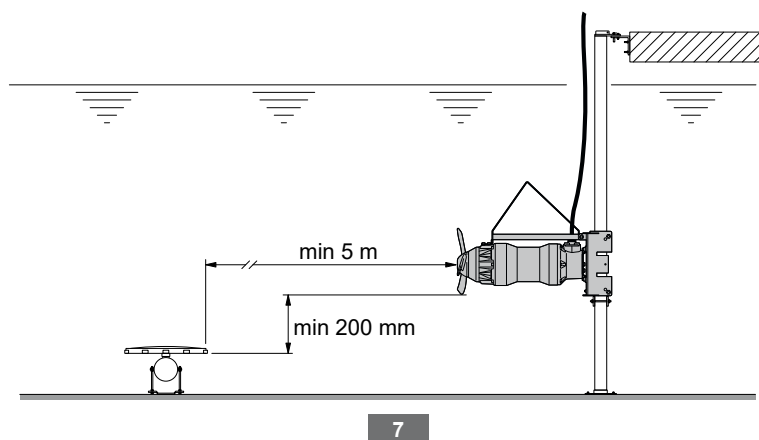
4.1 General concepts

- Installation of the mixer and connection to the electrical mains must only be carried out by a skilled technician.
- Always check that the motor is not connected to the electrical mains before doing any work on it.
- Place the mixer in such a way that a good mixing of the liquid in the entire tank is obtained. If more mixers are installed in the same tank, the mixers must not generate opposite flows.

WARNING! The unit must always be submerged, to ensure natural cooling of the motor and mechanical seals.



Ø Propeller mm	H1 _{min} mm	H2 _{min} mm	L _{min} mm
200	400	200	300
300	500	300	450
450	750	450	675
550	750	550	825
650	1000	650	975
800	1000	800	1200



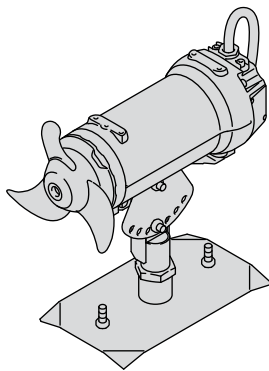
In tanks with aeration, an un-aerated area of at least 5 m must be provided on the bottom at each side of the unit.
The un-aerated area will ensure that the unit is able to operate correctly.

N.B. To allow the unit to be passed over the parapet, there must be a clearance of 1.2 m between the top edges of the parapet and the crane lifting point.

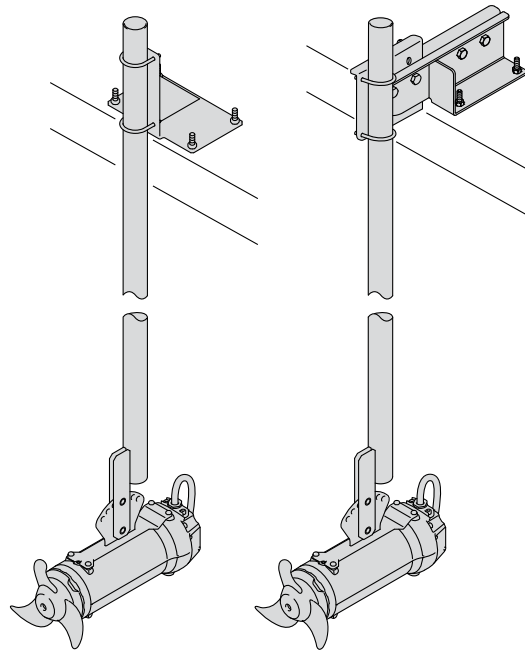
5. INSTALLATION



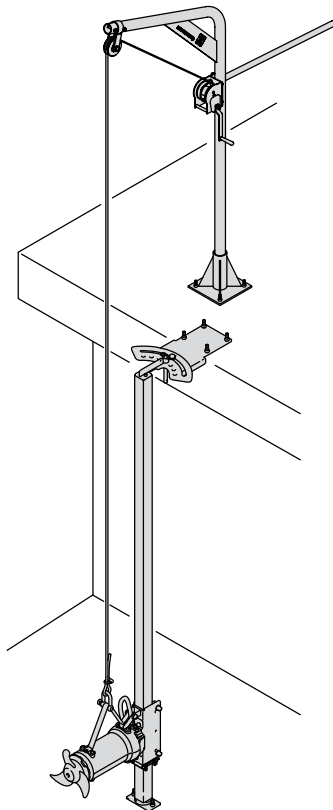
Once the unit has been installed in a closed tank, the tank access point must be closed so that people cannot fall in. Never leave the tank access point uncovered or unprotected.



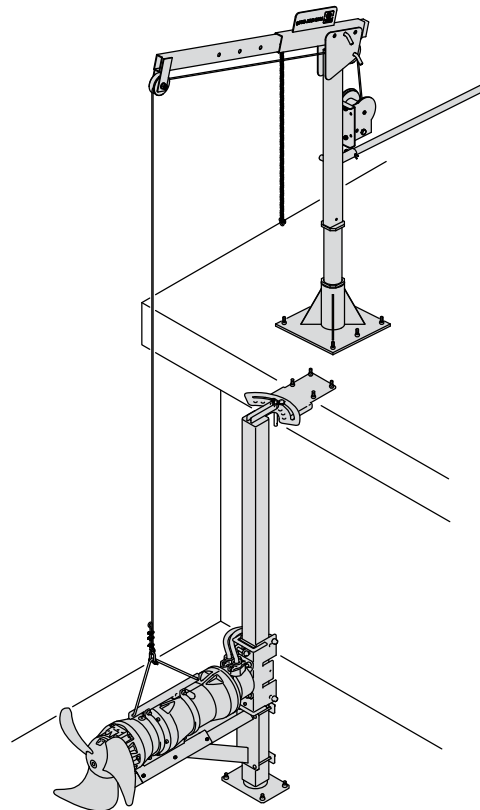
BOTTOM INSTALLATION



PENDULAR INSTALLATION

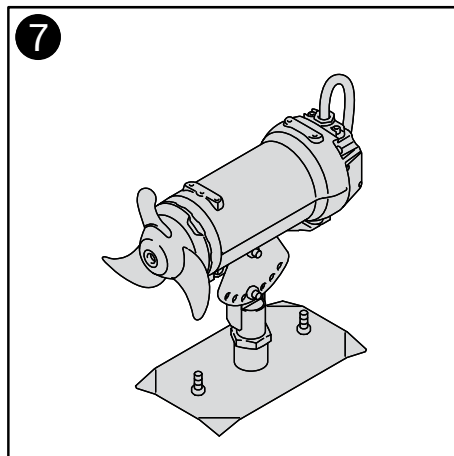
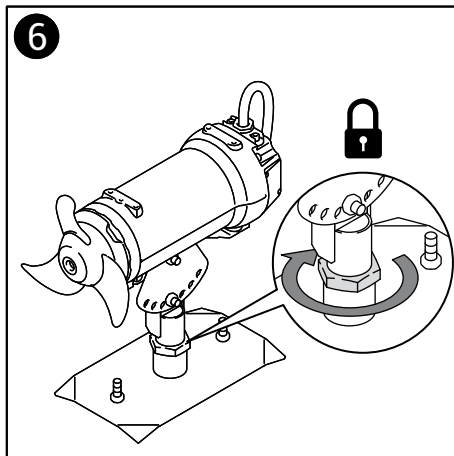
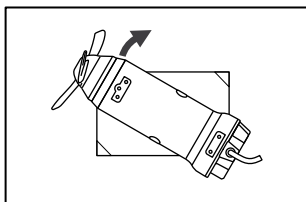
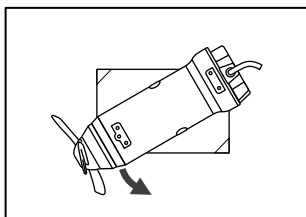
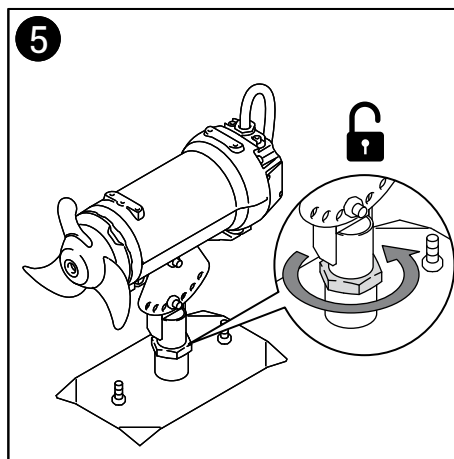
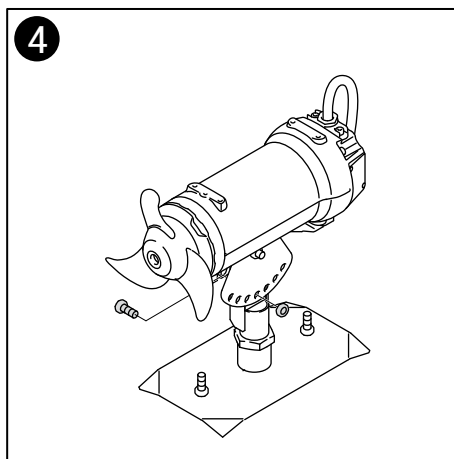
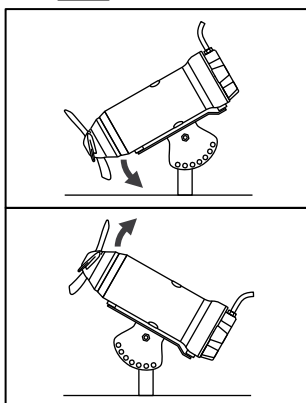
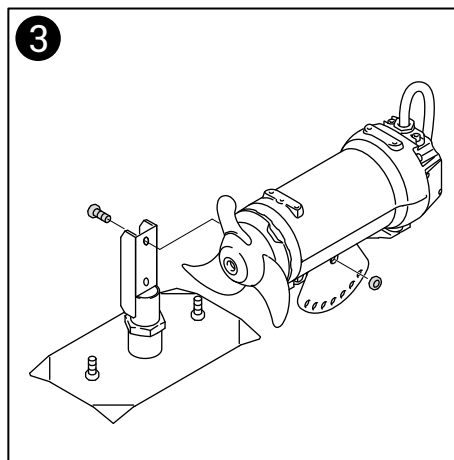
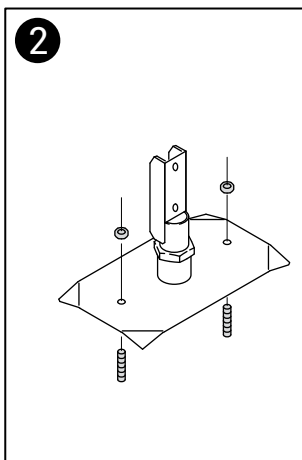
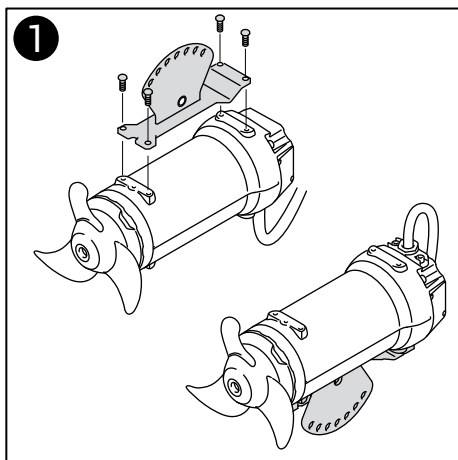


MAST 60x60 INSTALLATION

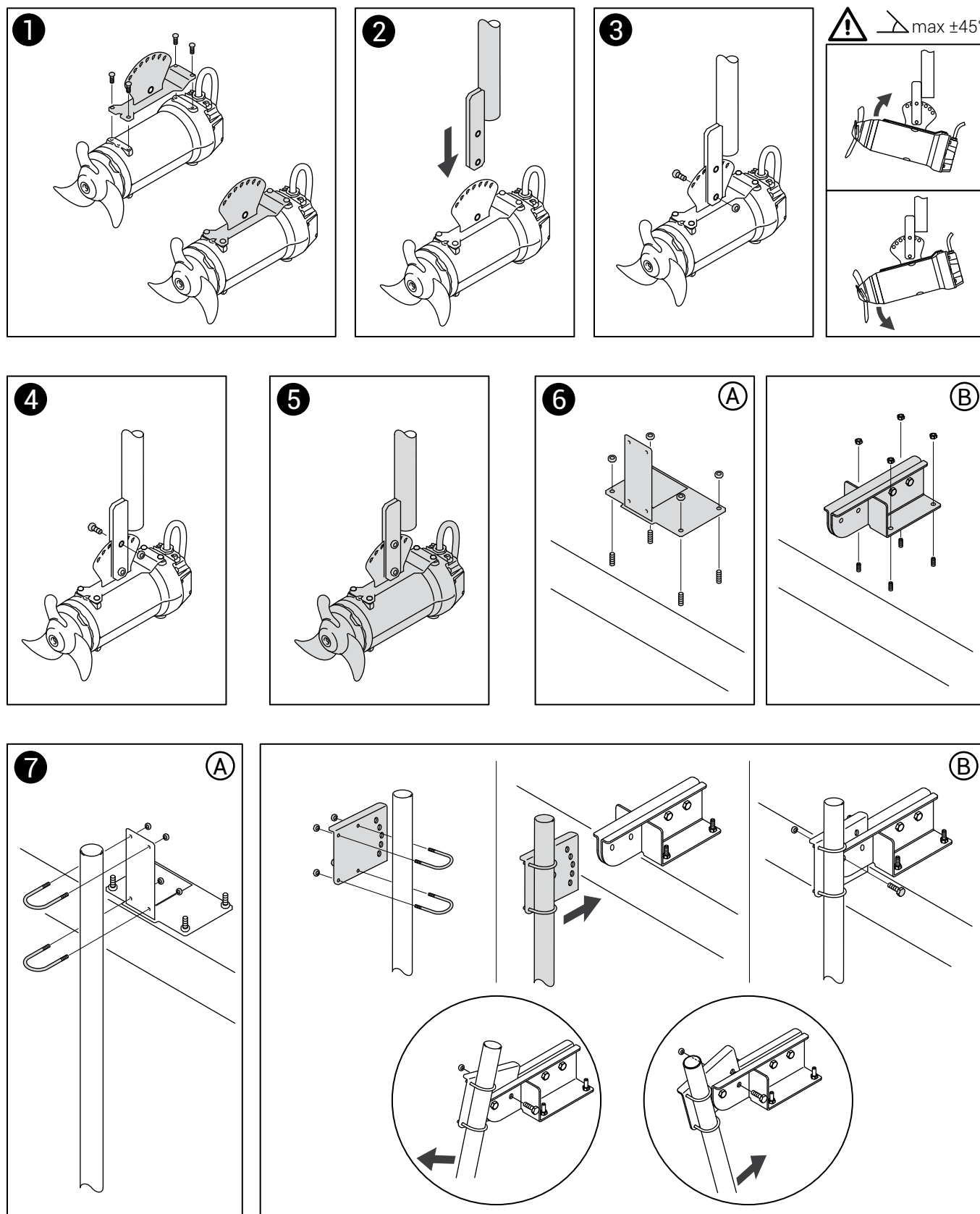


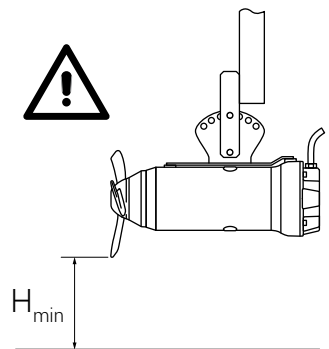
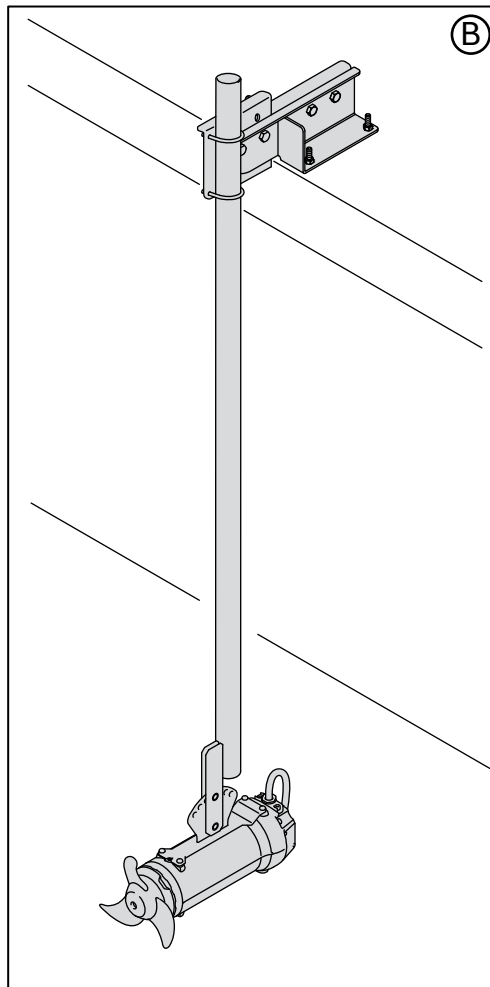
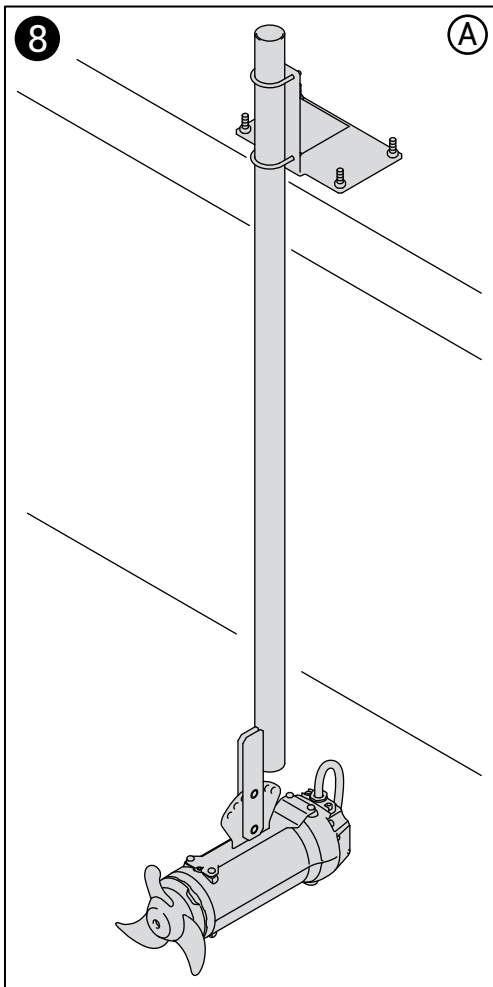
MAST 100x100 INSTALLATION

5.1 BOTTOM INSTALLATION

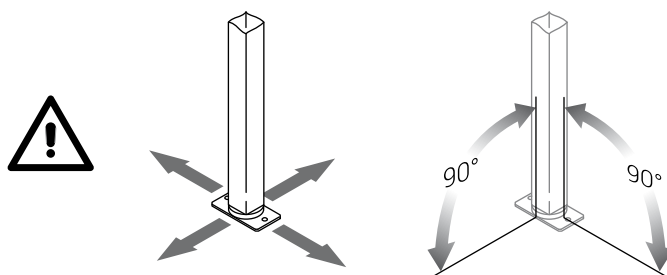
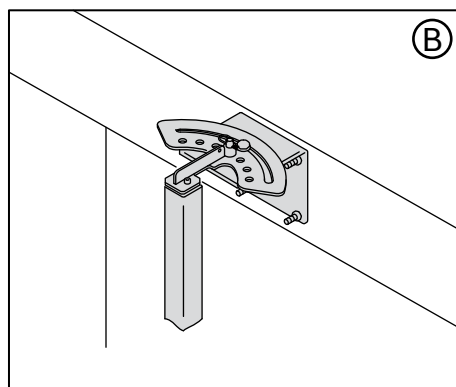
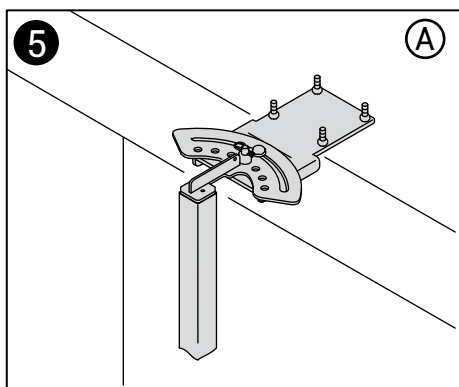
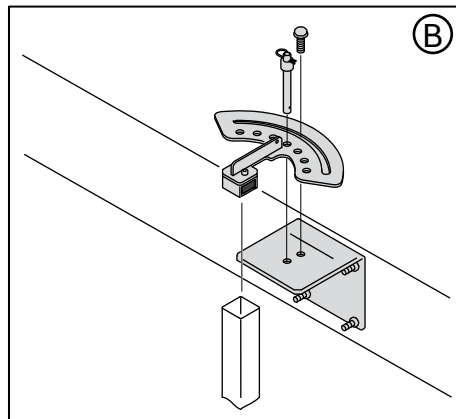
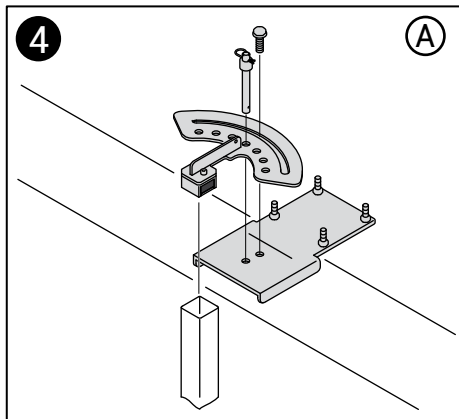
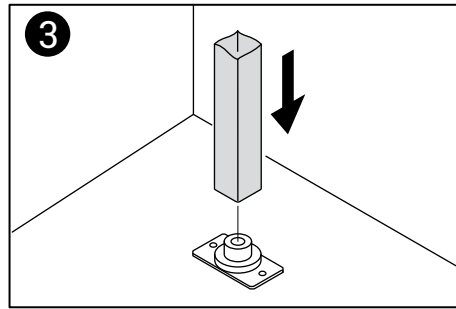
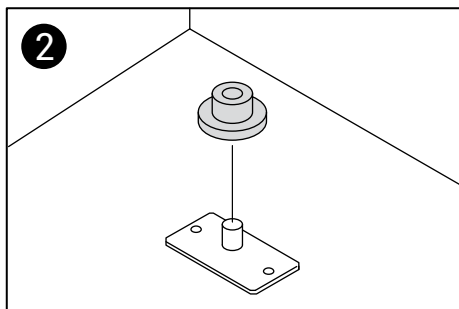
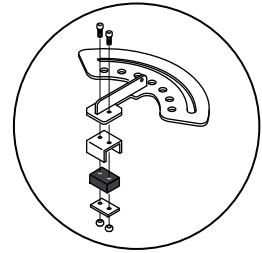
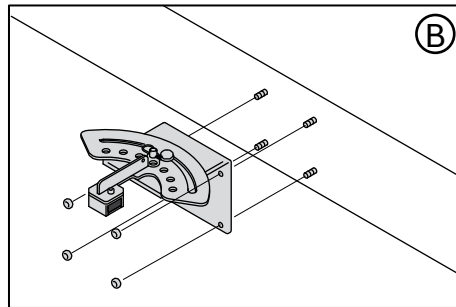
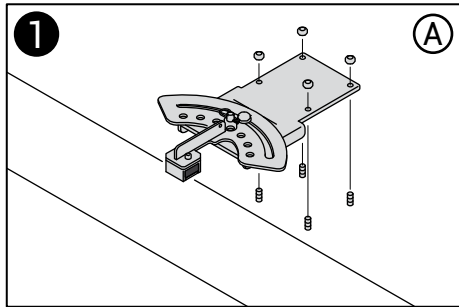


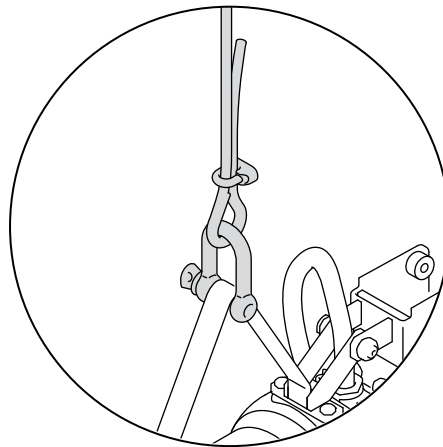
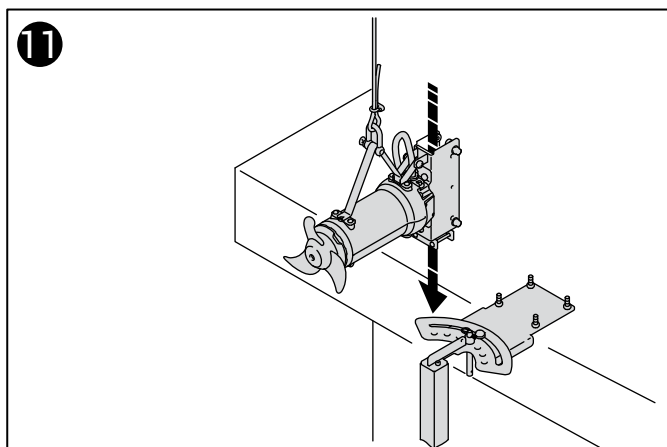
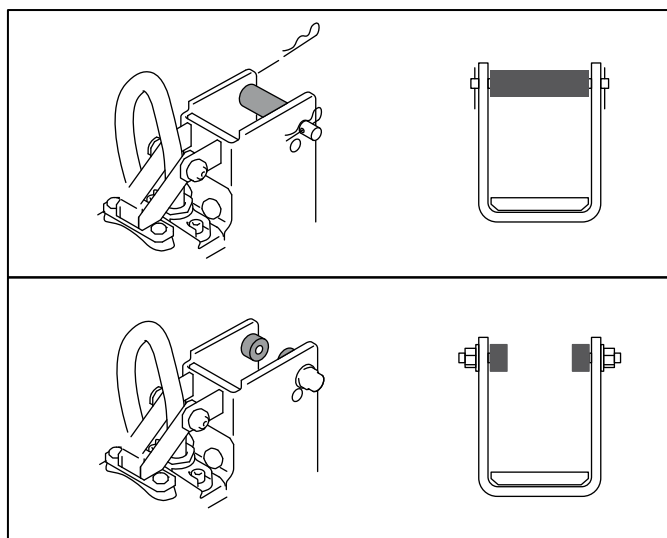
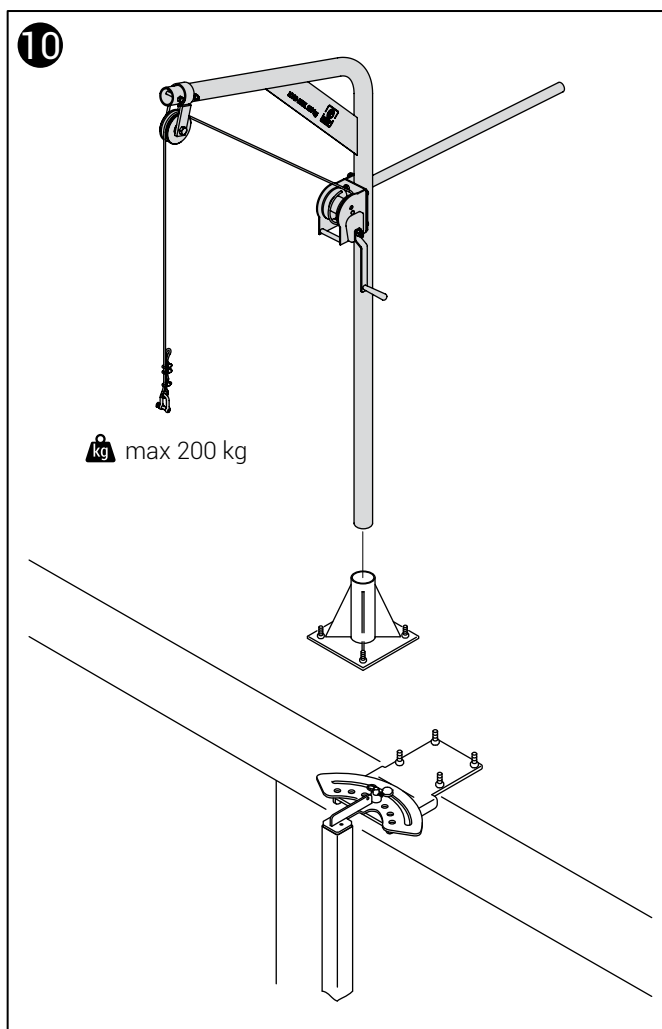
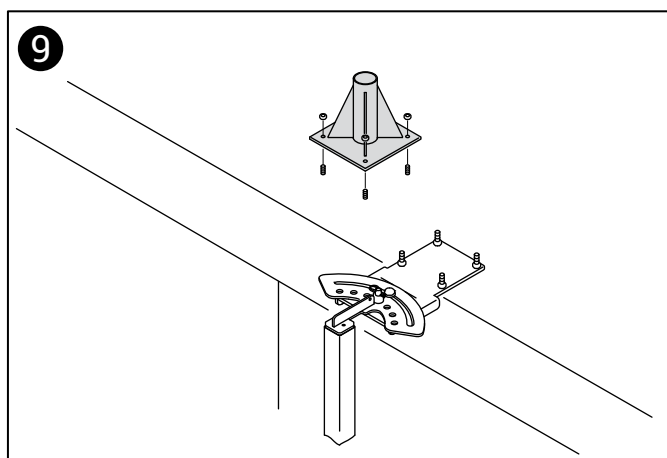
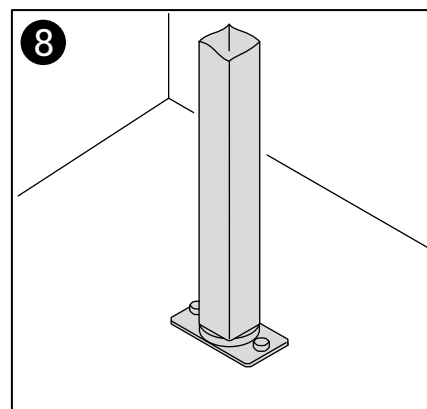
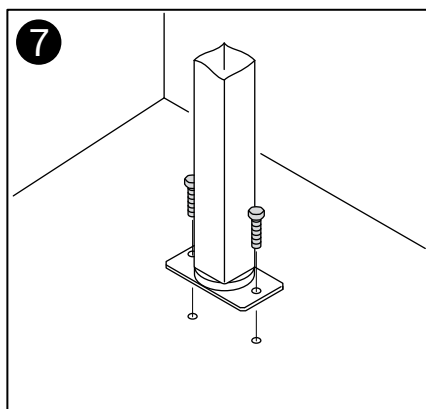
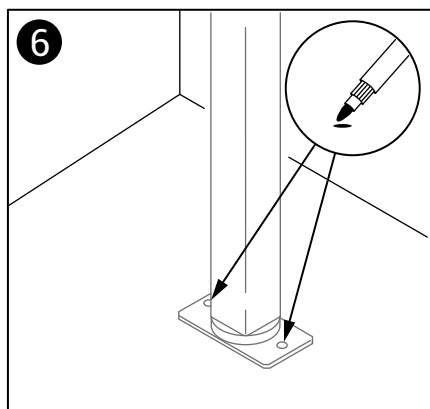
5.2 PENDULAR INSTALLATION

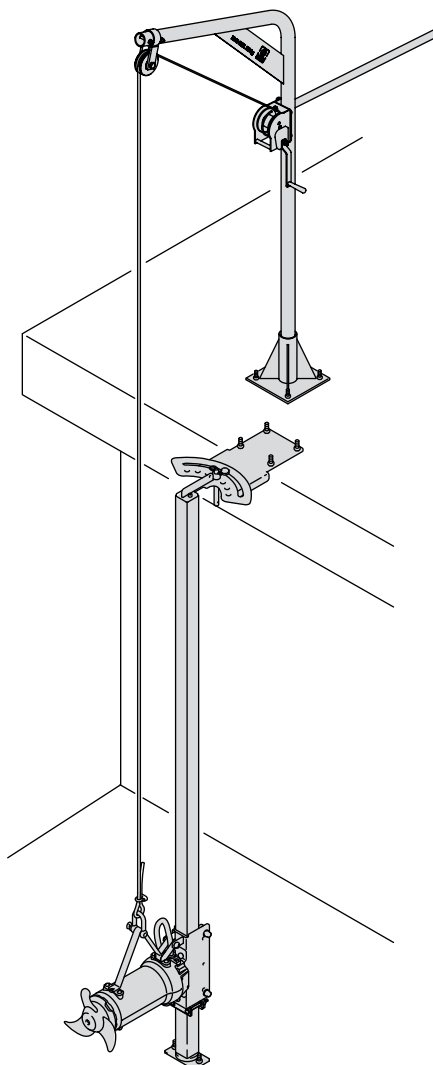
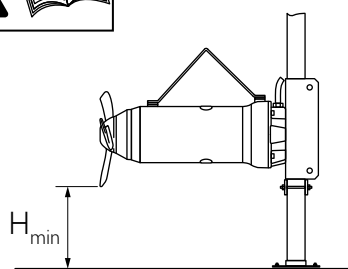
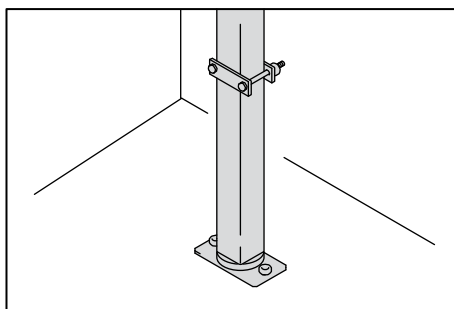
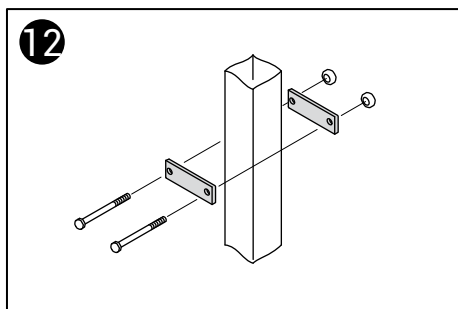




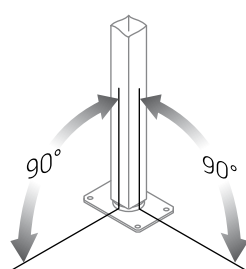
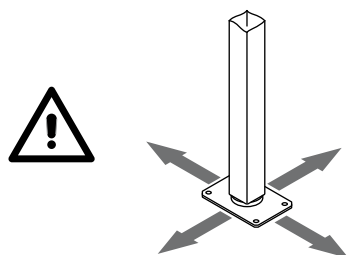
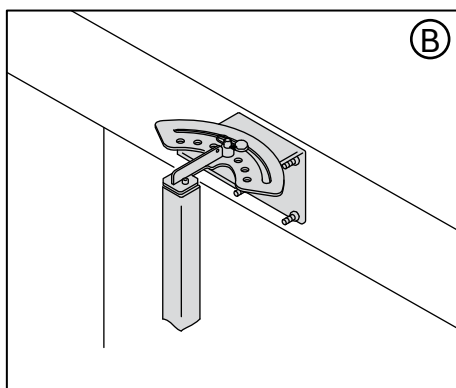
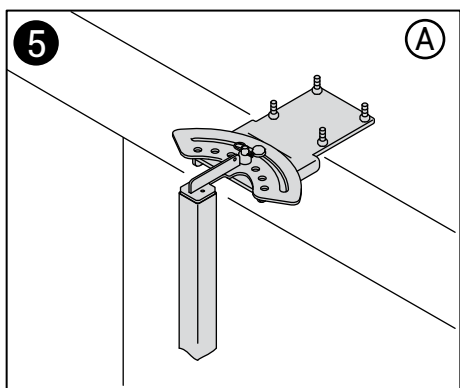
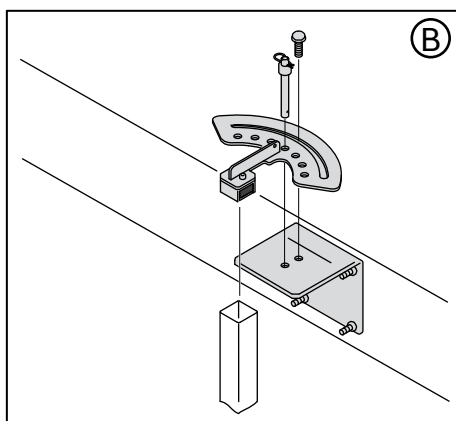
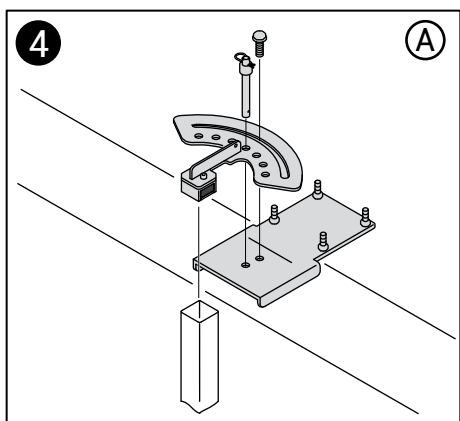
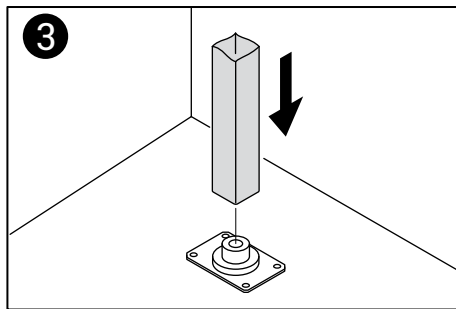
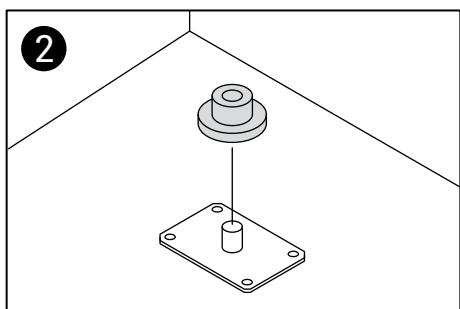
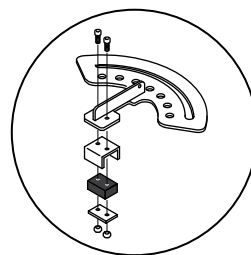
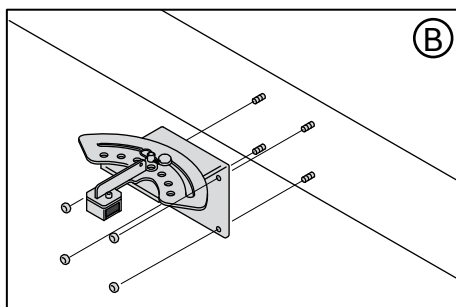
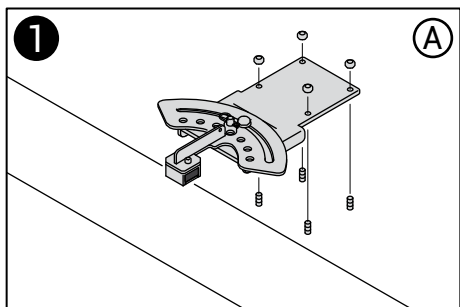
5.3 MAST 60x60 INSTALLATION

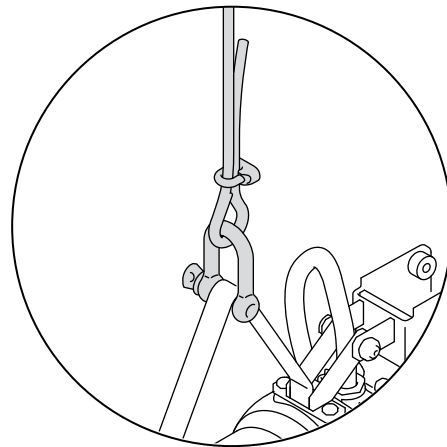
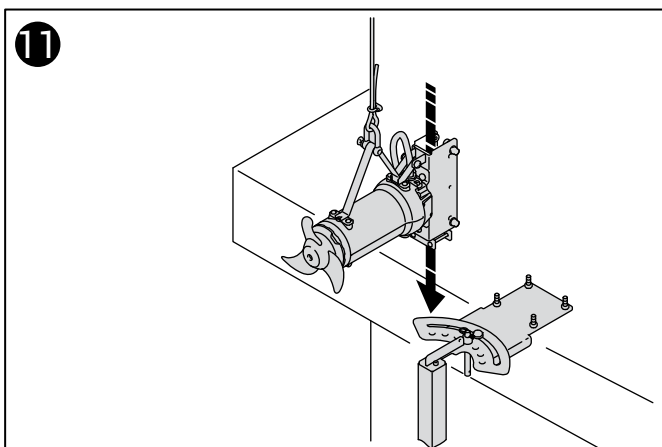
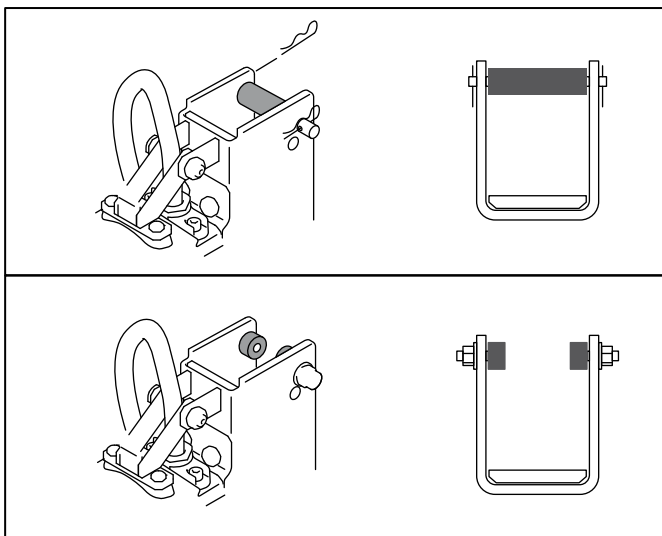
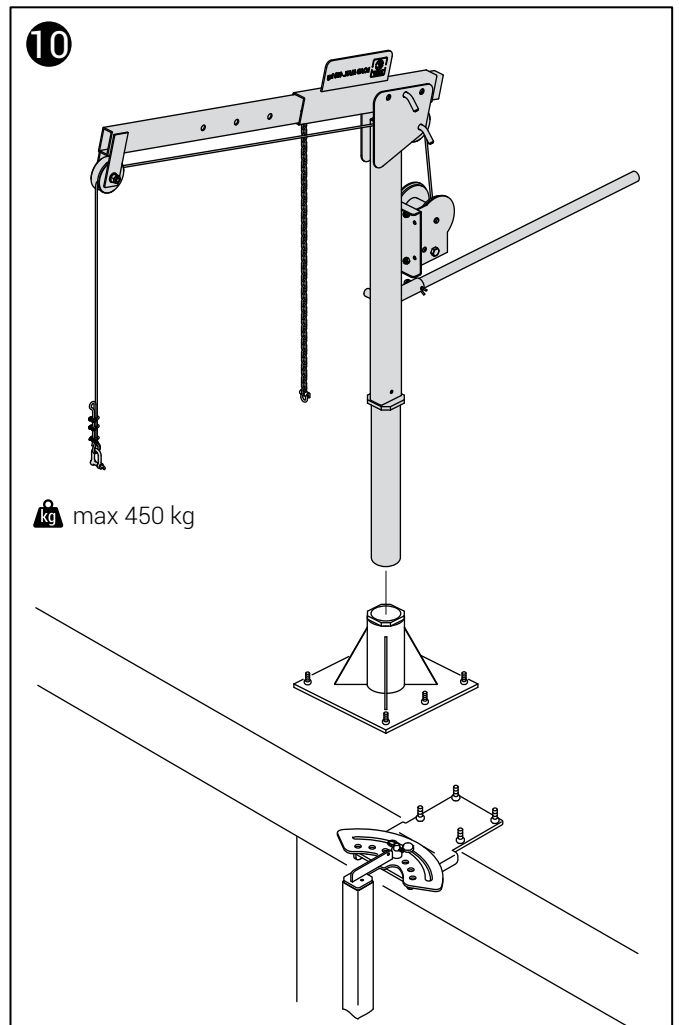
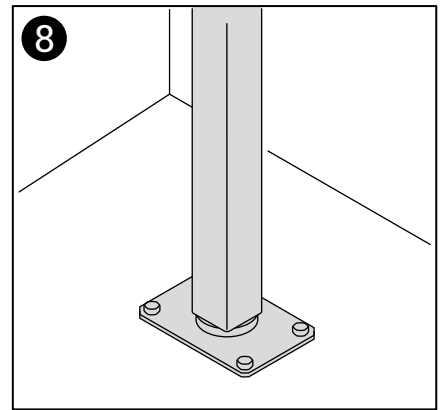


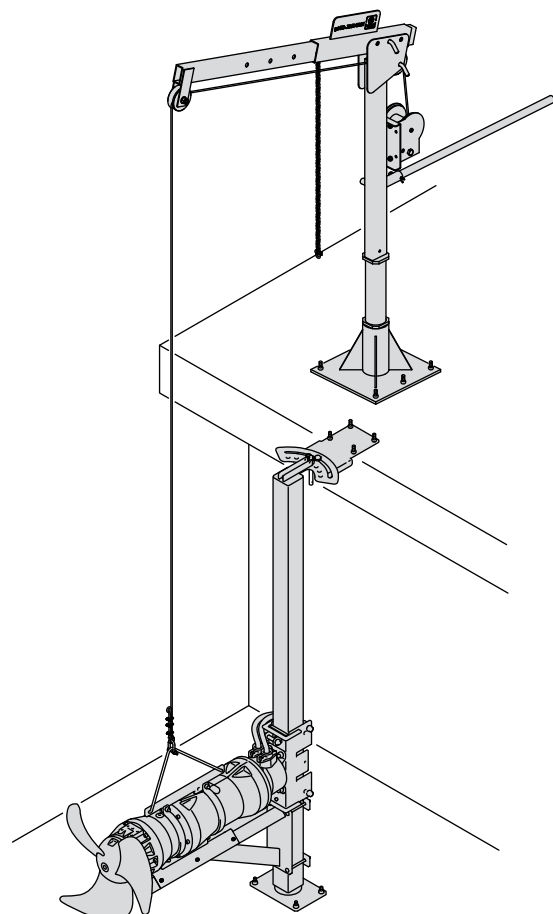
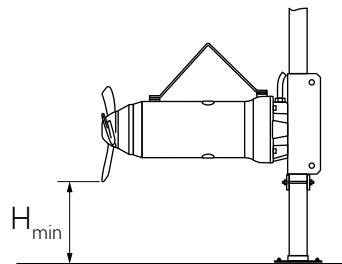
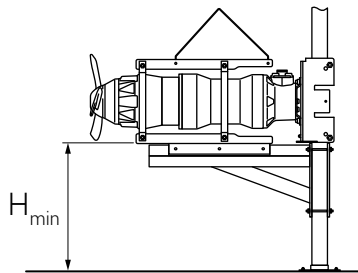
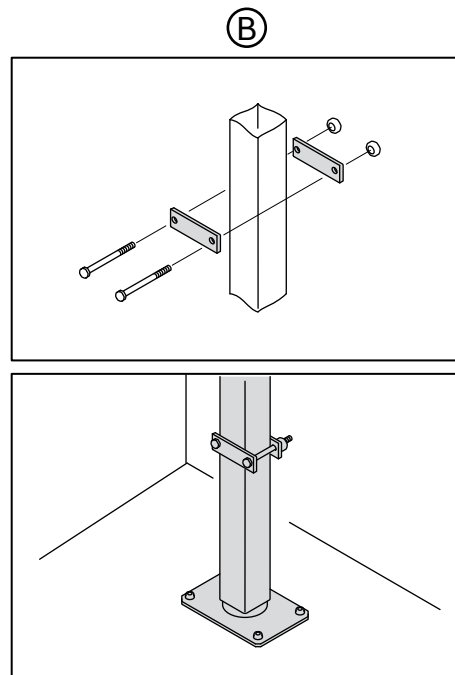
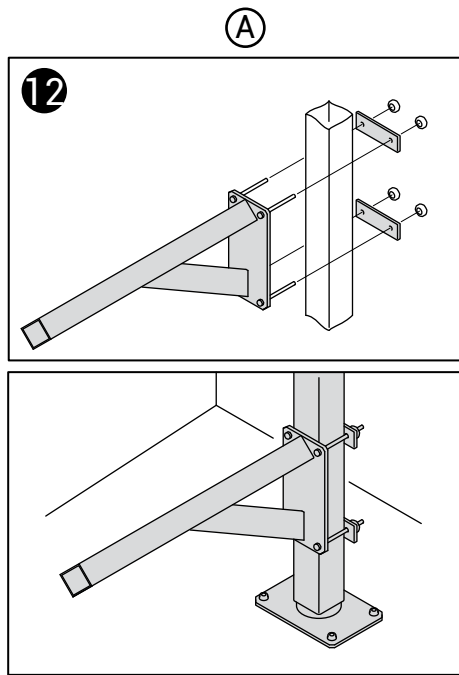




5.4 MAST 100x100 INSTALLATION







6. ELECTRICAL CONNECTIONS



6.1 General safety precautions

- All the procedures involved in connecting the unit to the electrical mains must be carried out by skilled staff in accordance with the relevant legal requirements: incorrect electrical connections may cause fires and an electrocution hazard, or the risk of damage to the product;
- Before putting the unit into service, make sure that electrical protection measures have been adopted (e.g. ground connection, residual current devices, etc.) in accordance with all relevant local and/or national regulations, laws and standards and that the skilled electrician has certified that the system is operating correctly;
- Check that the insulation resistance of the motor is 20 Mohm minimum (reference value based on new mixer, refer to point "9. Troubleshooting guide" for mixer that has already been put into service);
- Check that the unused conductors are properly insulated and fixed in the electrical panel;
- Before installation, make sure that the power supply line voltage and frequency are as stated on the nameplate and that the power absorption of the mixer is below the maximum current the system is able to deliver;
- The maximum voltage variation allowed for rated value is $\pm 5\%$;
- Voltage unbalance between phases: max 2%;
- The fuses and protective cut-outs must be of suitable rating for the system's characteristics;
- Protect the mixer motor using an overload cut-out suitable for the electrical data provided on the nameplate.;
- Make sure that the thermal protection and leakage detector devices are properly connected: apart from leading to forfeiture of warranty cover, failure to connect the protection devices may cause hazardous situations or damage to the motor;
- The electrical operation and safety of TSURUMI mixers are guaranteed for the configuration supplied by the manufacturer: any changes (e.g. addition of extra lengths of cable to the original power lead) may cause a deterioration in the mixer's characteristics.

WARNING! Before installation and the first startup, make sure that the electrical cables are not damaged in any way to avoid short circuit. All damaged cables must be replaced. Contact TSURUMI or an Authorised Service Centre

WARNING! Before making any electrical connections, make sure that the fuses have been removed or the mains switch has been switched off. It must be ensured that the power supply cannot be accidentally switched on.

6.2 Wiring

- Make sure that the electrical cables have not be exposed to damp and/or immersed in water;
- The cable's free terminals must be connected to a control panel with a degree of insulation suitable for the installation environment;
- Secure the electric cables so that they cannot be twisted, torn and/or crushed;
- If the cable is damaged, do not replace it; contact TSURUMI or an Authorised Service Centre;
- Do not underestimate the problems caused by voltage drops.

WARNING! The power cable must be fixed in such a way that it cannot be caught in the propeller during operation.

6.3 Ground connection

All electrical equipment must be connected to ground. Check that the ground wire is correctly connected. Check regularly that the ground system and residual current device are in good working order.

Check that the ground conductor is about 150 mm longer than the other conductors so that it will be the last to become disconnected from the panel in the event of accidental tugs.

Be sure to provide a ground wire securely. Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or telephone ground wire. Improper grounding could cause electrical shock.

6.4 Thermal protection

The equipment is equipped with thermal protectors inside the stator windings to shut down the power supply in case of motor overheating. The standard thermal protection consists of bimetal thermal protectors (normally closed) with nominal switching temperature NST=150°C; as option, bimetallic protectors can be replaced by PTC thermistors or PT100 sensors.

The thermal protection cables are marked with a label stating **TP** = THERMAL PROTECTION and must be connected to the corresponding terminals of the control panel.

6.5 Leakage detector

The mixer can be equipped with a single-electrode leakage detector as an accessory to detect and signal the infiltration of water into the oil chamber of the mechanical seals (the equipment grounding conductor is used as the return path for the conductive level limit detection).

In the case of detection (electric resistance in the water / oil mixture less than 30 k Ω) take out of service the mixer and proceed with maintenance. The signal cable is marked with a label with the letter **S**.

6.6 Electrical connections (standard version)

To make the electrical connection to the mixer, proceed as follows:

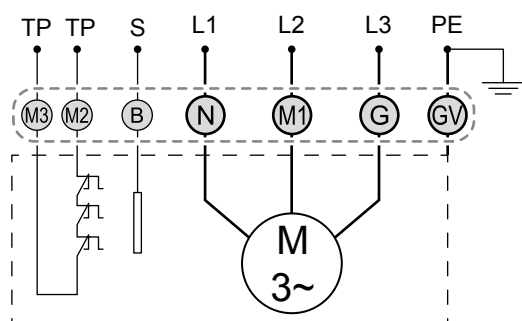
1. Check the type of electrical connection required on the dataplate (direct-on-line or Y/D starting);
2. First connect the ground conductor to the relative control panel terminal in accordance with the wiring diagram;
3. Connect the power supply conductors to the relative control panel terminals in accordance with the wiring diagram;
4. Connect the control device conductors to the terminals of the relative panel.

N.B. Comply carefully with the connections shown in the electrical panel diagram.

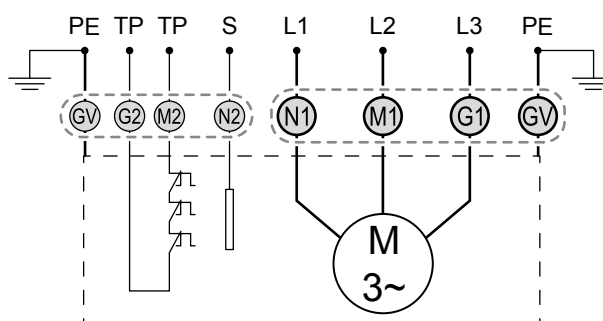
For Non-standard sensors and protective devices please refer to the specific documentation supplied with the unit.

6.7 Wiring diagrams

DIRECT-ON-LINE - STANDARD cable

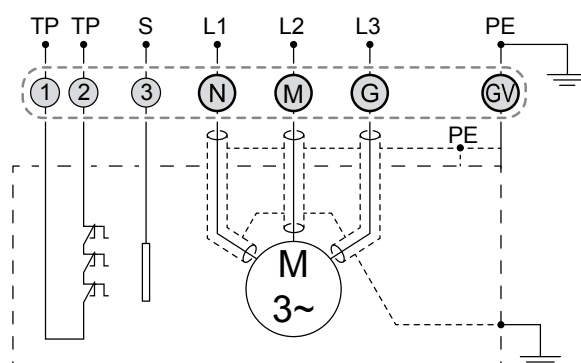


(4G₋ + 3x1) cable



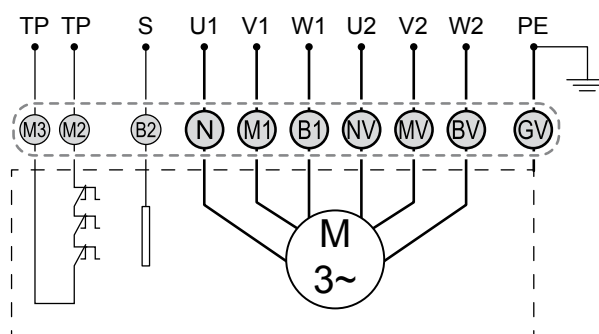
(4G1.5) cable + (4G₋) cable

DIRECT-ON-LINE - SCREENED cable



(3x₋ + 3x₋ /3E + 3x1.5 ST) cable

Y/Δ - STANDARD cable



(7G₋ + 3x1) cable

L1 - L2 - L3	U1 - U2 V1 - V2 W1 - W2	TP	S	PE
Three-phase power supply	Motor terminals	Thermal protection	Leakage detector	Ground

Cable colors (S1RN8-F standard cable, NSSHÖU screened cable)

(N) Black	(M) Brown	(G) Grey	(B) Blue
(GV) Yellow/Green	(BV) Blue/Green	(MV) Brown/Green	(NV) Black/Green

NOTE: In case of discrepancies of the wires color, contact the dealer where this equipment was purchased, or the TSURUMI sales office in your area.

7. START-UP

7.1 General inspection

Before you start the mixer, the following requirements must be met:

- There is oil in the mechanical seals oil chamber (see point 8.7).
- There is oil in the gearbox housing (gear drive versions) (see point 8.7).
- The machine is fixed to the installation system.
- The monitoring equipment incorporated in the product is correctly connected.

7.2 Checking the propeller rotation direction

Before making the definitive electrical connection, a skilled technician must make sure the propeller rotation direction is correct.

Start the motor briefly to check the direction of rotation.

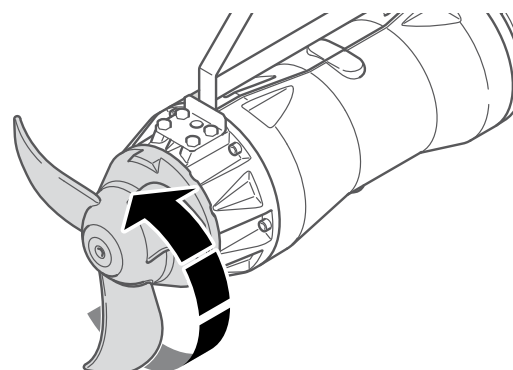
The correct direction of propeller rotation is counterclockwise when you look at the mixer from the propeller side.

The liquid must be pushed towards the front of the unit.

The illustration shows the correct direction of rotation (**Fig. 9**).

If the propeller is rotating in the wrong direction, interchange two phases of the mains supply (L1, L2, L3) and try again, repeating the procedure described.

Once the connection which provides the correct rotation direction has been obtained proceed with definitive installation.



9

7.3 Starting the unit

Once installation is complete, the system should be tested to ensure that it is fully operational.

Use an ammeter to check that the power absorption is within the limit stated on the dataplate. Check that the voltage is correct.

8. MAINTENANCE AND SERVICE

Regular maintenance and inspections are indispensable to maintaining the mixer's performance. For this reason, the complete unit should be cleaned thoroughly on a regular basis, maintained and inspected.

If the mixer behaves differently from its normal operating condition, refer to section "9. Troubleshooting guide" of this manual and take appropriate measures at an early stage.

Do not use the mixer if malfunctioning because sudden failure of the rotating parts may cause hazardous situations or damage to the motor.

Interval	Inspection Item
Weekly	Measuring the operating current: to be within the rated current.
	Measuring the power supply voltage: within $\pm 5\%$ of the rated voltage
Monthly	Inspecting the mixer: • If the mixer's performance has diminished significantly, the propeller may be worn or the propeller may be clogged with debris. Remove any debris and replace the part if it is worn. • Inspecting cables: refer to section 8.4 "electric cable inspection" • Measuring the insulation resistance: Insulation resistance reference value = 1 MΩ minimum <i>NOTE: The motor must be inspected if the insulation resistance is considerably lower than the last inspection.</i>
Semi-yearly	Inspecting oil (mechanical seal and gearbox): 3,000 hours or 6 months, whichever comes first. If the oil contains water, inspect mechanical seal. Refer to section 8.6 "Oil inspection".
	Cleaning and inspection of the lifting equipment:
	check winches, hooks and chains for signs of failure or wear and corrosion. Clean or lubricate them if necessary and replace any damaged components. Remove if foreign object is attaching to it.
	Verify that the bolts, nuts and screws are properly tightened. When tightening, renew the threadlocker if necessary.
Yearly	Check the screws in the bottom fixation guide or base every time the tank is empty.
	Inspecting mechanical seals, bearings, wearing parts.
Once every 2 years or 9000 hours for heavy duty	<i>NOTE: rubber parts need to be replaced if disassembled during inspection</i>
	Changing oil
	<i>NOTE: Refer to section "Oil inspection and change procedures" for further details.</i>
Once every 2 to 5 years	Changing the mechanical seals
	<i>NOTE: The inspection and replacement of the mechanical seals requires specialized equipment. To have this operation performed, contact the dealer where this equipment was purchased, or the Tsurumi sales office in your area.</i>
Once every 2 to 5 years	Overhaul:
	The mixer must be overhauled even if appears normal during operation. Especially, the mixer may need to be overhauled earlier if it is used continuously.

NOTE: shorter intervals may be required when the operating conditions are extreme, for example with very abrasive or corrosive applications.



8.1 General safety precautions

- Before starting any work on mixers used in liquids which could constitute a hazard to health, carry out thorough cleaning and venting of mixer, tank, etc. according to local regulations;
- Before cleaning and/or maintenance procedures, a skilled technician must disconnect the mixer from the power supply and ensure that it cannot start up accidentally;
- Always disconnect the phase wires first and then the yellow-green ground wire;
- Ensure that the mixer cannot fall or roll, causing injury or damage;
- After prolonged use, the surface of the mixer may become very hot: allow it to cool sufficiently to avoid burns;
- Always comply with the safety regulations in force in the place of installation, any local regulations and the dictates of common sense.

WARNING! The instructions for inspection and maintenance must never be viewed as “Do-It-Yourself” procedures; they require specific technical knowledge.

NOTE: The inspection and replacement of spare parts require specialized equipment. To have this operation performed, contact the dealer where this equipment was purchased, or the TSURUMI sales office in your area.

8.2 Cleaning

Remove any debris attached to the mixer's surface, and wash the mixer with tap water. Pay particular attention to the propeller area, and completely remove any debris from the propeller.

WARNING! If the mixer will not operated for a long period of time, pull the mixer, wash the mixer, allow it to dry, and store indoors (see chapter 2.4). For reinstallation, be sure to perform a trial operation before putting the mixer into operation. If the mixer remains immersed in water, operate it on a regular basis (i.e. once a week).

8.3 Electric cable inspection

Check that the electric cable is intact with no signs of pulling, cuts or other signs of misuse. A faulty cable may enable liquids to enter the unit and may cause electrical leakage, short circuit, electrical shock or fire.

Check that the cable gland is intact. Faulty parts must be replaced immediately.

8.4 Mixer exterior inspection

Verify that there is no damage, and that the bolts, nuts and screws are properly tightened. Tighten screws with correct tightening torques (see chart 1). When tightening, renew the threadlocker if necessary.

8.5 Bearings inspection

All bearing are rolling element type grease lubricated for life. Check the shaft noisy or heavy operation (turn the shaft by hand) and in case, replace the defective ball bearings.

8.6 Oil inspection and changing procedure

Place the mixer in a horizontal position on supports, and place a vessel underneath to collect oil.

WARNING! Possible excess pressure in the oil chamber: take care when unscrewing the oil plug

Mechanical seals oil

1. Remove the oil plug (pos. A);
2. Drain oil into a vessel and leave it there for approx. 15 minutes to check if it contains water. If the oil contains water, a likely cause is defective mechanical seal, which requires that mixer be disassembled and repaired;
3. Fill mechanical seal chamber with new oil (for quantity see the charts below);
4. Clean and refit the oil plug (pos. A). Use Loctite 243 threadlocker.

Oil type: TOTAL Bio Hydraulic TMP FR46 or equivalent

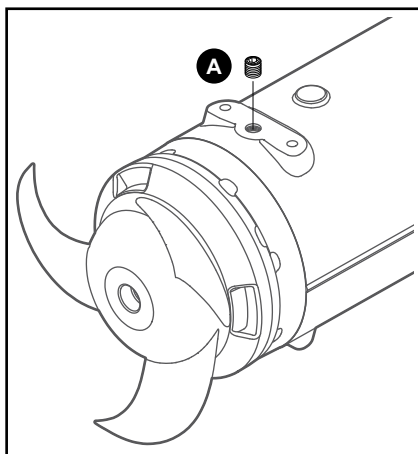
Gear box oil

Remove the oil plug (pos. B).

1. Drain oil into a vessel and leave it there for approx. 10 minutes to check if it contains water. If the oil contains water, a likely cause is defective mechanical seal, which requires that mixer be disassembled and repaired;
2. Fill oil into the gear box chamber with new oil (for quantity see the charts below);
3. Clean and refit the oil plug (pos. B). Use Loctite 243 threadlocker.

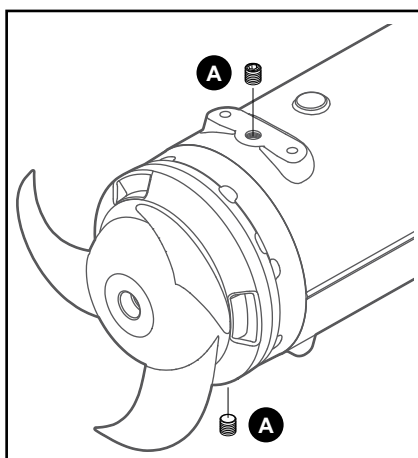
Oil type: CASTROL ALPHA SP 220 or equivalent with ISO viscosity grade 220.

NOTE: the drained oil must be disposed of in accordance with local regulations.



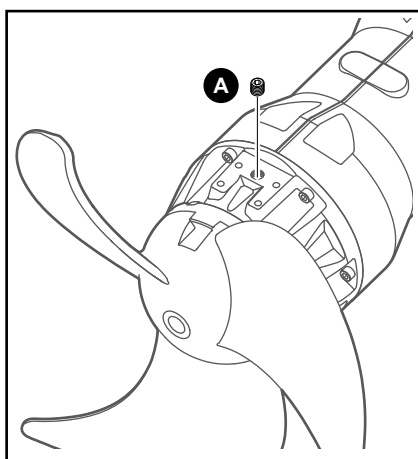
Model	P2 (kW)	Poles	Ø propeller	Reduction ratio	Oil Q.ty (litres)	
					Mech. seals	Gear- box
MMR21NF4.75D-5	0.75	4	200	-	0.3	-
MMR22NF41.1D-5	1.1	4	200	-	0.3	-
MMR23NF41.5D-5	1.5	4	200	-	0.3	-

Oil plug	
Mechanical seals chamber	Gearbox
A	-



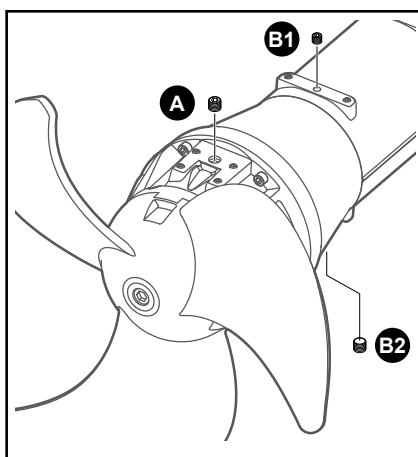
Model	P2 (kW)	Poles	Ø propeller	Reduction ratio	Oil Q.ty (litres)	
					Mech. seals	Gear- box
MMR33NF61.5D-5	1.5	6	300	-	0.44	-
MMR31NF61.5D-5	1.5	6	300	-	0.44	-
MMR32NF62.2D-5	2.2	6	300	-	0.44	-
MMR34NF63.0D-5	3	6	300	-	0.65	-
MMR35NF63.2D-5	3.2	6	300	-	0.65	-

Oil plug	
Mechanical seals chamber	Gearbox
A	-



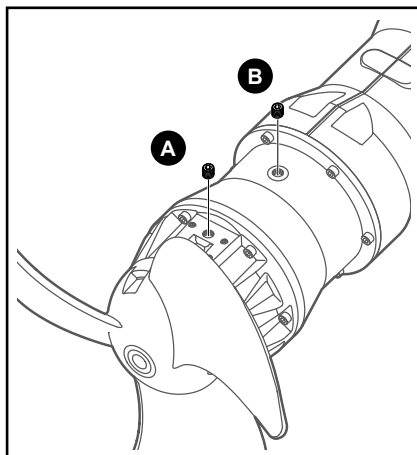
Model	P2 (kW)	Poles	Ø propeller	Reduction ratio	Oil Q.ty (litres)	
					Mech. seals	Gear- box
MMR45NF83.0D-5	3	8	400	-	1.47	-
MMR41NF83.0D-5	3	8	400	-	1.47	-
MMR42NF83.0D-5	3	8	400	-	1.47	-
MMR43NF84.0D-5	4	8	400	-	1.47	-
MMR44NF84.5D-5	4.5	8	400	-	1.47	-

Oil plug	
Mechanical seals chamber	Gearbox
A	-



Model	P2 (kW)	Poles	Ø propeller	Reduction ratio	Oil Q.ty (litres)	
					Mech. seals	box
MMR61NF44.0G072-5	4	4	650	7.2	2.3	2
MMR61NF44.0G066-5	4	4	650	6.6	2.3	2
MMR61NF45.5G058-5	5.5	4	650	5.8	2.3	2
MMR61NF45.5G054-5	5.5	4	650	5.4	2.3	2

Oil plug	
Mechanical seals chamber	Gearbox
A	B1 B2



Model	P2 (kW)	Poles	Ø propeller	Reduction ratio	Oil Q.ty (litres)	
					Mech. seals	Gear- box
MMR61NF47.5G049-5	7.5	4	650	4.9	2.3	2.1

Oil plug	
Mechanical seals chamber	Gearbox
A	B

8.7 Fasteners

For replacement purpose, the fasteners shall be Class A2-70, A2-80, A4-70 or A4-80.

Chart 1. Tightening torques (Nm)

M4	M5	M6	M8	M10	M12	M16	M20	M24	M30
2.7	5.4	9.0	22	44	76	187	364	629	1240

8.8 Changing the propeller



A damaged or worn propeller must be replaced immediately.

A damaged propeller is unbalanced and may damage the unit and the bearings, making repair work necessary.

Ensure that the mixer is disconnected from the electrical mains and cannot start accidentally.

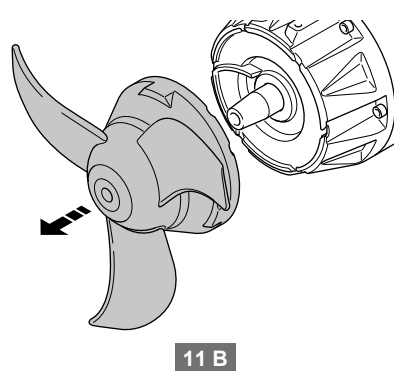
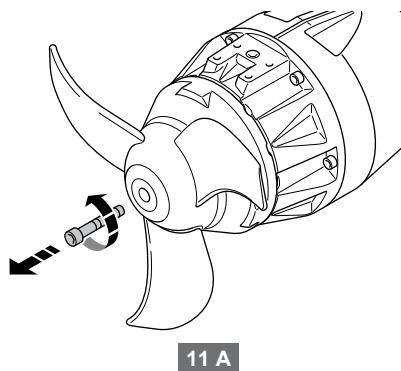
Secure the mixer to a flat, surface strong enough to support its weight.

Wear regulation personal protective equipment;

Remove the propeller

Direct Drive versions (Fig. 11):

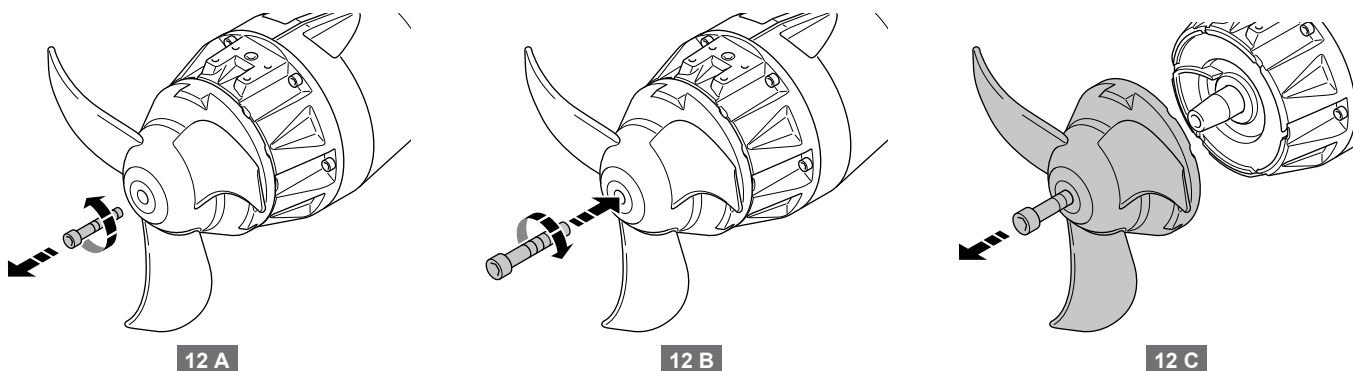
1. Fix the propeller so that it cannot turn.
2. Unscrew the propeller fixing screw (A) and remove it (B);



Model	Propeller fixing screw	Propeller extraction screw
MMR21NF4.75D-5	M8	-
MMR22NF41.1D-5	M8	-
MMR23NF41.5D-5	M8	-
MMR33NF61.5D-5	M10	-
MMR31NF61.5D-5	M10	-
MMR32NF62.2D-5	M10	-
MMR34NF63.0D-5	M12	-
MMR35NF63.2D-5	M12	-
MMR45NF83.0D-5	M12	-
MMR41NF83.0D-5	M12	-
MMR42NF83.0D-5	M12	-
MMR43NF84.0D-5	M12	-
MMR44NF84.5D-5	M12	-

Gear Drive versions (Fig. 12):

1. Fix the propeller so that it cannot turn.
2. Unscrew the propeller fixing screw and remove it (A);
3. Screw the extraction screw into the threaded hole in the propeller (B). This pushes the propeller outward, making it easy to disconnect it from the shaft (C).



Model	Propeller fixing screw	Propeller extraction screw
MMR61NF44.0G072-5	M16	M20
MMR61NF44.0G066-5	M16	M20
MMR61NF45.5G058-5	M16	M20
MMR61NF45.5G054-5	M16	M20
MMR61NF47.5G049-5	M16	M20

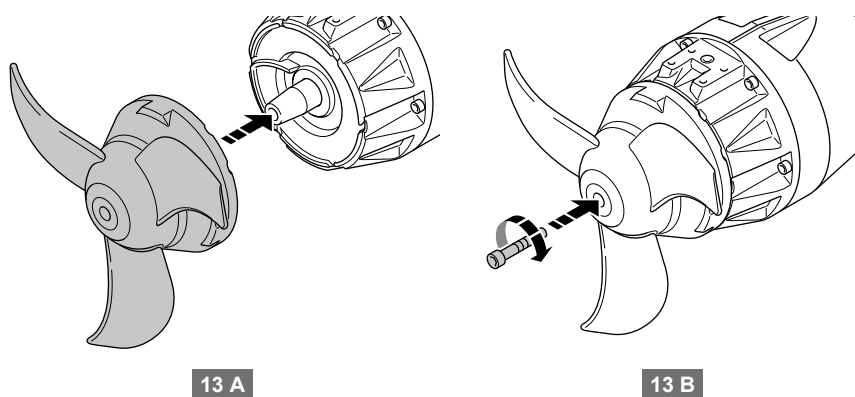
Fitting the propeller (Fig. 13):

1. Connect the propeller to the tapered shaft (A);
2. Secure the propeller with the fixing screw (B).
3. Fix the propeller so that it cannot turn and fully tighten the fixing screw. Use Loctite 270 threadlocker.

WARNING! Comply with the tightening torques. See Chart 1.

If the torque is insufficient, the propeller may become loose.

If the torque is excessive, the screw may become misshapen, reducing the traction force it applies and allowing the propeller to become loose.



9. TROUBLESHOOTING GUIDE

WARNING! Checks and corrective work must only be performed by skilled technician.

Before starting any work on mixers, make sure that the fuses have been removed or the mains switch has been switched off.

It must be ensured that the power supply cannot be accidentally switched on. All rotating parts must have stopped moving.

Make sure that no one is near the mixer when the power supply is reconnected to conduct checks that require voltage.

Failure to do so could result in death or serious injury.

	Problem	Possible cause	Solution
1	Mixer fails to start or, starts but stop immediately.	No proper power is supplied (i.e. power outage, voltage drop, etc.).	Contact a skilled electrician.
		Power cable is faulty or disconnected.	Inspect the cable and check that the connections to power line are properly tightened.
		Malfunction in control system (control panel).	Have the cause investigated and repaired by a skilled electrician.
		Fuses blown.	Check fuses type and rating and replace them with correct ones.
		Tripped circuit breaker.	Refer to Point 2.
		Tripped thermal protector.	Refer to Point 3.
		Leakage detector has cut out mixer.	Refer to Point 4.
		Tripped residual current device (RCD).	Refer to Point 5.
2	The power supply circuit breaker trips.	Phase voltages too low or not balanced.	Contact a skilled electrician.
		Wrong electrical connection.	Check and correct the electrical installation.
		Overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current.
		Stator windings are faulty.	Contact an authorised service center.
		Foreign matter is wedged in the propeller, causing the motor protector to trip.	Pull up the mixer unit, remove the debris and check manually that the propeller can rotate freely.
		Blocked rotor.	Contact an authorised service center.
3	The thermal protection trips after a short operating time.	Foreign matter is wedged in the propeller, causing the motor protector to trip.	Pull up the mixer unit, remove the debris and check manually that the propeller can rotate freely.
		Internal moving parts are damaged.	Contact an authorised service center.
		High drop voltage due to an overextension of the mixer cable.	Shorten the extension cable or increase its size.
		Phase voltages too low or not balanced.	Contact a skilled electrician.
		Starts per hour exceed the permitted number.	Reduce starts per hour according to specifications.
4	Leakage detection.	Water ingress in the mechanical seal chamber due to wearing or breaking down of mechanical seals or o-rings.	Contact an authorised service center.
5	Tripped residual current device (RCD).	Humidity in motor.	Contact an authorised service center.
		Low motor winding insulation.	Contact an authorised service center.
		Fault in cable.	Have the cable checked and repaired by a qualified electrician.
6	The mixer operates but the flow is low or null.	Propeller rotates in the wrong direction.	Check the direction of rotation, interchange two phases of the mains supply.
		Propeller blades are dirty, damaged or worn.	Pull up the mixer unit, remove the debris and inspect for any wear. In case the propeller worn or damaged, contact an authorised service centre.
		Wrong mixer selection.	Replace the mixer with a suitable one.
7	Noisy operation and excessive vibrations.	Propeller blades are dirty, damaged or worn.	Pull up the mixer unit, remove the debris and inspect for any wear. In case the propeller worn or damaged, contact an authorised service centre.
		Propeller rotates in the wrong direction.	Check the direction of rotation, interchange any two of the phases.
		Electrical phase missing	Contact a skilled electrician.
		Internal moving parts are damaged.	Contact an authorised service center.
		Oscillation caused by the installation.	Check installation structure.
8	Absorbed current is too high.	Wrong voltage supply.	Contact a skilled electrician.
		Wrong electrical connection.	Check and correct the electrical installation.
		Propeller jammed, damaged or worn.	Pull up the mixer unit, remove the debris and inspect for any wear. In case the propeller worn or damaged, contact an authorised service centre.
		Internal moving parts are damaged.	Contact an authorised service center.
		Stator windings are faulty.	Contact an authorised service center.

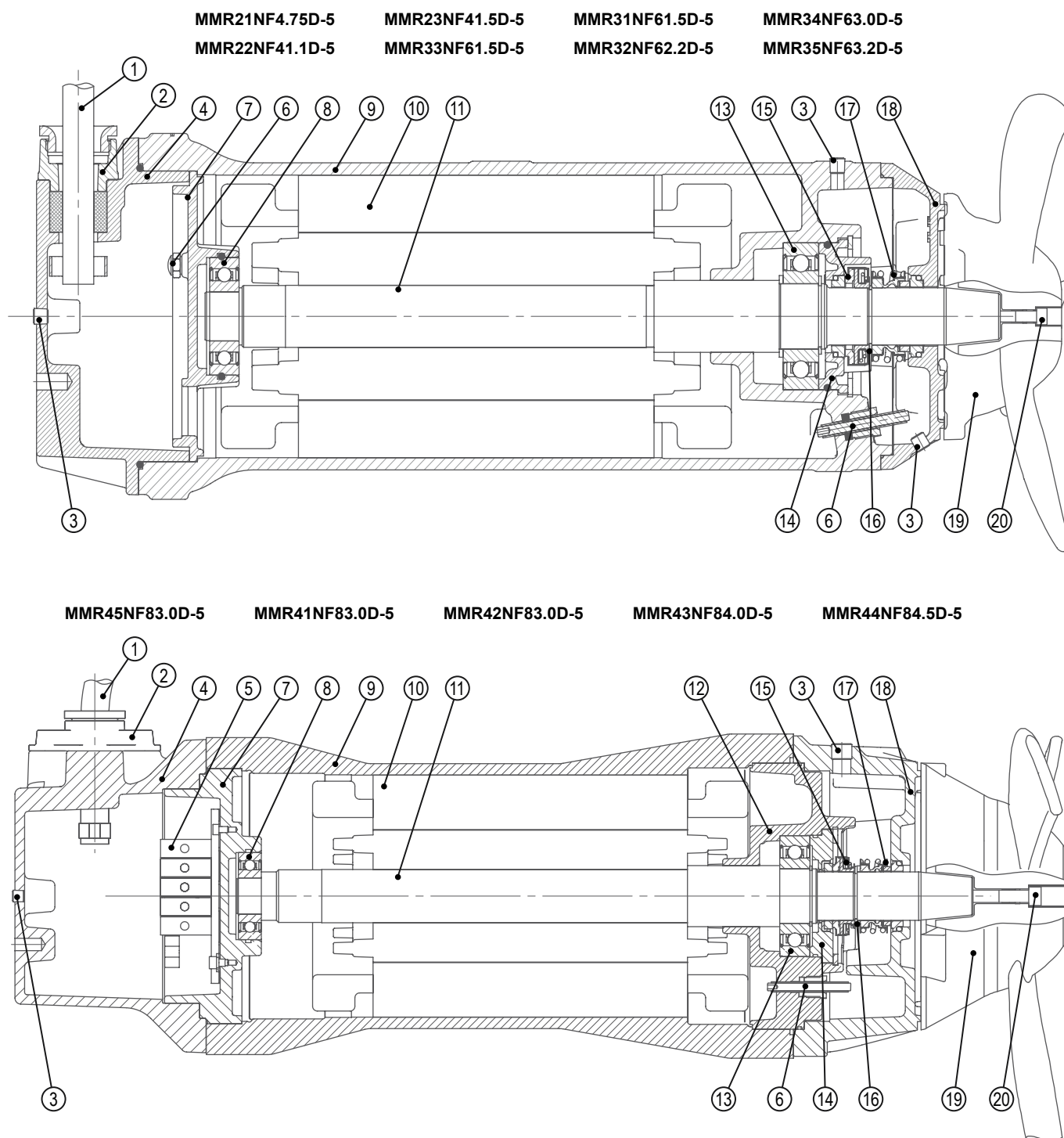
The following information is required when ordering repairs or making other inquiries:

Product model	Serial number	Purchase date

Remarks:

10. DESCRIPTION OF MAIN COMPONENTS

10.1 DIRECT TRANSMISSION models



Description	Material
1 Cable	Rubber/copper
2 Cable gland	Cast iron/steel
3 Plug	Steel
4 Rear motor cover	Cast iron
5 Terminal	Plastic/metal
6 Leakage detector	Plastic/steel
7 Rear bearing support	Metal
8 Rear bearing	Steel
9 Motor case	Cast iron
10 Stator	Iron/copper

11 Shaft with rotor	Steel/iron/aluminium
12 Front bearing support	Cast iron
13 Front bearing	Steel
14 Bushing	Metal
15 Mechanical seal	Rubber/metal/SiC
16 Seeger	Steel
17 Mechanical seal	Rubber/metal/SiC
18 Front motor cover	Cast iron
19 Propeller	Steel
20 Propeller fixing screw	Steel

The product's outline is purely guideline

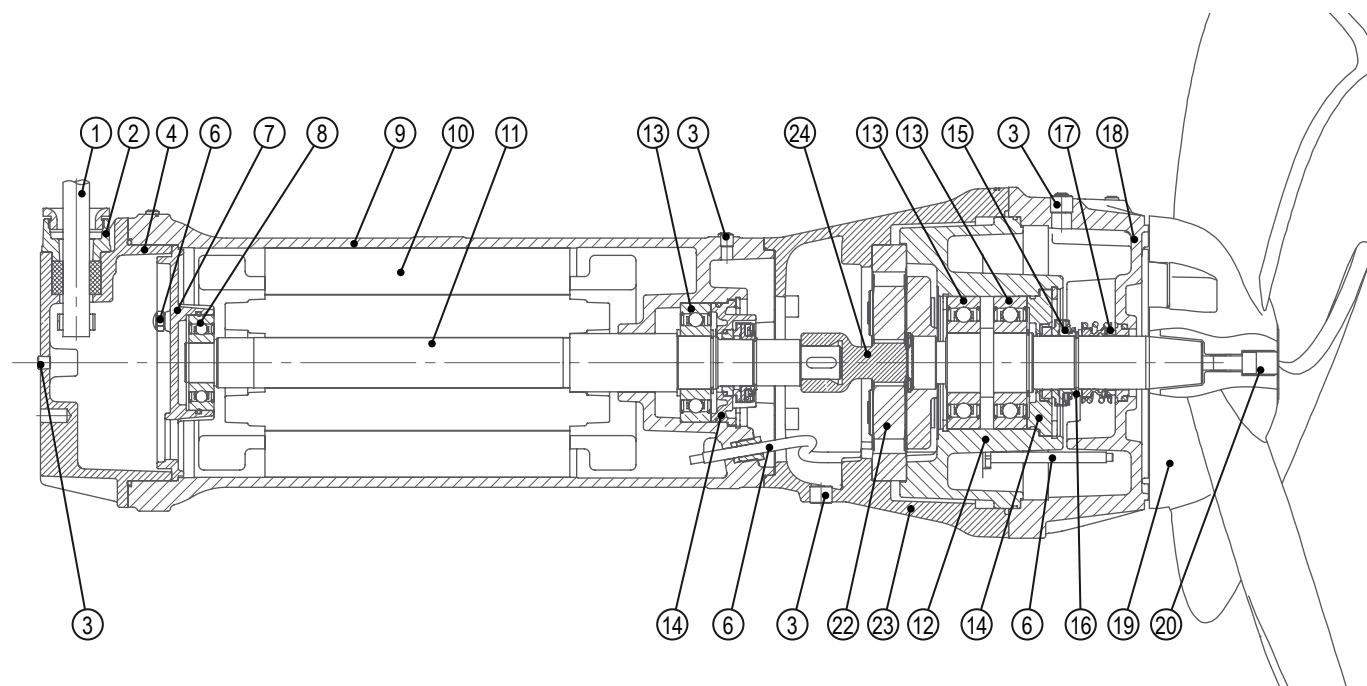
10.2 GEAR DRIVE models

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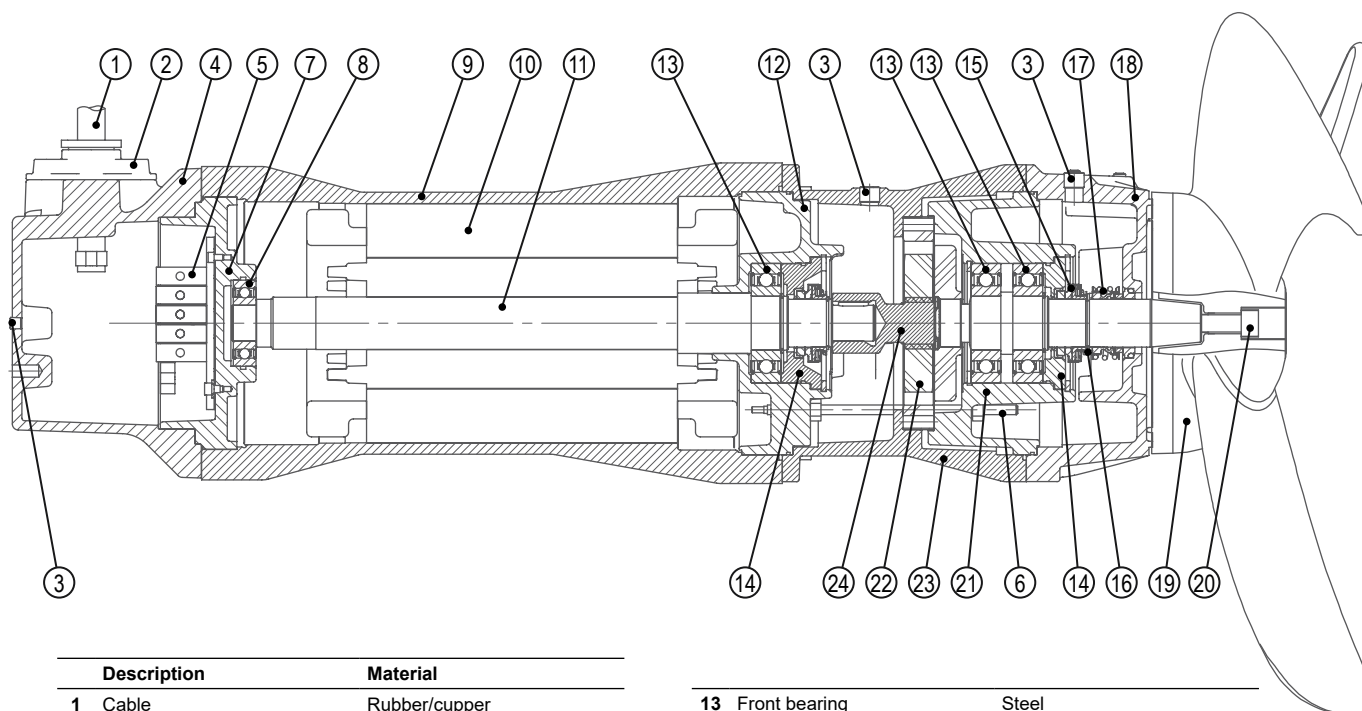
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MMR61NF45.5G058-5

MMR61NF45.5G054-5



MMR61NF47.5G049-5



Description	Material
1 Cable	Rubber/copper
2 Cable gland	Cast iron/steel
3 Plug	Steel
4 Rear motor cover	Cast iron
5 Terminal	Plastic/metal
6 Leakage detector	Plastic/steel
7 Rear bearing support	Metal
8 Rear bearing	Steel
9 Motor case	Cast iron
10 Stator	Iron/copper
11 Shaft with rotor	Steel/iron/aluminium
12 Gearbox bearing support	Cast iron

13 Front bearing	Steel
14 Bushing	Metal
15 Mechanical seal	Rubber/metal/SiC
16 Seeger	Steel
17 Mechanical seal	Rubber/metal/SiC
18 Front motor cover	Cast iron
19 Propeller	Steel
20 Propeller fixing screw	Steel
21 Propeller bearings support	Metal
22 Reduction gearbox	Steel
23 Reduction gearbox body	Cast iron
24 Reduction gearbox shaft	Steel

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TSURUMI MFG.CO.,LTD.

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