



## INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

# NBI VERTICAL AGITATOR



### **INOXPA, S.A.**

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**MANUFACTURER DECLARATION**  
**According the EC directive about machines**  
**98/37/CE, Annex II B**

The manufacturer:

**INOXPA, S. A.**

c/ Telers, 54

17820 Banyoles (Girona) - Spain

Hereby declares, that the agitators

_____	_____	_____
Denomination	Type	Manufacturing year

Comply with the pertinent disposition, in the execution supplied by **INOXPA, S.A.** for the incorporation in a machine or installation, or for the assembly with other machines as a subunit of other higher order machine.

Harmonized norms used, particularly:

EN 292 part 1 and 2, EN 809

The machine above must not be put into service until the machinery into which it has been incorporated have been declared in conformity with the EC Machinery Directive. It must meet, particularly, the standards EN 294, EN 563, EN 809 y EN 953 in its respective current editions.

Year of CE marking: CE 95  
Banyoles, January 1995

  
\_\_\_\_\_  
Josep Maria Benet    Technical Manager

**EC DECLARATION OF CONFORMITY**  
**According the EC directive about machines**  
**98/37/CE, Annex II B**

The manufacturer:

**INOXPA, S. A.**

c/ Telers, 54

17820 Banyoles (Girona) - Spain

Hereby declares, that the agitators

_____	_____	_____
Denomination	Type	Manufacturing year

Are in conformity with the essential requirements of the Machinery Directive 98/37/CE (latest modifications included), according the following Council Directives and harmonized norms:

- 72/23/CE Directive "low voltage"
- Norms EN 292 part 1 and 2, EN 809

Year of CE marking: CE 95  
Banyoles, January 1995

  
\_\_\_\_\_  
Josep Maria Benet    Technical Manager

# 1. Safety Instructions.

## **SAFETY INSTRUCTIONS.**

This instruction manual contains the basic indications that should be complied with during installation, start-up and maintenance. Consequently, it is essential that, before installation, both the installer and the plant technical manager read this instruction manual and that it be permanently available alongside the agitator or corresponding installation.

Not only must the detailed safety instructions in this chapter be complied with, but so also should the special measures and recommendations added in the other chapters of this manual.

## **SYMBOLS USED**

The safety instructions included in this manual, whose non-compliance may cause risk to persons or to the machine and its correct operation, are expressed by means of the symbols indicated below:



**Danger to people in general.**



**Electrical hazard.**



**Danger of injury caused by the agitator.**



**Danger due to suspended loads.**



**Danger for the agitator and its correct operation.**



**General obligation.**

**GENERAL SAFETY INSTRUCTIONS.**

- Read the instructions in this manual before installing the agitator and before starting it up.
- The installation and use of the agitator must always be in accordance with the rules applying to health and safety.
- Before starting up the agitator, check that it be correctly anchored and that the shaft be perfectly aligned. Poor alignment and/or excessive force in fitting may cause serious mechanical problems for the agitator.



- Specialised personnel should carry out all electrical work.
- To control the engine characteristics and its control panel, especially in areas where there is a risk of fire or explosion, the user company's technical manager shall establish danger areas (area 1 – 2 – 3).
- Do not spray the motor directly during cleaning.
- Do not disassemble the agitator without previously disconnecting the power supply. Remove the fuses and disconnect the motor feed cable.



- Do not operate the agitator if turning components do not have the protection system or if they are badly fitted.
- The agitator has rotating parts. Do not put hands or fingers into an agitator whilst it is operating. This may cause serious injury.
- Do not touch any of the parts of the agitator that are in contact with liquid whilst in operation. If the agitator works with hot products at temperatures exceeding 50 °C, there is a risk of burns. In these cases, collective protective measures should be put in order of priority (distance, protective screen, heat resistance), or –failing this possibility- to provide individual protection (gloves).



- Take all possible precautions in lifting the agitator. Always ensure that it securely attached when being transported by crane or any other lifting mechanism.



- Withdraw all the tools used in mounting before starting up the agitator.
- The agitator is unable to work without liquid. Standard agitators are not designed to operate during the filling or emptying of tanks.



- Do not exceed the agitator's maximum operating conditions. Do not modify the operating parameters that were initially set for the agitator without the prior written consent of INOXPA.
- The agitators and their installation may cause noise levels that exceed 85 dB (A) in some unfavourable operating environments. In such cases, operators should wear hearing protection.

### **WARRANTY.**

We wish to point out that any warranty issued will be null and void and that we are entitled to an indemnity for any civil liability claim for products which might be filed by third parties if:

- operation and maintenance work has not been done following the corresponding instructions; the repairs have not been made by our personnel or have been made without our written authorization;
- modifications are made to our material without prior written authorization;
- the parts or lubricants used are not original INOXPA parts/lubricants;
- the material has been improperly used due to error or negligence or have not been used according to the indications and the intended purpose.
- All components subject to wear are excluded from the guarantee.

The General Delivery Terms which you have already received are also applicable.

### **INSTRUCTIONS MANUAL.**

The information provided in the instruction manual refers to updated data.

We reserve the right to modify the design and/or manufacturing specifications of our products as required, devoid of any obligation on our part to adapt any product supplied prior to such alteration.

The technical information made available in this instruction manual, together with the graphs and technical specifications provided, shall continue to belong to us and should not be used (except for starting up this installation), copied, photocopied, made available or otherwise given to third parties without our prior written consent.

INOXPA is reservation the right to modifying this instructions manual without previous notice.

### **INOXPA SERVICE.**

In the event of doubt or should you require a fuller explanation on particular data (adjustment, assembly, disassembly...), please do not hesitate to contact us.

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## 2. Reception, storage and transport.

### RECEPTION.

On reception of the agitator, check the packing and its contents to ensure that it agrees with delivery note. INOXPA packs the agitators fully assembled. Ensure that the agitator has not suffered any damage. In the case of it being found not to be in correct condition and/or some part(s) are missing, the transporter shall have to prepare a report as quickly as possible.

### STORAGE.

If the agitator is not immediately installed, it must be stored in an appropriate place. The shaft must be stored in a horizontal position and on some wooden or similar supports. The shaft in such a position will not become deformed and must not support loads of any description.

### TRANSPORT.

Take all possible precautions in lifting the agitator. Always use the sling hooks when moving the agitator with a crane or any other type of lifting equipment.



**Depending on the model, the agitators are too heavy to store or install manually. Use an adequate means of transport. Do not manipulate the agitator by the shaft because it can easily become deformed.**

Type	Weight [Kg] with Gear motor
NBI 1.10-4055-1-175	24
NBI 1.10-4055-1-200	
NBI 1.10-4055-1-250	
NBI 1.10-4055-1-300	
NBI 1.10-4075-1-200	25
NBI 1.10-4075-1-250	
NBI 1.10-4075-1-300	
NBI 1.10-4110-1-250	33
NBI 1.10-4110-1-300	
NBI 1.10-4110-1-350	
NBI 1.10-4150-1-250	37
NBI 1.10-4150-1-300	
NBI 1.10-4150-1-350	

### 3. Identification, description and use.

#### IDENTIFICATION.

The agitator is identified by means of a plate stating its characteristics attached to the motor. The type of agitator and serial number are on the plate. See figure 3.1.

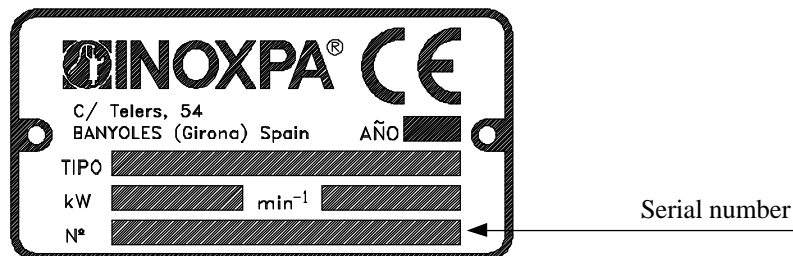


Figure 3.1: Characteristics plate.

#### Example:

<b>NBI</b>	<b>1.</b>	<b>10</b>	<b>-</b>	<b>4</b>	<b>055</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>200</b>
	1	2	3	4	5	6	7		

#### 1. Name of the agitator.

NBI = vertical agitator

#### 2. Number of agitation elements.

1 = one agitation element.

2 = two agitation elements.

#### 3. Type of agitation elements.

10 = marine propeller.

#### 4. Motor speed.

4 poles = 1500 rpm.

#### 5. Motor power.

055 = 0.55 kW.

075 = 0.75 kW.

110 = 1.1 kW.

#### 6. Motor.

1 = IP-55.

2 = IP-65.

3 = Flameproof.

4 = Explosion-proof.

5 = Single phase.

#### 7. Diameter of the agitation element.

200 = 200 mm.

250 = 250 mm.

300 = 300 mm.

**DESCRIPTION.**

The NBI series is a range of vertical agitators with direct-coupled speed reduction gearbox. The agitator mounting plate fixed to the tank is constructed from stainless steel and a v-ring shaft sealing system is used. The half shaft is rigidly supported by two bearings to withstand the thrust and radial loads transmitted by the mixing element.

In turn the agitator shaft is held directly onto the half shaft with two allen studs.

All product contact parts are made of AISI-316 (1.4401) stainless steel with an electro-polished surface finish.

The standard agitation element is the marine propeller type 10.

**USE OF THE AGITATOR.**

The NBI models are applied in open or closed tanks for agitation and mixing processes with products having a viscosity from 1 to 1000 cPs.

## 4. Installation and assembly.

### INSTALLATION AND ASSEMBLY.



**If the agitator is supplied without a drive or other element, the purchaser shall be responsible for its assembly, installation, start-up and operation.**

### SITE.

Place the agitator in such a way as to facilitate inspection and servicing. Leave sufficient room around the agitator for adequate servicing, separate, even when it is in operation. It is very important to be able to obtain access to the electrical connection mechanism of the agitator, even when it is in working mode.

To achieve an effective mixing process it may be necessary to fit baffles to the bottom of the tank. Consult our technical department for each particular application. If required, the approximate dimensions of the baffles in relation to the diameter of the tank are shown in figure 4.1 and table 4.1.

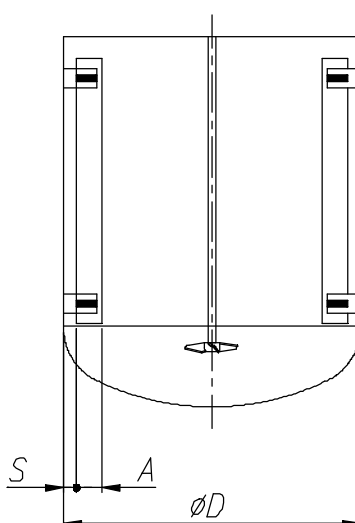


Figure 4.1

Ø D	300	400	500	600	800	1000	1200	1600	2000	2500	3000	3500	4000
A	20	30	35	40	50	70	80	115	130	180	200	240	280
S	5	5	10	10	10	15	20	20	30	30	50	50	50

Table 4.1

### ASSEMBLY.

To locate and fix the agitator in the support flange of the tank, the propeller must be removed from the shaft. Once the base of the agitator is placed on the supporting flange, the fixing nuts and screws will be assembled in their corresponding holes, without being tightened. When this operation has been carried out, the agitator must be levelled using the following method.

- Place a spirit level against the shaft.
- Check 4 points at 90° to each other around the circumference of the shaft and at the same height.

Once the shaft is level, firmly tighten the fixing nuts and screws. Finally the propeller is mounted on the end of the shaft. Be careful when assembling the shaft not to hit or strain it so as to avoid it being bent.



**Force should never be applied to the end of the agitator shaft, as it can easily suffer permanent damage.**

**Check the alignment of the agitator shaft with the half shaft once its assembly is completed.**

**ELECTRICAL CONNECTION.**

Before connecting the electric motor to the mains, check the local regulations and the corresponding standards regarding electrical safety. Take special account of those parts referring to command and control of the agitator. Check the manufacturer's instruction manual of the motor for connecting it to the mains.

**Let the electrical connection of the motors to qualified personnel. Take the necessary measures in order to prevent any type of breakdown.**



**The motor should be protected with devices against overload and short-circuits.**

**It is not possible to use the agitator in areas of risk of fire or explosion if this has not been included in the order. Risk areas (zones 1 -2 - 3).**

## 5. Start-up, operation and shutdown.

Agitator start-up shall be able to be carried out if the detailed instructions in the section on installation and assembly have previously been realised.

### START-UP.

- Check that the electrical supply is appropriate for what is indicated on the motor plate.
- Check the alignment of the agitator shaft.
- Check the tank's liquid level. Unless specified in the order, the agitators cannot function during tank filling or emptying.



**The agitator can NEVER run without a product. The agitation element must be submerged at least to a height of 1.5 times its diameter.**

- All the protectors must be in place.
- Start up the agitator.
- Check that the rotation of the propeller is correct (clockwise when viewed from the side of the motor). See figure 5.1.



**Respect the direction of rotation of the agitation element as indicated by the arrow stuck on the motor. The wrong direction will cause a loss of agitation efficiency.**

- Check the motor's electrical consumption.

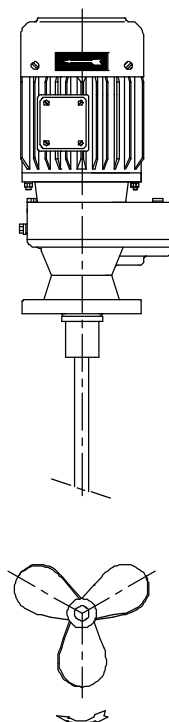


Figure 5.1

**OPERATION.**

**Do not modify the operating parameters for which the agitator was initially selected without prior written consent of INOXPA. (Risk of deterioration and danger for the user).**

**Follow the operating instructions and safety indications described in the instructions manual of the tank on which the agitator is mounted.**



**Mechanical hazards (drag, shearing, cutting, strike, squashing, clipping, etc.). If the agitation element is accessible from above or at the man way of the tank then the user is exposed to the aforementioned hazards.**

The tank should be equipped with protection devices and safety equipment. Check the manufacturer's instructions manual.



**The introduction of a solid object or raw material may cause breakage of the agitation element or the breakage of other mechanical parts and endanger safety.**

## 6. Maintenance and conservation.



**Maintenance work can only be carried out by qualified personnel that are trained and equipped with the necessary resources to carrying out this work.**

**Before beginning maintenance work, ensure that the electric motor is disconnected and that the tank is empty.**

### **MAINTENANCE.**

- Inspect the agitator regularly.
- Do not fail to keep the agitator clean.
- Check the state of the gear motor.
- Check the sealing: V-ring.

Gear motor maintenance shall be carried out in accordance with the manufacturer's instructions. See the instructions manual.

### **LUBRICATION.**

The lubrication of the bearings of the gear motor will be carried out according to the manufacturer's instructions.

### **SPARE PARTS.**

To order spare parts it is necessary to indicate the type and serial number included on the agitator's characteristics plate, as well as the position and description of the part as found in chapter 9, of technical specifications.

### **CONSERVATION.**

If the agitator is out of service for a considerable period of time, clean and treat the parts with VG 46 mineral oil. The shaft must be stored in the horizontal position and on wooden supports or on supports of a similar material.

## 7. Operating problems: causes and solutions.

Operating problems	Probable causes
Motor overload.	1, 2.
Insufficient agitation.	1, 3, 4, 5.
Vibrations and noise.	6, 7, 8, 9.
Peakage.	10,11

Probable causes		Solutions
1	Viscosity of the liquid too high.	Reduce the viscosity, e.g. by heating the liquid.
2	High density.	Increase motor power.
3	Tank too big for the chosen agitator.	Check with the technical department.
4	Wrong direction of rotation.	Change direction of rotation.
5	Agitator speed too low.	Increase the speed.
6	Liquid level insufficient or none.	Check liquid level in the tank.
7	Shaft bended.	Replace the shaft.
8	Critical speed.	Check with the technical department.
9	Worn bearings driver.	Replace the bearings driver.
10	Head lip seal worn.	Replace the head lip seal.
11	V-ring worn or damaged.	Replace the V-ring.



**If the problems persist stop using the agitator immediately. Contact the agitator manufacturer or the representative.**

## 8. Disassembly and assembly.

The assembly and disassembly of the agitators should only be carried out by qualified personnel. Ensure that staff read this instruction manual carefully, especially those parts that make direct reference to their work.

### **ELECTRICAL SAFETY.**

Ensure that the motor starter is turned off when carrying out disassembly or assembly work on the agitator.



- Place the agitator switch in the “off” position.
- Block the electrical panel and put a warning notice on it.
- Take out the fuses and take them with you to the work area.

### **DISASSEMBLY.**

Once the motor is disconnected, disassembly work may begin:

- Remove the propeller (02) from the shaft loosening the allen stud (55).
- Then, loosen the other allen studs (55A) that are situated at the output shaft of the gear motor (93A) and support the agitator shaft (05). Remove the agitator shaft (05).
- Remove the V-ring (81).
- Finally, remove the stainless steel base plate (42) through the countersunk screws (50).

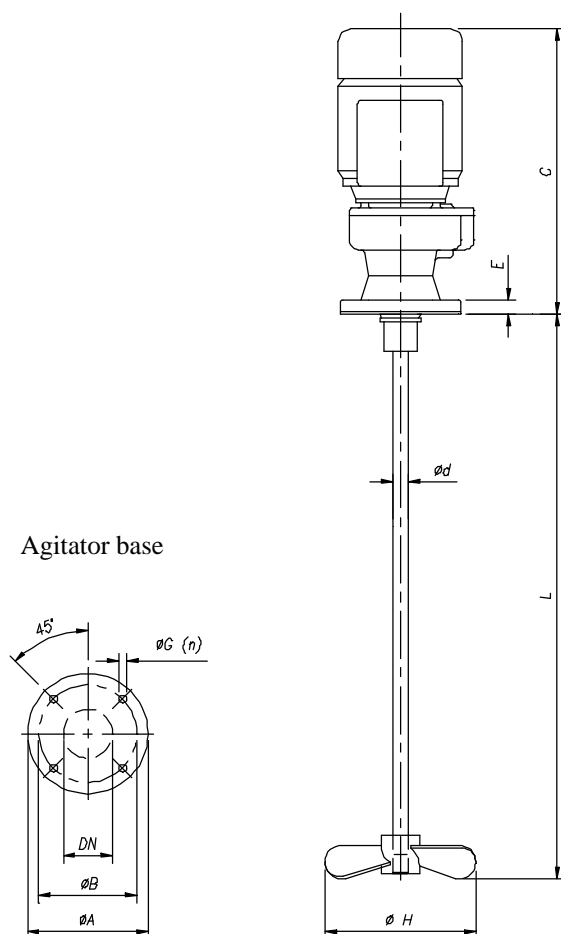
### **ASSEMBLY.**

- Place the base plate (42) on the output flange of the gear motor (93A), fixing it with the countersunk screws (50).
- Fit the V-ring (81) as shown in page 9.4 of this manual.
- Introduce the agitator shaft (05) into the output shaft of the gear motor and fix by means of the allen studs (55A).
- Finally, fix at the other end of the agitator shaft (05) the propeller (02) with the allen studs (55).

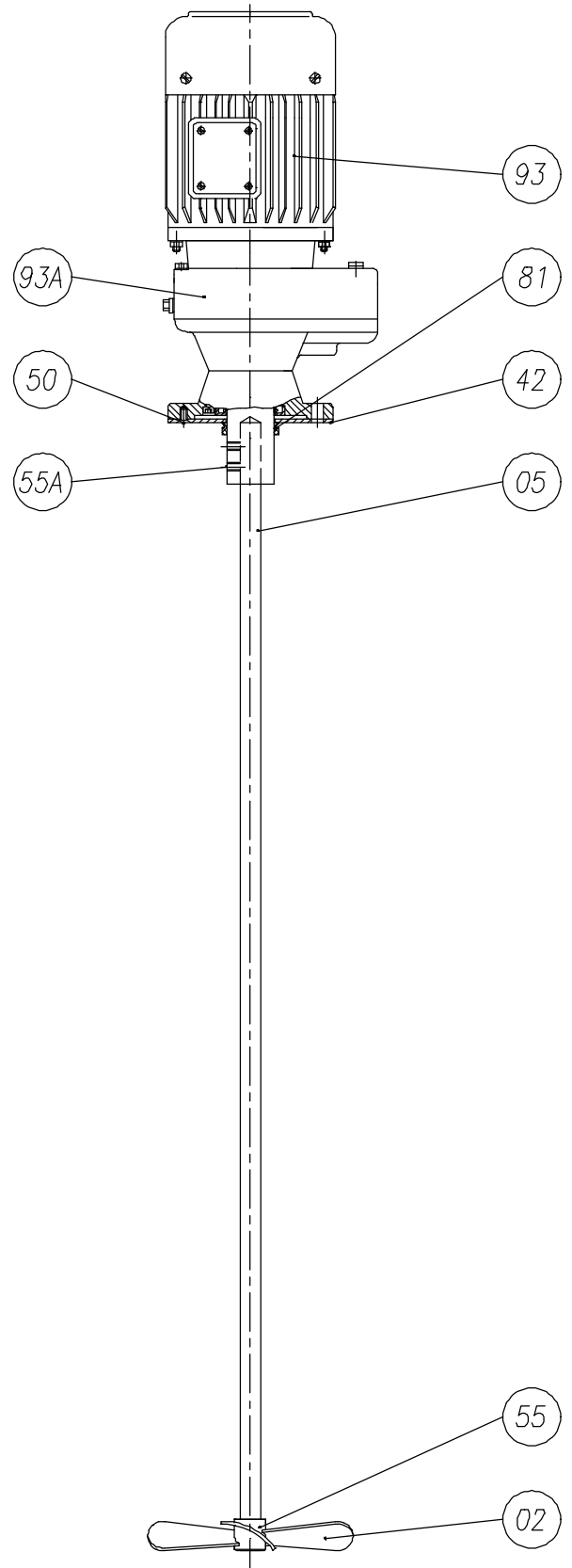
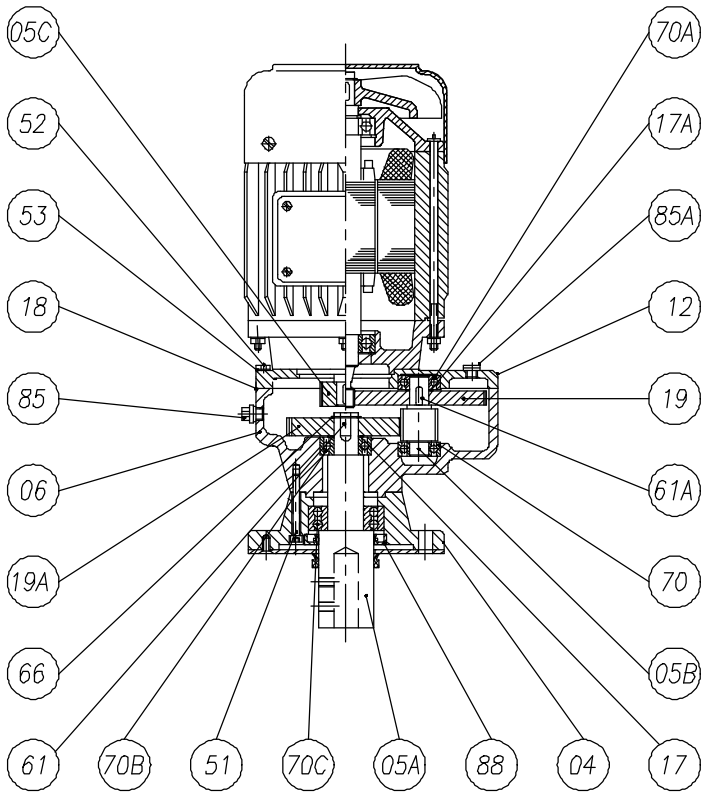
## 9. Technical Specifications.

### TECHNICAL SPECIFICATIONS AND DIMENSIONS.

Agitator type	Motor power	Speed	Dimensions					Agitator shaft		Type	
			C	E	Flange				Ø d	Lmáx.	10
	Ø A	Ø B			Ø DN	Ø G(n)	Marine propeller	Ø H			
NBI 1.10-4055-1-175	0,55	Speed in rpm. to be determined as per input power	405	19	160	130	65	10,5 (4)	20	1400	175
NBI 1.10-4055-1-200											200
NBI 1.10-4055-1-250											250
NBI 1.10-4055-1-300											300
NBI 1.10-4075-1-200	0,75		445	19	160	130	65	10,5 (4)	25	1600	200
NBI 1.10-4075-1-250											250
NBI 1.10-4075-1-300											300
NBI 1.10-4110-1-250	1,1		445	19	160	130	65	10,5 (4)	25	1600	250
NBI 1.10-4110-1-300											300
NBI 1.10-4110-1-350											350
NBI 1.10-4150-1-250	1,5	445	19	160	130	65	10,5 (4)	25	1600	250	
NBI 1.10-4150-1-300										300	
NBI 1.10-4150-1-350										350	



**NBI AGITATOR AND REDUCTION UNIT TOWER.**



**PARTS LIST FOR THE NBI AGITATOR AND REDUCTION UNIT TOWER.**

<b>NBI AGITATOR</b>			
<b>Position</b>	<b>Quantity</b>	<b>Description</b>	<b>Material</b>
02	1	Propeller	AISI-316
05	1	Agitator shaft	AISI-316
42	1	Base plate	AISI-316
50	4	Countersunk screw	A2
55	2	Allen stud	A2
55A	2	Allen stud	A2
81	1	V-ring	NBR
93	1	Motor	-
93A	1	Gear motor with tower	-

<b>GEAR MOTOR WITH TOWER</b>			
<b>Position</b>	<b>Quantity</b>	<b>Description</b>	<b>Material</b>
04	1	Support flange	GG-15
05A	1	Output shaft	AISI-316
05B	1	Intermediate pinion	F-1540
05C	1	Primary pinion	F-1540
06	1	Gear case	GG-15
12	1	Gear case cover	GG-15
17	1	Separator	Steel
17A	1	Separator	Steel
18	1	Flat seal	Klingerit
19	1	Entry wheel	F-1540
19A	1	Exit wheel	F-1540
51	4	Allen screw	A2
52	4	Hexagonal screw	A2
53	4	Spring washer	A2
61	1	Key	F-1140
61A	1	Key	F-1140
66	1	Outer elastic ring	Steel
70	1	Bearing	Steel
70A	1	Bearing	Steel
70B	1	Bearing	Steel
70C	1	Bearing	Steel
85	5	Grease plug	8.8
85A	1	Crankcase breather	8.8
88	1	Lip seal	NBR

**SEALING: V-RING.**

