PRO-DO-MIX®
PRODUZIONE DOSAGGIO MISCELAZIONE

INSTRUCTIONS FOR USE

MANUFACTURER:

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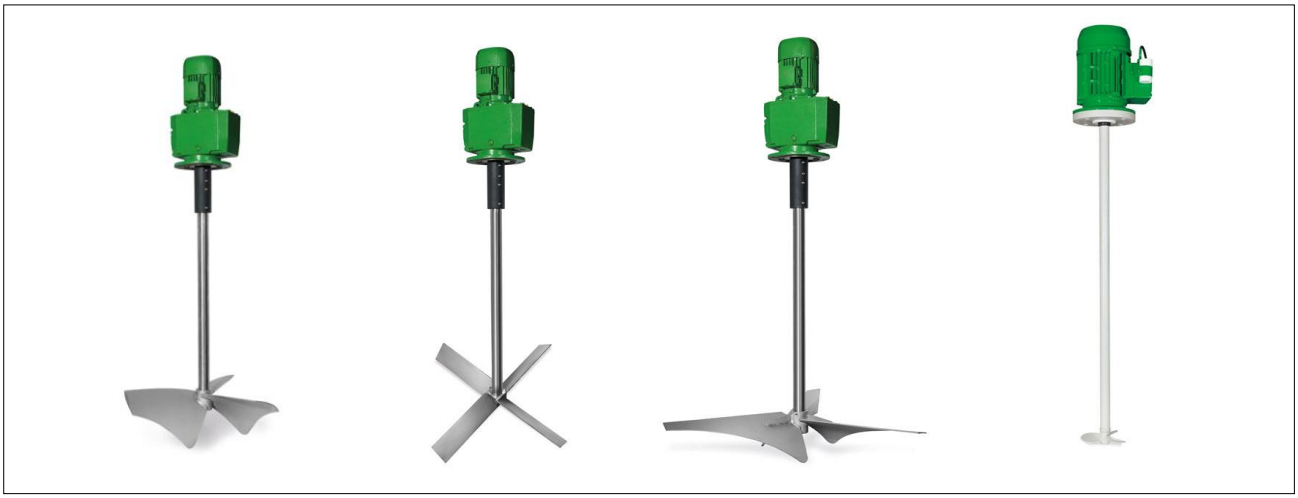
MACHINE:

INDUSTRIAL VERTICAL AGITATORS

SERIES:

GREENLINE - BLUELINE – SILVERLINE - GOLDENLINE



First edition

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Edition

Document validation

Validated by[1]	Date	Review	Subject
RV	February 2019	R0	First edition
		R1	
		R2	
		R3	
		R4	

Conformity of instructions

For the editing we referred to the following regulations and specifications:

Regulation	Edition	Title	Relevant sections
UNI 10653	02.2003	Technical documentation – Quality of the technical documentation of the product.	Complete doc
UNI 10893	07.2000	Technical documentation of the product – Manual of instructions – Development and explanatory order of the content.	Complete doc

Warnings for operators

The descriptions and images attached to this documentation are not meant to be binding. **PRO-DO-MIX S.R.L.** reserves the right to make at any time any modifications to components, essential parts or supplies that it deems appropriate for the purpose of improvement or for any other requirement, without committing to update this publication.

1 Signature of the person in charge as per note 1: the validation of the DRAFT document allows the issue of the Review R0 and validates all the sections/chapters of this document.

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Chapters, Illustrations, Tables

Chapters

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CHAPTER 1
General warnings

1 General warnings

1.1 Intended use of the manual

This Instruction Manual provides detailed information regarding the safety, the characteristics, the operation, the use, the maintenance and the demolition of the machines called 'Agitator'.
What is described in the manual is oriented to the training and information of the following categories of people:

- **Chapter 1**. It is the general information chapter addressed to **all operators** who use the machine: it explains how the document is structured and to whom it is intended, how to consult it, the meaning of the symbols, of the notes and the glossary used; it indicates the original reference version in the event of disputes due to translations.
- **Chapter 2**. It is the chapter of the safeties where all the notes and warnings concerning the use of the machine and all the information for the operators deriving from the risk analysis are gathered. It is mainly addressed to the **responsible for health and safety** (it is an operating function, the one who, knowing the workplaces and its occupants, supervises the work activities and watches the observance of the instructions given; his tasks are to supervise and monitor the instructions given), but also to **other operators** using the machine; it covers the intended and unexpected uses for which the machine was designed and built, the tasks of the operator, the operator place/s, the risks and hazards related to the use and maintenance of the machine, the pictograms (warning, hazard or others) applied to the machine, the PPE that the operator must use according to his duties.

  The topics covered in the chapter are split by distinguishing between general safeties and safeties pertinent to the machine.
- **Chapter 3**. It is the General description chapter of the machine: addressed to **all operators**, it shows an overall layout of the machine, the technical data (characteristics, power supplies, pneumatic or other, weights, dimensions), it reports the results detected by the noise test, it must give information concerning the vibrations, the identification plate applied on the machine.
- **Chapter 4**. It is the chapter dedicated to the transport, installation, assembly / disassembly, storage of the machine and it is addressed to the operator/s involved in the aforementioned operations: it shows the settings due by the user, the general safety warnings concerning load handling, work equipment, PPE to use; how the transport and the type of packaging is carried out; the procedure/s for lifting and handling the machine, for possible storage and installation at the workplace; the connection to the various power supplies; disassembly.
- **Chapter 5**. It is the chapter describing the commands and is addressed to the **operator in charge of operating the machine**: the use of photographs and tables facilitates the description of the functions of the individual machine controls.
- **Chapter 6**. This is the chapter dedicated to the operation and use of the machine: addressed to **the operator in charge of operating the machine**; all the information is provided to allow safe use of the machine during the production cycle.
- **Chapter 7**. It is the chapter entitled 'Malfunctions' and it is addressed **to the operator in charge of maintenance**: it includes tables that show the anomalies that can occur, the reasons that can cause them and the troubleshooting.
- **Chapter 8**. It is the Maintenance chapter: it is addressed to **the maintenance operator** and it deals with the procedure for putting the machine into maintenance status, ordinary and scheduled mechanical/electrical maintenance and extraordinary maintenance. The setup of 'forms' that must be filled in by the operator who carries out the intervention allows having maintenance register always updated.
- **Chapter 9**. It is the chapter that deals with the demolition and disposal of the machine: notes are given regarding the removal and separation of the parts to be disposed of **for the operator (or operators) assigned to disassembly**.

- **Chapter 10** It is the chapter entitled 'Attached documentation' and it shows what is attached to the manual; this chapter is addressed to:
  - the **sales office** because the manual comes with a copy of the declaration of conformity attached;
  - **the maintenance operators** because the manual comes with the circuit diagrams, mechanical drawings, commercial manuals, etc... attached.

In addition of the chapters the manual has the following annexes:

- **Annex A**: 'Technical glossary' compliant with the EN ISO 12100 and EN 60204-1 standards.
- **Annex B**: 'Safety signs on the machine' compliant with UNI 7543-1 standards.

The machine must be used in accordance with what is specified in these instructions: it is therefore recommended to **read them carefully** before carrying out any operation, without neglecting anything written and illustrated. Compliance with the aforementioned standards and recommendations allows the operator to use the machine in the ways and methods permitted by the manufacturer.
If the operator detects discrepancies between what is described in this document and the machine, he must immediately inform the responsible for health and safety, without using the machine: incorrect or rash maneuvers can be a source of danger for the health of the operator and/or of the people who are near the machine itself.

The operating instructions are an integral part of the machine; it is therefore necessary to keep them in good condition, in a safe place and made available for the operator (or anyone else who requests it, provided that he is authorized to use the machine) for the entire productive life of the machine.

In the case of sale, rental, concession in use or leasing of the machine, the instructions must be attached to it.

OBLIGATION TO READ THE MANUAL

THE EMPLOYER (OR HIS MANDATORY) MUST READ THE CONTENTS OF THESE INSTRUCTIONS FOR THE USE OF THE OPERATORS, IN ORDER TO AVOID THAT THE **NON-KNOWLEDGE** OF THE NEWS CONTAINED IN IT BECOMES THE CAUSE OF GENERATING A RISK SITUATION WITH A CONSEQUENT DANGER FOR THE OPERATOR'S HEALTH.

These instructions for use are written in such a way as to contain all the information necessary for the correct **training and information** of the operator so as to avoid improper and dangerous use of the machine.

The use of the machine for purposes other than those envisaged, or any other improper use of this machine, which is prohibited, will invalidate any liability of the manufacturer PRO-DO-MIX s.r.l.

Tampering, replacement, modification of one or more parts of the machine not authorized by the manufacturer PRO-DO-MIX s.r.l. and, more generally, any intervention that does not fall within the ordinary or extraordinary maintenance, entails the end of any responsibility of the manufacturer.

1.2 Original version

This document was originally issued in the Italian language.

In the presence of any disputes due to translations, even if these have been made by PRO-DO-MIX s.r.l., the reference text will be only the Italian version.

1.3 How to read the manual

The instructions are identified by a VERTICALIOM2019.doc code and divided into chapters and paragraphs numbered consecutively. In addition to the news described by means of words (description of an information), the instructions contain symbols, photographs and drawings.

The photographs and drawings (defined Figures) are numbered in progressive order and the number is followed by a brief description of the illustration. In the example shown we have Figure 1-1, where the first 1 is the indication of the chapter and the second 1 is the progressive number of the figure inside the chapter (the next figure will be the 'Figure 1-2' and so on).
The figures always refer to the paragraph in which they are inserted and their reference is shown in the description of the paragraph (in this case Figure 1-1 refers to the description of Paragraph 1.3 as it was used to explain its reading).
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Figure 1-1 How to read the manual

It is essential that the operator in charge of operating the machine knows the meaning of the symbols which are called pictograms in the technical language referring to the machines.
The pictograms, depending on their shape and color, can represent:

HAZARD
triangular pictogram, with yellow background edged in black and a black graphic symbol.

PROHIBITION
circular pictogram, with white background edged in red and black graphic symbol.

OBLIGATION
pictogram of circular shape with blue background and white graphic symbol.

GRAPHIC SIGN
defined as a visually perceptible figure to convey an information independent of language

In this regard, we refer to the consultation of **Annex B** for the explanation of the specific pictograms on the machine that might be used during the drafting of the manual to draw the reader's attention to the importance of the subject in question.

1.3.1 Description of general symbols

Table 1: General Symbols					
	READ THE INSTRUCTIONS FOR USE		GENERIC NOTE FOR THE OPERATOR		Disposal of electrical and electronic equipment (WEEE) subject to the RoHS directive

1.3.2 Description of notes

To attract the attention of the operator on important news, a table divided into 2 columns will be used, which will be composed as follows:

1	2

1. **Position of the Pictogram**:
2. **Description of the note**:
   - If the note is written on a **grey background** it indicates **danger for the operator**;
   - If the note is written on a **white background** it indicates **danger for the machine**.

Examples given:

DANGER FOR THE OPERATOR

ELECTROCUTION HAZARD

DO NOT CONNECT THE MACHINE TO ENERGY SOURCES DIFFERENT FROM THE ONES INTENDED BY THE MANUFACTURER.

DANGER FOR THE MACHINE

CAUTION

DO NOT MAKE ANY MANEUVER IF YOU DO NOT KNOW THE REACTIONS GENERATED BY THE COMMANDS.

NOTA

NOTE

IMPORTANT GENERAL NOTE FOR THE OPERATOR.

1.4 Warranty

The warranty is only for the benefit of the Customer, therefore the assignees of the Customer or other third parties cannot raise any claim directly against PRO-DO-MIX.

This warranty will not be applied in case of defects, damages or omissions of the vertical agitators resulting from one or more of the following:

- Inaccurate handling during transport and/or inaccurate handling during loading and unloading operations and storage of the Good at the Customer's warehouses, inaccurate assembly, improper use, inadequate installation or maintenance or works on vertical agitators not authorized by PRO-DO-MIX;
- Operations above the estimated capacity;
- Damages caused accidentally by fire or by other accidents or negligence not attributable to PRO-DO-MIX;
- Omissions resulting from unauthorized modifications or alterations;
- Any damage, loss or consequence deriving from defects or non-conformities caused by omissions, faults and/or errors in the information or technical specifications provided by the Customers;
- Any damage, loss or consequence arising from the Customer's failure to comply with the instructions contained in this document;
- Any other cause not attributable to gross negligence on the part of PRO-DO-MIX.

The Buyer loses all rights to the warranty if, upon discovery of a non-conformity or a defect, he does not immediately suspend the use of the agitator.
Limited to the warranty period, PRO-DO-MIX will repair or, at its sole discretion, replace products found not in compliance. Again at its sole discretion, PRO-DO-MIX may allow the Customer to return the defective Goods against a refund of the original invoice price. If requested by PRO-DO-MIX, the replaced Goods must be delivered at the PRO-DO-MIX plant, free of charge for PRO-DO-MIX, at the expenses and cares of the Customer.
The Client, under pain of losing the warranty, must notify in writing via certified e-mail (PEC) or by registered letter with acknowledgment of receipt, within and not later than 8 (eight) days from the date of receipt of the Products any non-conformity or defect found or, in the event of hidden defects, no later than 8 (eight) days from the date of discovery. The burden of proving the date of discovery lies with the Customer. In no case claims for non-conformity or defects will be accepted if received by PRO-DO-MIX after 18 (eighteen) months from the date of delivery of the relative Products or after 12 (twelve) months from the start-up or use of the Property, (i.e. Expiration of the warranty upon the occurrence of the first of the two events).
Any other express or implicit warranty of suitability or marketability is, to the extent permitted by law, expressly excluded and not applicable.

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CHAPTER 2
Safeties

2 Safeties

2.1 Safety general information

2.1.1 Directives and regulations used for the machine design

The following directive was used for the project:

- Machinery Directive 2006/42 / EC.

And the following harmonized standards:

- EN 12100: 2010 Safety of machinery - General principles of design - Risk assessment and risk reduction.
- EN 60204-1: 2016 Safety of machinery - Electrical equipment of machines - Part 1: General rules

2.1.2 Not permitted operator behaviors

The responsible for health and safety[2] and the operators assigned to operating, maintenance and demolition of the machine **must not:**

1. Use the machine, unless the operator has been previously trained and informed;
2. disregard the behavioral methods described in these instructions for use;
3. let unauthorized people approach and/or use the machine;
4. tamper with the protections, thus exposing other operators and other people to risks of a residual nature;
5. remove or alter the safety signals (such as pictograms, warning signs and others) present on the machine;
6. use the machine without having first read and understood the behavioral, operational and maintenance information contained in this document;
7. carry out the following operations as they present residual risks:
   - adjustment of mechanical and electrical parts on the machine during operation;
   - disassembly of mechanical and electrical parts on the machine during operation;
   - removal of the protection devices of mechanical and electrical parts during operation;

These uses, which cannot be warded off by the construction, must not be allowed.

CAUTION

IT IS MANDATORY FOR THE RESPONSIBLE FOR HEALTH AND SAFETY TO **SUPERVISE** SO THAT THE MACHINE IS NOT USED IN AN IMPROPER WAY, PUTTING AT RISK THE HEALTH OF THE OPERATOR AND OF THE PEOPLE EXPOSED.

IT IS MANDATORY FOR THE WORKER TO INFORM OF DANGER THE RESPONSIBLE FOR HEALTH AND SAFETY IN CASE OF IMPROPER USE OF THE MACHINE, BECAUSE BEING AN INSTRUCTED PERSON THE WORKER IS RESPONSIBLE FOR THE USE THAT HE IS GOING TO DO.

2

Responsible for health and safety: it is an **operating function**, the one who, knowing the workplaces and its occupants, supervises the work activities and watches the observance of the instructions given. His tasks are to **supervise and monitor the instructions given**.

2.1.3 Operator characteristics and obligations

An **operator** is defined as the person or persons in charge of installing, operating, adjusting, cleaning, repairing and handling a machine or performing its maintenance.

The machine has been designed and built so as not to overload the operator's mental commitment beyond the allowed limits. The work done by the operator on the machine is such as not to cause tensions or create situations that cannot be managed by the operator himself.

It must be emphasized, however, that the operator in charge of using the machine to avoid creating hazardous situations for himself, for people exposed in hazard zones, for animals or for materials, must have the following characteristics and be aware of the following indications:

- The operator must be an able-bodied person, in full possession of his mental faculties, aware and responsible for the dangers that can be generated using a machine.
- The operator in not optimal psychophysical conditions must not perform operations of any kind with the machine.
- The state of health of the operator assigned to using the machine is very important in order to avoid accidents at the workplace.
- It is considered of fundamental importance to underline that the operator that is not in perfect psychophysical conditions can cause serious damages to himself, and also to people, animals or material assets present within the work area.
- The operator assigned to the installation, operation or maintenance of the machine must not take substances that can alter the physical and mental capacities (such as medications, alcohol, drugs, etc.).
- If for any reason an operator should, for a certain period of time, take substances that decrease the reactive capacities of the human body, he must immediately inform the plant's safety manager, who will provide for his temporary suspension from this task.
- The entire suspension and rehabilitation procedure must be followed by adequate medical documentation.
- The operator must not allow strangers to approach the machine during its operation (as they are not informed about the hazards generated), and must prevent strangers from using it.
- The use of the machine is recommended to operators at least 18 years old: the use of the machine is forbidden to personnel that has an apprentice grade.
- The operator must wear clothing suitable for the work to be performed during work operations (see Paragraph 2.1.4).

CAUTION

THIS USER AND MAINTENANCE MANUAL CONCERNING THE USE OF THE MACHINE DESCRIBED MUST BE KEPT BY THE LIABLE PERSON IN PROXIMITY OF THE MACHINE, IN A PERFECT STATE OF MAINTENANCE AND AT THE BECK AND CALL OF THOSE WHO EXPLICITLY ASK FOR IT, PROVIDED THAT THE APPLICANT IS IN ANY WAY LINKED AT THE OPERATION OF THE MACHINE ITSELF.

2.1.4 Personal protective equipment (PPE)

To safeguard the health of the operator for the use of the machine it is mandatory to use (or have available) the PPE mentioned below.

2.1.4.1 PPE for the operator in charge of installing and operating

Table 2: PPE for the operator in charge of installing and operating

Identification pictogram	Description	Notes
	FOOTWEAR	Use of **safety footwear** to avoid the risks generated by falling materials during operations and/or storage as prescribed by the current safety regulations.
	PROTECTION GLOVES	Hand **protection gloves** available in case of manipulation of objects that can cause damage.
	APPROPRIATE CLOTHING	**Appropriate clothing**, such as overalls; the use of clothing with wide sleeves and/or attachments that can be easily held by mechanical components is prohibited.
	PROTECTION MASK	Wear the **protective mask** in accordance with the provisions of the Safety Manual of the machine installation system to avoid the risks generated by the contact of potentially hazardous chemical or biological substances.

2.1.4.2 PPE for the operator in charge of maintenance

Table 3: PPE for the operator in charge of maintenance

Identification pictogram	Description	Notes
	FOOTWEAR	Use of **safety footwear** to avoid the risks generated by falling materials during maintenance operations (especially when disassembling parts).
	PROTECTION GLOVES	Hand **protection gloves** available in case of manipulation of objects that can cause damage.
	APPROPRIATE CLOTHING	**Appropriate clothing**, such as overalls; the use of clothing with wide sleeves and/or attachments that can be easily held by mechanical components is prohibited.
	HELMET Mechanical maintenance	**Protection helmet,** available, in the event of lifting parts with significant masses.
	FACE SHIELD Electric maintenance	Protection **face shield** during intervention on electrical parts, especially if under tension.
	PROTECTION MASK	Wear the **protective mask** in accordance with the provisions of the Safety Manual of the machine installation system to avoid the risks generated by the contact of potentially hazardous chemical or biological substances.

2.2 Safety information regarding the machine

2.2.1 Intended use

The machine has been designed and realized, for professional use, to agitate liquids exclusively inside a tank/vessel.

2.2.2 Not permitted uses

It is prohibited:

1. to use the machine for operations other than those described in the 'Intended use' Paragraph;
2. to use the machine in a construction configuration different from that intended by the manufacturer and represented in the relative demonstration;
3. to use the machine with tampered and/or removed safeguardings;
4. to use the machine if the area where it is installed is at risk of explosion and/or fire (i.e. it is not certified according to directive 2014/34 / UE ATEX);
5. to connect the machine to energy sources other than those specified by the manufacturer;
6. to use the machine to mix/agitate liquids with environmental conditions and density and viscosity values different from those established in Paragraph 3.5.3;
7. to use the machine in case of scheduled maintenance failure;
8. to use the machine in the absence of liquids in the tank or in the used vessel.

2.2.3 Mechanical safeties

The mechanical safety devices in the machine consist of the carters and the 'machine' bodies of the engine and gearbox components. The table shows some typological examples:

Table 4: Type of mechanical guards used _ motor and gearbox mechanical guards _	
• Vertical agitator with motor and worm screw gearbox.	
• Vertical agitator with motor and coaxial gearbox.	

Table 5: Type of mechanical guards used _ motor and gearbox mechanical guards _	
• Vertical agitator with motor with extra fan and parallel axis gearbox	
• Vertical agitator with motor and parallel axis gearbox and mechanical seal containment lantern	
• Vertical agitator with motor and planetary gearbox	

Table 6: Types of mechanical guards used _ *motor and gearbox mechanical guards* _	
• Example of type with motor with integrated inverter and coaxial gearbox	

2.3 Residual risks

2.3.1 Mechanical residual risks

From the risk analysis conducted, they have been identified some residual risks that are dangerous for the operator and they have been reported in Table 7.
Another source of risk may be generated by operator behaviors that are not permitted, such as the failure to use the PPE reported in Paragraph 2.1.4.
On the machine, there have been applied warning signs for the operator as shown in Table 8.
.

Table 7: Residual risks			
1	**Area**	Motor body of the machine	
	Residual risk	**Burn** resulting from contact with the motor case during prolonged periods of use under the maximum permitted efforts.	
	Warning sign description	• Obligation to read the instructions for use • Danger hot surfaces	

2.3.2 Residual risks during maintenance

During machine maintenance it is reasonably foreseeable the possibility of injury:

- to the upper extremities (abrasion on mechanical parts);
- to the lower extremities (fall of mechanical parts if not adequately supported);
- to the eyes (dangers generated by under tension elements);
- to the head (impact with machine parts).

CHECK THAT GUARDS AND SAFEGUARDINGS ARE EFFICIENT

THE GUARDS AND SAFEGUARDINGS CAN BE REMOVED IN PART O ALL DURING THE MAINTENANCE OPERATIONS BY SPECIALIZED AND/OR AUTHORIZED PERSONNEL, WHICH WILL PUT THEM BACK INTO THE ORIGINAL POSITION AS SOON AS THE MAINTENANCE OPERATIONS ARE FINISHED: DISASSEMBLING THE SAFEGUARDINGS FOR MAINTENANCE MUST BE DONE ONLY WITH THE AUTHORIZATION AND SUPERVISION OF THE RESPONSIBLE FOR MAINTENANCE. AT THE END OF MAINTENANCE THE RESPONSIBLE FOR MAINTENANCE MUST ENSURE THAT THE SAFEGUARDINGS THEMSELVES ARE CORRECTLY ASSEMBLED AND EFFICIENT.

THE MACHINE CANNOT BE STARTED AFTER A MAINTENANCE INTERVENTION UNLESS THE SAFEGUARDINGS AND OTHER DEVICES HAVE BEEN REFITTED.

THE MACHINE CANNOT BE STARTED AFTER A MAINTENANCE INTERVENTION UNLESS SAFEGUARDINGS AND OTHER DEVICES HAVE BEEN REASSEMBLED.

2.3.3 Warning signs

CAUTION

IT IS STRICTLY FORBIDDEN TO REMOVE THE WARNING SIGNS FROM THE MACHINE.

Since some residual risks have been identified, a number of warning signs, reported below, have been installed on the machine, in accordance with UNI 7543-1. The Customer is obliged to immediately replace any warning sign that becomes illegible due to wear.

Table 8: Warning signs

Sign installed	Description	Position
	**Danger hot surfaces**	In correspondence with the machine body
	**Prohibition to remove security guards**	In sight of the operator
	**Prohibition to repair and/or lubricate components in movement**	In sight of the operator
	**Obligation to consult/read the instructions for use**	In sight of the operator
	**Obligation to use protective gloves**	In sight of the operator
	**Obligation to use safety footwear**	In sight of the operator
	**Obligation to use appropriate clothing**	In sight of the operator
	**Obligation to check the efficiency of the protective devices**	In sight of the operator

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CHAPTER 3
General description and technical data

3 General description

3.1 Description of the machine

The machine has been designed and realized to agitate liquids exclusively inside a tank.
The rotation motion generated by the electric motor supplied is transmitted to the transmission shaft that causes the impeller immersed in the fluid to rotate.

3.2 Layout of components

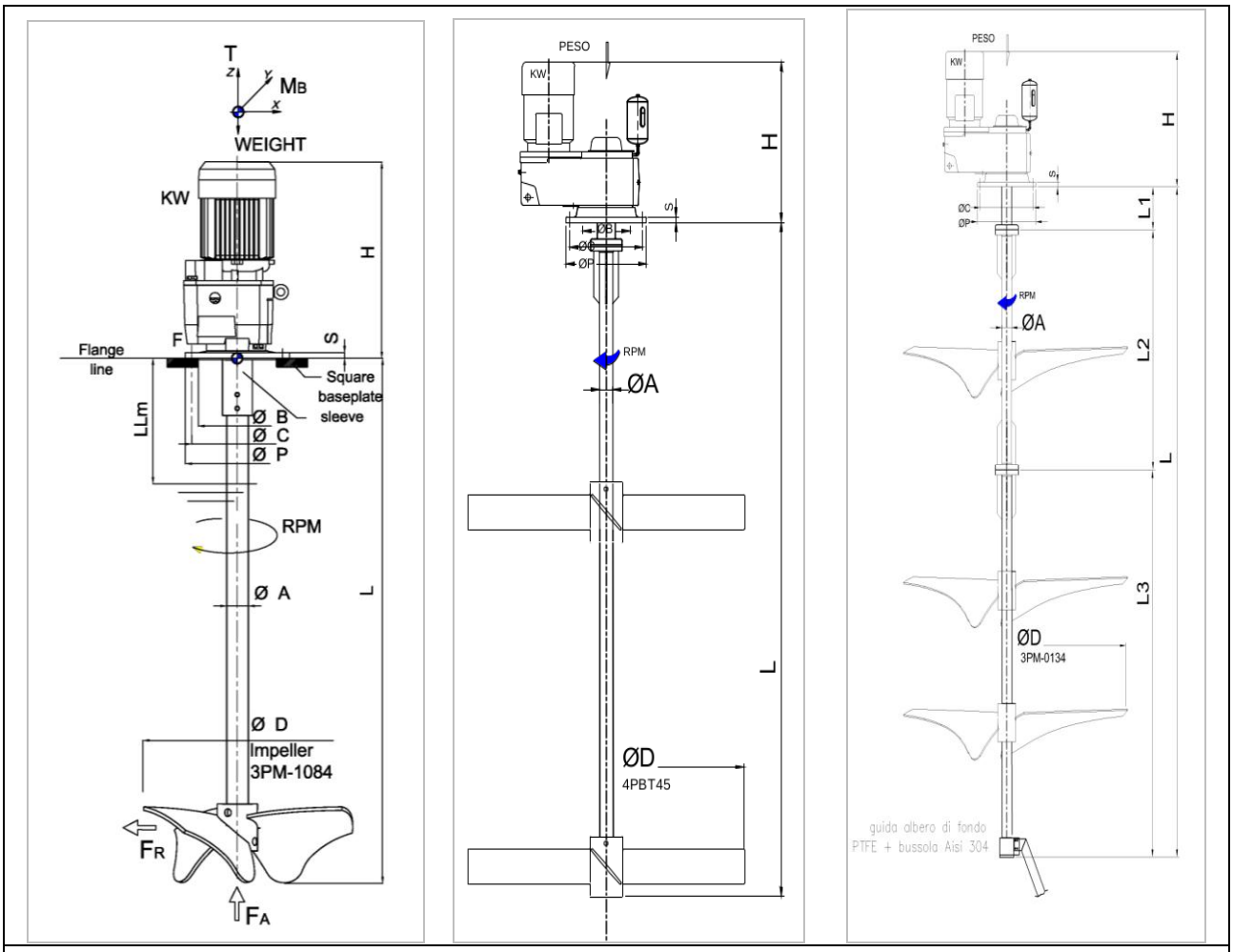

Figure 3-1 General arrangement drawing

3.3 Agitator range

The vertical agitators range includes a different number of models according to the different combination of components. Depending on the construction variants or the accessories installed, the agitator type code can be completed with one or more letters according to synoptic in Table 9.

Examples of vertical agitator families:

ACC	Vertical agitator of the range GreenLine with motor and coaxial gearbox, equipped with a high efficiency impeller 3PM-1084 Excellent.
ADH	Vertical agitator of the range GreenLine with direct motor and three-bladed marine propeller.

Example of vertical agitator model:

GPP.11042.S.250 / DLOV	Vertical agitator of the range GoldenLine with motor not supplied by PRO-DO-MIX, parallel axis gearbox, ANSI flange, lip seal, turbine with 4 45 ° inclined blades and diameter 400 mm, shaft length 2500 mm, material of the parts in contact with the liquid AISI 316L, with special painting of the drive unit (as per customer specification).

3.4 Machine codes synoptic

Table 9 : Machine codes synoptic

G P L . 15 16 1 . S . 300 / OPTIONS O L X B V Y

SHAFT LENGHT – from drive unit flange to bottom part of impeller (cm)

WETTED PARTS MOC

A	Carbon Steel
Q	SS 304L
S	SS 316L
P	PP lining
R	ABCITE lining
L	EBONITE / rubber lining
H	HALAR / ECTFE lining
V	PVC lining
Z	Duplex
X	Any other MOC / lining option

CODE FOR INTERNAL USE ONLY

IMPELLER DIAMETER

External diameter; i.e. dia. 850 mm = 08 dm (turbine and impeller)
diameter 128 mm = 13 cm (propeller)

INSTALLED POWER

00	For a motor of	0,09 or 0,12	kW
01	For a motor of	0,2	kW
02	For a motor of	0,3	kW
03	For a motor of	0,4	kW
05	For a motor of	0,6	kW
07	For a motor of	0,8	kW
11	For a motor of	1,1	kW
15	For a motor of	1.5	kW
22	For a motor of	2.2	kW
30	For a motor of	3	kW
40	For a motor of	4	kW
55	For a motor of	5,5	kW
75	For a motor of	7,5	kW
92	For a motor of	9,2	kW
A1	For a motor of	11	kW
A5	For a motor of	15	kW
A8	For a motor of	18,5	kW
B2	For a motor of	22	kW
C0	For a motor of	30	kW
C7	For a motor of	37	kW
D5	For a motor of	45	kW

IMPELLER TYPE

A	ANCHOR IMPELLER
B	3PM-0242 HIGH-EFFICIENCY MASTER IMPELLER
C	3PM-1084 HIGH-EFFICIENCY EXCELLENT IMPELLER
F	TURBO PROPELLER
H	MARINE PROPELLER
L	3PM-0030 HIGH-EFFICIENCY EVOLUTION IMPELLER
P	4PBT45° 4 PITCHED BLADES TURBINE
S	2PBT45° 2 PITCHED BLADES TURBINE
R	2PM-0650 HIGH-EFFICIENCY PREMIUM IMPELLER
T	3PM-0134 HIGH-EFFICIENCY HURRICANE IMPELLER
X	COWLES PROPELLER

DRIVE UNIT

D	Direct drive
L	Direct drive with lantern house bearing support
V	Worm gearbox
C	Coaxial gearbox
P	Parallel axis / bevel gearbox
H	Hortogonal axis gearbox
E	Planetary gearbox with lantern bearing

AGITATOR RANGE

A	GreenLine agitator
B	BlueLine agitator
S	Silver Line agitator Ceramic Mining Concrete
G	Golden Line agitator Special Application
X	ATEX Line agitator up to zone II 2G c IIB T4 (Tamb= -20°C +40°C) / II 2D c IIIB T135°C

All non codified options

PAINTING OPTION

	Standard = RAL 6017 green 40-70µm total DFT (Dry Film Thickness)
V	Special paint according to our internal procedure (C5-M, C5-I)

MECHANICAL OPTION

G	SS 304 rigid coupling
B	Square base plate
D	DN or ASA standard flange
K	Disassemblable impeller
F	Food grade wetted parts (Ra <0,8)
Z	PTFE bottom steady bearing to be welded
2	Number of impellers

LUBRICATION OPTION

	Standard = synthetic oil VG220
X	Special oil (food grade or mineral) according to customer specs.

DRIVE UNIT OPTION

	Standard version = compact motor, MOC aluminum, IP55
L	Without motor (motor supplied by customer)
C	IEC motor
A	IEC motor, MOC cast iron
I	VFD electronic variable speed motor
H	Manual speed variator
M	Single phase motor
P	Rain-cap
R	Heating resistance
S	PTC thermistors
J	IP65

SEALING OPTION

E	PP sealing flange with V-ring
O	Lip seal - radial shaft seal
T	Stuffing box
N	Single mechanical seal
Q	Double mechanical seal

3.5 Technical data

3.5.1 Power supply

Rated voltage	For the machine specific data see Table 10 and consult the following documents: - Order confirmation - Agitator technical file - Agitator dimensional drawing - Motor technical file
Frequency	
Power	

3.5.2 Application ranges per family

In Table 10 they are reported the application ranges for the different vertical agitator families. All data reported below are approximate, for the specific technical information please refer to one of the following supplied documents:

- Order confirmation
- Agitator technical file
- Agitator dimensional drawing.

Table 10 Application ranges per agitator family

				APPLICATION RANGES				
	Family	Gearbox type	Impeller type	Power	Speed	Impeller diameter	Shaft max length	Max mass
				kW	rpm	mm	mm	kg
GREENLINE	ADH	NA	Marine propeller	0,09 ÷ 2,2	700 ÷ 2800	90 ÷ 250	1500	50
	ADT		3PM-0134			200	1500	50
	ALH		three-bladed marine propeller			90 ÷ 250	2000	100
	ACC	coaxial	3PM-1084	0,18 ÷ 3	50 ÷ 300	200 ÷ 800	3000	250
	ACP		Turbine 4PBT45°	0,25 ÷ 3	50 ÷ 200	110 ÷ 800	2500	250
	ACR		2PM-0650	0,37 ÷ 1,1	30 ÷ 70	500 ÷ 1200	3500	250
	ACT		3PM-0134	1,1 ÷ 5,5	50 ÷ 150	700 ÷ 1500	3500	350
	AVC	Worm screw	3PM-1084	0,18 ÷ 3	50 ÷ 300	200 ÷ 800	3000	250
	AVH		Marine propeller	0,09 ÷ 0,75	50 ÷ 200	90 ÷ 130	1350	50
	AVP		turbine 4PBT45°	0,25 ÷ 3	50 ÷ 200	110 ÷ 800	2500	250
	AVR		2PM-0650	0,37 ÷ 1,1	30 ÷ 70	500 ÷ 1200	3500	250
	AVT		3PM-0134	1,1 ÷ 5,5	50 ÷ 150	700 ÷ 1500	3500	350

Table 10 Application ranges per agitator family

				APPLICATION RANGES				
	Family	Gearbox type	Impeller type	Power	Speed	Impeller diameter	Shaft max length	Max mass
BLUELINE	BCP	coaxial	turbine 4PBT45°	0,37 ÷ 18,5	20 ÷ 130	900 ÷ 2000	3500	500
	BEP	epicyclical	turbine 4PBT45°	1,1 ÷ 18,5	20 ÷ 120	900 ÷ 2000	3500	1200
	BEL	epicyclical	3PM-0030	0,55 ÷ 45	15 ÷ 120	1650 ÷ 4000	6000	1200
	BCB	coaxial	3PM-0242	0,55 ÷ 2,2	20 ÷ 60	1600 ÷ 2200	4000	500
	BEB	epicyclical	3PM-0242	1,1 ÷ 18,5	15 ÷ 50	1600 ÷ 3400	5500	1200
	BCR	coaxial	2PM-0650	0,37 ÷ 3	4 ÷ 40	1400 ÷ 2200	4500	500
	BER	epicyclical	2PM-0650	0,37 ÷ 5,5	2 ÷ 30	1400 ÷ 3000	4500	1200
SILVERLINE	SCL	coaxial	3PM-0030	3 ÷ 5,5	70 ÷ 100	1000 ÷ 1650	6000	500
	SEL	epicyclical	3PM-0030	5,5 ÷ 18,5	30 ÷ 70	1450 ÷ 3500	6000	1200
	SCC	coaxial	3PM-1084	0,55 ÷ 5,5	40 ÷ 120	500 ÷ 1050	6000	700
	SCP	coaxial	turbine 4PBT45°	1,5 ÷ 4	40 ÷ 120	700 ÷ 1500	6000	1200
	SCT	coaxial	3PM-0134	1,5 ÷ 5,5	70 ÷ 130	900 ÷ 1500	6000	700
	SEP	epicyclical	turbine 4PBT45°	4 ÷ 11	30 ÷ 80	1500 ÷ 2000	6000	1200
	SEC	epicyclical	3PM-1084	1,1 ÷ 4	2 ÷ 20	1800 ÷ 3200	6000	1200
GOLDENLINE	Non standard agitator tailor-made designed with specific characteristics.							

3.5.3 Environmental limits of the machine

Unless otherwise specified in the contract, it is understood that the machine can function properly only in the environmental conditions referred to in the following points. Environmental conditions other than the one prescribed may cause malfunctions or breakages with consequent hazardous situations for the health of the operator and people exposed.

It is the responsibility of the production plant manager to verify that these conditions are always met.

3.5.3.1 Explosion and/or fire

The machine has not been designed to be used in places where substances in the form of a dust cloud can cause an explosive atmosphere with air.

HAZARD OF EXPLOSION AND/OR FIRE

THE MACHINE MUST NOT WORK IN AREAS WITH HAZARD OF EXPLOSION OR RISK OF FIRE.

3.5.3.2 Altitude

The machine is able to function properly at altitudes up to 1000 meters above sea level.

3.5.3.3 Physical parameters of the immersion liquid

The vertical agitators guarantee their correct and safe operation exclusively inside liquids with values of:

- Density equal or less than 1,1kg/dm^3;
- Viscosity equal or less than 10 cPs;
- Temperature below 80°C.

3.5.3.4 Ambient air temperature

The electrical equipment works correctly at air temperatures between **-5° C** and **+ 40° C**.
The electrical equipment is able to work correctly when the relative humidity does not exceed **50%** at a maximum temperature of **+ 40 ° C**. Higher relative humidity is allowed at lower temperatures.

3.5.3.5 Vibrations and impacts

The machine must be installed on surfaces that do **NOT** transmit vibrations and in environments where there is **NO** danger of impact with other mechanical units.

3.5.3.6 Noise

The noise emission of the machine during normal operation is lower than the value of 85 dB.
The value refers to an emission level and does not necessarily represent a safe working level.

The other factors that influence the actual level of exposure of operating personnel include:

- the state of efficiency of the machine;
- the specific characteristics of the environment in which the machine is used;
- the interaction of the noise produced by the machine with other noise sources;
- the position of operating personnel.

OBLIGATION FOR THE USER AND THE EMPLOYER OF RESPECTING THE LAWS OF THE COUNTRY OF INSTALLATION OF THE MACHINE, IN THE MATTER OF DAILY EXPOSURE OF THE PERSONNEL TO NOISE WITH THE POSSIBLE PRESCRIPTION OF USE OF PPEs ACCORDING TO THE OVERALL LEVEL OF SOUND PRESSURE PRESENT IN THE WORK AREA.

3.5.4 Lighting

The minimum illumination must be such as to guarantee the correct perception of symbols and markings (approximately 500 lux).

The lighting level must always be such as to guarantee operation in the best possible safety.

The installation operations must be carried out in a ‘normal’ light condition, that is, such as not to blind the view of the operator or to force it in the case of poor lighting.

Use battery lighting devices or devices installed on columns and connected to the plant's electricity supply network.

Do not point the auxiliary lighting devices directly on the operator's eyes so as not to dazzle him.

PRO-DO-MIX®
PRODUZIONE DOSAGGIO MISCELAZIONE

CHAPTER 4
Installation

4 Installation

4.1 General warnings

The operator in charge of installing the machine must be a person suitably trained and informed regarding the work he is about to do.

The operator must use suitable means to carry out the installation operations safely; therefore, remember that all the equipment used for installation must be in perfect condition and must be used as required by the respective manufacturers.

The choice of the place or of the spaces is important for the quality of work (maintenance, safety, etc.): this area must be well lit and ventilated.

The environmental and operating conditions must not constitute an obstacle for access to the controls.

Before starting to handle the machine, check:

- the efficiency of lifting equipments.
- their scope; to lift the machines or parts of them they are required means having a minimum capacity higher than the mass declared and shown on the packaging.

During lifting and transport operations it is necessary to take every possible precaution in order to avoid dangerous movements that could cause accidents or damage to people or materials.

When lifting, avoid sudden movements that could damage the machine.

Lifting operations must be carried out by expert personnel.

Make sure there are no people exposed in the hazard area.

Lifting must be carried out continuously (without pulses).

Keep the load as low as possible during handling for better load stability.

CAUTION SUSPENDED LOADS

DURING LIFTING AND TRANSPORT OPERATIONS, THE MACHINE MUST ALWAYS BE STABLE AND SAFE. DURING THE PERFORMANCE OF THESE PROCEDURES THE AREA OCCUPIED BY THE MACHINE HANDLING AND THE SURROUNDING AREAS ARE TO BE CONSIDERED HAZARD AREAS.

CAUTION

FOR THE HANDLING OF THE MACHINE, MEANS WITH MINIMUM CAPACITY HIGHER THAN THE DECLARED MACHINE MASS MUST BE USED. BEFORE YOU START HANDLING THE MACHINE YOU MUST CHECK THE EFFICIENCY OF THE LIFTING MEANS AND THEIR CAPACITY LOAD.

CAUTION

IN CASES IN WHICH THE AGITATOR IS DELIVERED ALREADY ASSEMBLED OR IN WHICH THE AGITATOR HAS ALREADY BEEN INSTALLED, AVOID MOVING IT WITH A GRIP ON THE SHAFT. LOADS AND SUDDEN MOVEMENTS IN FACT MAY AFFECT THE STRAIGHTNESS OF THE SHAFT.

MOVE THE SHAFT AS IN FIGURE 4-5

4.2 Storage and packaging

4.2.1 Packaging

The machine is transported and delivered partially assembled and accommodated on pallets.
Before moving and unpacking the components of the machine, check their integrity and the total absence of any potential damage suffered during the transport phases.
Particular attention is to be paid in verifying the perfect linearity of the shaft.
Check the weight and the dimensions as shown in Table 10 *Application range per family* and displayed on the packaging.

Figure 4-1 Type of packaging on wooden case for *complete agitator*

Figure 4-2 Type of packaging only for *drive unit*

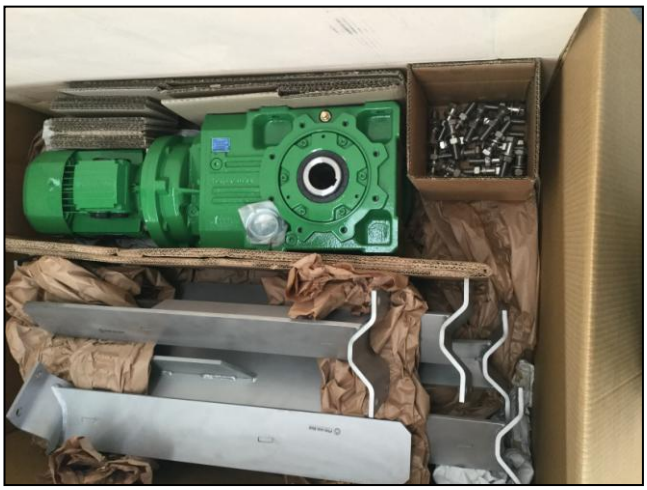

Figure 4-3 Type of packaging for *drive unit* and *impeller*

4.2.2 Storage

We recommend storing the vertical agitator on pallets or other packaging supplied by PRO-DO-MIX and warehousing it in a suitable place, covered and protected from atmospheric agents. The warehouse must not be exposed to big temperature fluctuations, that could damage the integrity of the electrical equipment, and must guarantee protection against humidity, against extreme temperatures (below -20° C and above + 40° C) and against condensation phenomena. No other type of material or equipment should be stored above the packed machine.

4.2.3 Extended storage

For storage periods longer than 3 months, the surfaces involved in the couplings such as flanges, shaft ends and impeller bore must be protected with a suitable antioxidant product. The gearboxes, on the other hand, must be positioned with the vent plug in the highest position and completely filled with oil. For information on the type of oil used for the first load, contact PRO-DO-MIX.

Before actually putting back into service the agitator, the correct quantity of oil must be restored.

4.3 Machine handling

The packed pallet can be moved using suitable lifting equipment with forks to be positioned in the appropriate pallet seats.

During handling, make sure that adequate maneuvering spaces are available, as well as suitable surfaces free of obstructions and disconnections and the absence of people along the maneuvering and transport path.

Only after checking the stability of the machine and its components on the pallet, lift the packaging to the minimum level necessary for its handling, avoiding oscillations and impacts that could damage the machine or cause hazard.

Place the pallet on the ground near the installation site.

Remove the neck fixing straps one at a time, always checking the stability of the machine and of the components in order to avoid possible dangerous sudden slips of the machine itself.

For the following phases the machine can be handled:

- using ropes/chains attached to the eyebolt located on the connection flange of the drive unit in models equipped with this system (Figure 4-4);
- using a center of gravity harness (Figure 4-5).

Before transport and handling, check the weight and dimensions as shown in Table 10 *Application range per family*.

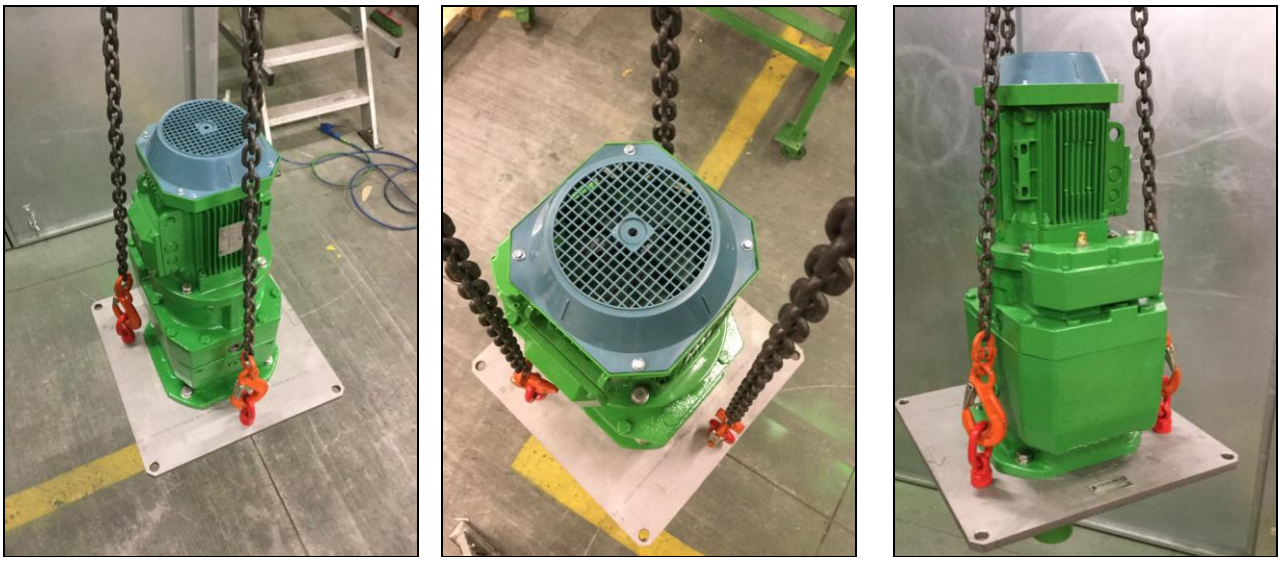

Figure 4-4 Handling by hanging on the base flange

Figure 4-5 Handling by means of harness at the center of gravity of the part

CAUTION

THE USE OF LIFTING EQUIPMENT NON ADEQUATE MAY RESULT IN DAMAGES OR ACCIDENTS TO PERSONNEL IN CHARGE OF THE OPERATION AND DAMAGE TO THE MACHINE.

DO NOT TWIST OR KNOT THE ROPES/CHAINS.

4.4 Positioning

4.4.1 Preliminary operations

Check the machine status by a visual inspection.

Any deformation of the visible parts indicates shocks to the machine during transport, which could compromise its normal functioning.

The installation site must be suitable for safe use of the machine.

Check the tightness of the screws, bolts and machine fittings.

Check and clean the machine as follows:

- Check the data on the machine plate.
- Check that the voltage and current of the mains to which the machine is to be connected for power supply are compatible with those indicated for its correct and safe operation.
- The integrity of the safeguardings supplied with the machine and their correct and safe positioning on it.
- Remove external dust and dirt accumulated during transport.
- Thoroughly clean and dry each part, uncovered or painted using hot water and degreaser, then dry with a clean rag.

4.4.2 Positioning on the tank or vessel

When positioning the machine on the installation site, check that:

- The spaces for maneuvering and for the seat of the machine during its operation are sufficient and suitable both for the drive unit (outside the tank) and for the shaft and impeller (inside the tank)
- Check the suitability of the housing structure of the machine. Sizing and finishing must be widely able to withstand the weight of the machine and the stresses transmitted by the machine to the structure and to guarantee the standards required by the type of fixing provided (threaded bars, screws, grouting chemistry ...). The structure of the seat must not show any weakness that could transmit vibrations or oscillations to the machine, jeopardizing stability and operational safety.
- The agitators must be installed in a vertical position, with the motor upwards and with no tilt with respect to the vertical.
- When the agitator is installed centrally inside a cylindrical section tank, the breakwaters (or anti-rotation blades) are essential.
  There can be three or four according to the agitator's impeller type; three breakwaters at 120° if the impeller has 3 blades, four breakwaters at 90° if the impeller has 4 or 2 blades.
  Their characteristics are:
  - Width: T / 10, where T is the diameter of the tank.
  - With suspended solids, breakwaters spaced from the wall are preferable.
  - If the breakwaters are spaced from the wall, always propose a 2% gap with respect to the diameter of the tank and a width of the breakwaters of 8%.
  - Height: that of the liquid, in general up to the bottom of the tank except in the presence of suspended solids (approximately 100 mm from the bottom).

  Example: for a 3 m diameter tank, the breakwaters will have a width of 0.30 m or 0.24 m and will be spaced from the wall by 0.06 m.

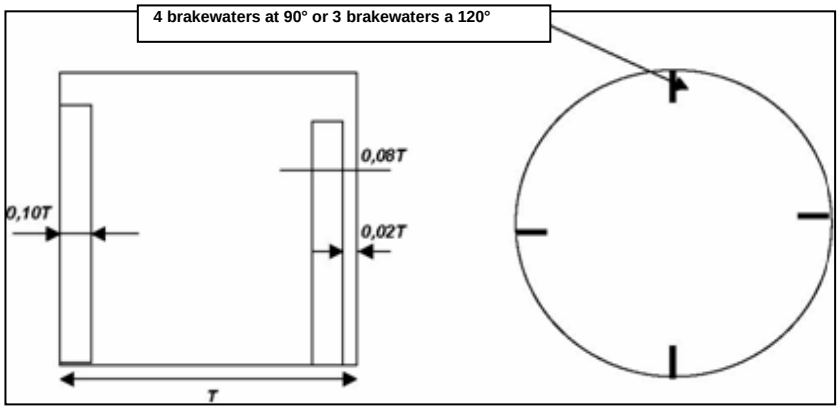

Figure 4-6 Arrangement of the breakwater elements inside a cylindrical tank

- When the agitator is installed inside a cylindrical section tank without a breakwater, position the vertical agitator off center by ¼ of the diameter of the tank itself.

The procedure for positioning the vertical agitator must include:

- The safety of the places and of the operator assigned to the positioning through collective or individual safety devices (for this purpose, consult the Safety Manual of the plant where the machine is installed).
- The safe suspension of the preassembled parts of the machine (Paragraph 4.4 Machine movement).
- Inserting the shaft and the impeller inside the tank.
- The fixed support with suitable stands on the ground which can give stability to the shaft, in order to avoid dangerous oscillations of the machine when coupling to the structure.

4.4.3 Fixing

Introduce the agitator in the intended location paying particular attention not to hit the tank or other fixed parts with the agitator components.
The agitator must be firmly fixed to its support by bolts.
The bolts must always be of the maximum size allowed by the fixing holes that are on the connection flange of the agitator drive unit.
Check that the shaft is perfectly vertical and that by rotating the shaft manually there is no friction between the shaft itself and any fixed parts close to the shaft or to its coupling.
Fix the screws and the nuts with a non-permanent locking (such as LOCTITE 242® Threadlocker or similar, not included in the scope of supply PRO-DO-MIX), in order to avoid loosening of the threaded coupling during operation, even in the presence of vibrations.
This artifice allows an easier disassembly of the fasteners and of the fixing screws.

Table 11 : Torque wrench

FIXING SYSTEM OF CLASS A2-70 _e.g. stainless steel screws and nuts		FIXING SYSTEM OF CLASS 8.8 _e.g. carbon steel screws and nuts	
dimensions	torque wrench Nm	dimensions	torque wrench Nm
M8	23	M8	23
M10	30	M10	50
M12	50	M12	80
M14	85	M14	130
M16	120	M16	200
M18	180	M18	280
M20	240	M20	400
M22	320	M22	600
M24	400	M24	700
M27	650	M27	1000
M30	800	M30	1400

- ✓ Avoid insufficient tightening or over-tightening whose occurrence causes a reduction in the quality of the connection;
- ✓ For tightening use calibrated tools and instruments capable of returning the applied torque value;
- ✓ Consult and apply the indications referred to in the EN ISO 6789:2004 standard *Operating tools for screws and nuts - Hand torque tools - Requirements and test methods for design conformance testing, quality conformance testing and recalibration procedure* to respect the correct tightening speeds; this allows the exact tightening tension to be reached.

4.5 Installation of the vertical agitator

Before proceeding with the installation of the machine, proceed with checking the condition of the tank or tank housing the machine, which must be completely dry, perfectly ventilated and free of residual vapors, aerosols, gas of any kind, with sufficient space to accommodate the installer operator, work equipment, personal and collective safety equipment according to the places and safety instructions described in the Plant Safety Manual.

If possible always prefer an installation like the one shown below, in order to allow an easy installation and easy removal in case of maintenance. It's about building a support with an open side.

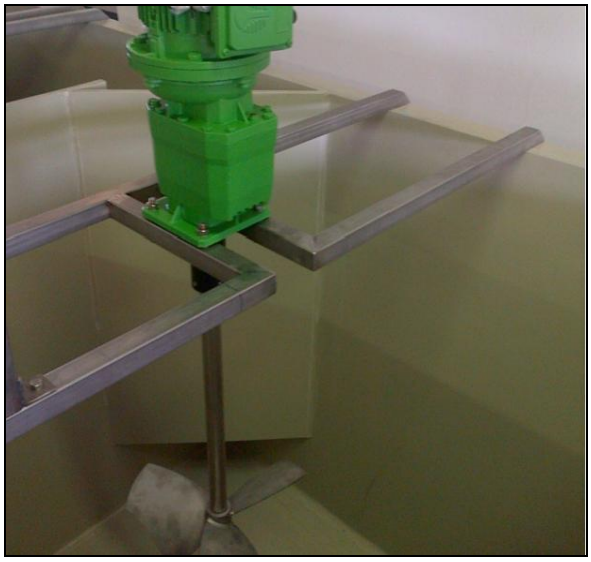

Figure 4-7 Agitator: optimal installation method

4.5.1 Installation of the drive unit

4.5.1.1 Set up of an agitator with preassembled drive-shaft unit

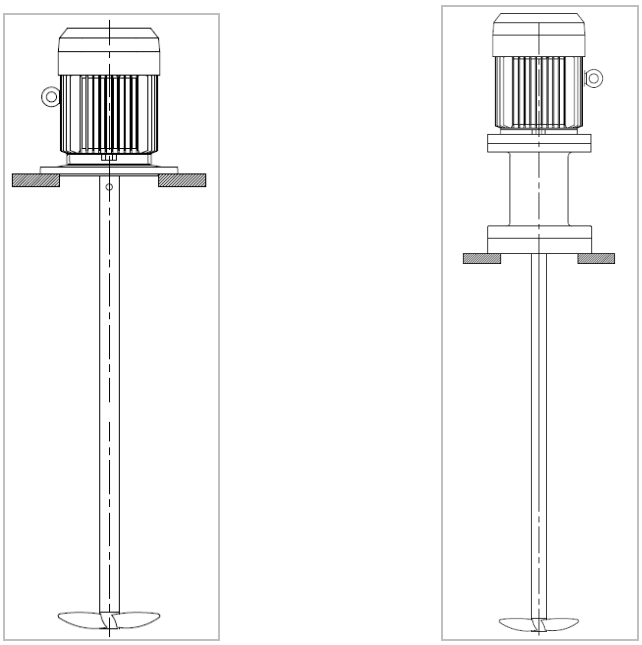

Figure 4-8 Agitator with preassembled drive-shaft unit: views

For all the agitators supplied in a preassembled configuration (motor and/or gearbox preassembled to the shaft) proceed with the installation as follows:

- position the gasket for the flange (only in the cases in which it is supplied);
- center the housing holes of the agitator anchor system and the respective ones made on the structure;
- screw the bolts and screws supplied (only in the cases in which they are supplied) according to the sequence and tightening required;
- install the impeller using the procedure described in Paragraph 4.5.2 Installation of the impeller

4.5.1.2 Set up of a non assembled agitator (with drive unit separated from shaft)

For all the agitators supplied with motor and/or gearbox not preassembled to the shaft, proceed with the installation as follows:

- position the gasket for the flange (only in the cases in which it is supplied);
- center the housing holes of the agitator anchor system and the respective ones made on the structure;
- tighten the screws supplied (only in case it is supplied) according to the sequence and tightening required;
- anchor the plugs supplied with the models that require this type of anchor according to the scheme described above;
- for agitators anchored to the support structure (tank/s) by chemical grouting wait for the setting times indicated in the technical data sheets of the products used.

Depending on whether the agitator has a cylindrical sleeve coupling, a flange coupling, or a female gearbox (without joint), the installation procedure is different.

Agitator with sleeve cylindrical coupling

The agitator shaft has an adhesive that identifies the side to be inserted in the coupling (drive unit side). Place the shaft inside the cylindrical coupling and fix the nuts in correspondence of the slot or seat on the shaft. The number and size of the nuts vary according to the type of coupling. Screw the supplied bolts and screws according to the sequence and tightening required.

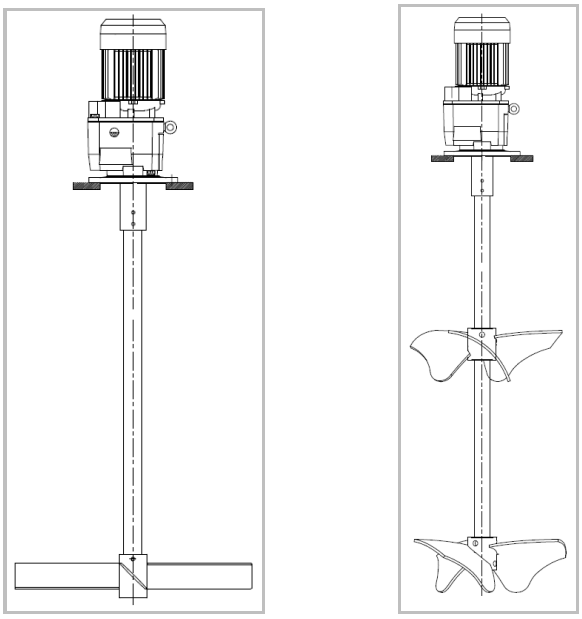

Figure 4-9 Non-assembled agitator and sleeve cylindrical coupling: views

Agitator with flange coupling

The agitator shaft has a cylindrical flange to be fixed to the outlet flange of the drive unit. Screw the supplied bolts and screws according to the sequence and tightening required.

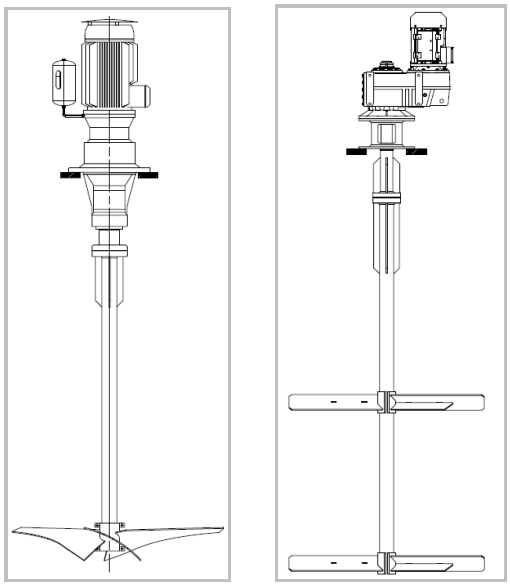

Figure 4-10 Non-assembled agitator and flange coupling: views

Agitator with female gearbox (without joint)

The shaft has a threaded hole, female or male depending on the size on its head. Seat the shaft up to the lower stop of the gearbox.
Insert on the thread the washer, the screw or the nut and tighten it as described above.
Protect the exposed rotating part with a lid (only in cases where it is supplied).

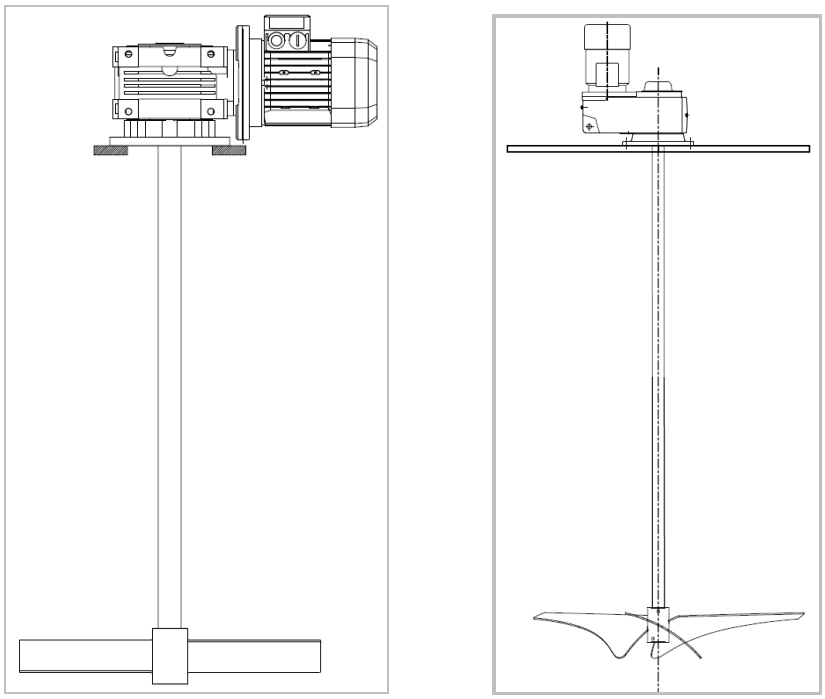

Figure 4-11 Non-assembled agitator and female gearbox: views

4.5.1.3 Set up of a vertical agitator with bottom stabilizing bush

The bottom stabilizing bush, where present, must be installed at the end of all other installation procedures. The supports must be adapted on site according to the position of the agitator shaft. It is essential to check the perfect alignment between shaft and bushing by turning the shaft by hand so as to check that there is no friction. Where provided, the bushing may have adjustment screws which will allow alignment during assembly. Screw the supplied bolts and screws according to the sequence and tightening required.

Figure 4-12 Bottom stabilizing bush

4.5.1.4 Set up of a vertical agitator with plastic coating

In case of coated agitator, the shaft is a single body with the impeller/s. It will therefore not be possible to separate the shaft from the impeller/s to be able to insert it inside the tank.
Take extreme care to avoid damage to the coated parts. Some coatings may have a minimum thickness of 100 micron.

4.5.2 Installation of the impeller

The impeller supplied with the vertical agitator can only be installed after the drive unit is fixed to the structure of the tank or vessel.

The procedure for coupling the impeller to the machine shaft requires:

- Verification of the total absence of the electrical connection of the machine to the mains supply. This operation will be performed only after installation is complete.
- Impeller harnessing with suitable and certified lifting equipment (check the impeller technical data shown in Table 10) and fastening of control ropes for remote control by the operators of the approaching and centering movements of the impeller hub on the shaft of the machine.

The coupling of the impeller to the agitator shaft can be of 4 types:

- **screwed impeller:** screw the impeller to the shaft. Position the gasket between the shaft and the impeller (only in the cases in which it is supplied);
- **impeller with cylindrical housing:** the agitator shaft has an adhesive that identifies the side where the impeller is housed (impeller side). Insert the impeller on the shaft and fix the nuts at the slot or seat on the shaft. The number and size of the nuts vary according to the type of impeller. Screw the supplied bolts and screws according to the sequence and tightening required;
- **impeller divided into several parts:** position the impeller on the appropriate seat or as shown in the drawing supplied during the design phase. Screw the supplied bolts and screws according to the sequence and tightening required;

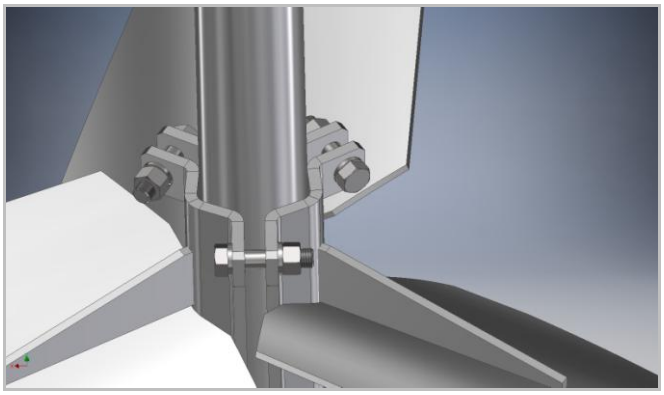

Figure 4-13 Pluricomponent impeller

- **impeller with bolted blades**: position the blades on the hub and tighten the screws supplied according to the sequence and tightening required.

4.5.3 Connection to the power supply

The connection of the machine to the electrical panel of the system must be carried out by specialized personnel, in compliance with the standards of good technique and safety in force.

It is essential to connect the machine to an efficient and controlled grounding system.

In case of doubt about the efficiency of the network do not connect the machine.

CAUTION

EQUIP THE MACHINE WITH A PADLOCKABLE ELECTRICAL POWER SUPPLY DEVICE, WITH SHAPE, DIMENSIONS AND PHYSICAL CONSTITUTION CHARACTERISTICS SUFFICIENT ENOUGH TO GUARANTEE CORRECT USE BY THE OPERATOR, NEAR THE MACHINE, AWAY FROM HAZARD AREAS AND AT A HEIGHT FROM THE SOIL SUCH TO ALLOW AN ACCESS WITHOUT EXCERTION OR IMPEDIMENT.

GUARANTEE BY LABEL THE LOCAL IDENTIFICATION OF THE ASSOCIATED FUNCTION.

The User is required to set up an adequate electric line isolating switch upstream of the system, in addition to effective means of protection against overcurrents and indirect contacts.

At the time of connection check:

- that the voltage of the power supply corresponds to the voltage and frequency indicated in Paragraph 3.5 Technical data;
- that the power supply network is equipped with an adequate grounding system;
- to have correctly applied the indication for installation and use of the electrical components supplied with the machine represented by the motor and the isolating switch;
- to have carried out all the preparations and electrical connections in compliance with the technical reference standard IEC 602014-1: 2018 Electrical equipment of machines

CAUTION

BEFORE REALIZING ANY KIND OF ELECTRICAL CONNECTION THE SPECIALIZED PERSONNEL WHICH IS AUTHORIZED TO CARRY OUT INTERVENTIONS ON MACHINE MEMBERS AND ELECTRICAL COMPONENTS MUST HAVE READ AND UNDERSTAND THE CONTENTS OF THE INSTRUCTION MANUAL OF THE ELECTRIC MOTOR OF THE MACHINE ATTACHED TO THIS MANUAL

For the electrical connection of the machine, proceed as follows:

- isolate the machine and its upstream components from any possible energy source;
- consult the Manual of the electric motor supplied;
- remove the cover of the motor terminal board;
- follow the connection instructions of the terminal board shown on the back of its box;
- connect the ground terminal of the motor to the protective conductor.

The electric power supply of the motor must be equipped by the installer with a magneto-thermal switch or a magnetic starter with overload and minimum voltage protections, a thermal relay and fuses installed upstream.
The electrical guard of the motor (fuse and thermal, or contactor), must correspond to the nominal intensity of the motor.

4.6 Start-up

Once all the installations and the checks referred to in the previous points have been carried out, the inspections and procedures for the start-up of the machine are:

1) check that the level of the liquid in the tank/vessel in which the shaft and impeller are immersed is the one required for the agitator to operate at full speed;

2) verify the correct fixing of the machine to the installation base;

3) activate the machine for a few minutes by acting on the current switch installed by the user, bringing it to the **– I – ON** position.

4) verify the correct direction of rotation of the impeller by checking the correspondence to the direction of rotation indicated by the specific arrow shown on the drive unit;

5) in case of wrong direction of rotation disconnect the agitator motor, wait a time of calm for the dissipation of any residual currents and overheating and invert the power supply phases according to the indications given in the Motor Manual;

6) verify the absence of movements, noises and anomalous oscillations for each component;

7) after a few minutes from the first start-up, disconnect the machine, wait for a time of calm for the dissipation of any residual currents and overheating, proceeding with the following checks:
   - ✓ no oil leaks or lubricating fluids from the gearbox;
   - ✓ visual inspection of the mechanical seal where present.

CAUTION

THE AGITATOR COMMAND GROUP CAN BE SUPPLIED WITH THREE DIFFERENT TYPES OF VENT PLUG:

- PRESSURE VENT PLUG: NO OPERATION TO BE PERFORMED.

- COLORED PLUG (BLACK OR YELLOW): IT IS NECESSARY TO REMOVE IT AND REPLACE IT WITH A PRESSURE PLUG SUPPLIED SEPARATELY.

- VENT CAP WITH REMOVABLE TANG: REMOVE THE TANG.

Figure 4-14 Pressure vent plug

Figure 4-15 Colored plug

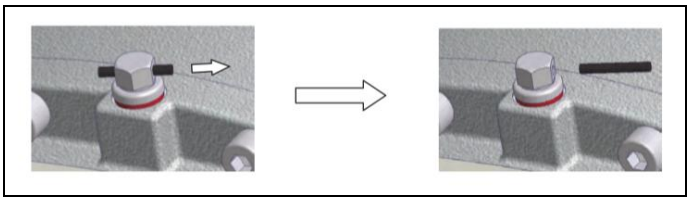

Figure 4-16 Plug with removable tang

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CHAPTER 5
Description of commands and signals

5 Description of commands and signals

5.1 Control panel

The logic and operation of the machine are directly dependent on the control logic envisaged for the machine itself inside the Installation system.
Refer to the Plant Operation Manual for a description of the control panel.

It is the duty of the user to install, at the service of the machine, a disconnecting device for the electrical supply of the machine which can be padlocked with the functions of the GENERAL SWITCH and connection **– I – ON** and disconnection **– O – OFF** of the machine from electricity.

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CHAPTER 6
Operation and use

6 Operation and use

6.1 Controls and checks for a safe use of the machine

Established that:

- the operator must not tamper with or alter the operation or efficiency of the protection devices placed on the machine;
- must always keep watchfulness and alertness awake;
- must be in perfect psychophysical conditions;

before starting operations with the machine, every day, the operator will have to carry out checks to make sure that all the safety conditions are in place to avoid accidents.

To facilitate the operator, here is a list of pre-start checks:

1. check that the machine is equipped with all the pictograms and warning signs provided and shown in Table 8;
2. visually check the general condition of the machine and check that there are no damages or conditions of obvious neglect, especially with regard to aging, wear and fatigue;
3. check that the machine has not been tampered with or that anomalous situations can lead one to think that the machine is no longer in the original brand-new configuration and/or the configuration of the first installation: in this case put the machine out of service and immediately inform the person in charge;
4. check the efficiency of security systems;
5. make sure that the machine is connected to the earth network;
6. make sure that all the detachable parts are firmly secured;
7. check that the hydrostatic head of the fluid in the tank in which the shaft and impeller are immersed is the one foreseen for the agitator to operate at full speed.

CAUTION

THE MACHINE DAMAGED OR MODIFIED WITH RESPECT TO THE ORIGINAL CONFIGURATION MUST **NEVER** BE USED. IF DAMAGES OR CHANGES WITH RESPECT TO THE ORIGINAL CONFIGURATION ARE VERIFIED, REPORT IMMEDIATELY THE NON-CONFORMITIES FOUND TO THE SUPERVISOR.

EVERY TECHNICAL MODIFICATION THAT HAS AN EFFECT ON THE OPERATION OR SAFETY OF THE MACHINE MUST BE CARRIED OUT BY AUTHORIZED TECHNICAL PERSONNEL ONLY.

NO SMOKING

DURING THE PROCEDURES THE OPERATOR'S HANDS MUST BE FREE FROM EXTRANEOUS AND HAZARDOUS OBJECTS, TO HAVE THE MAXIMUM POSSIBLE REACTIVITY.

6.2 Machine ignition

To switch on the machine proceed as follows (refer to Chapter 5):
1. Turn the MAIN SWITCH of the isolating switch to the **– I – ON** position.

6.3 Operating

For operating the machine operate as follows:
1. Follow the Machine ignition instruction reported on Paragraph **Errore. L'origine riferimento non è stata trovata.**.

6.4 Cutting the power supply

To cut off the power supply turn the GENERAL SWITCH of the isolating switch to the **– O – OFF** position.

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CHAPTER 7
Malfunctions

7 Malfunctions

7.1 Operation troubleshooting

See the following table for failure diagnostics and investigation:

Table 12 : Troubleshooting

	Troubleshooting		Possible cause	Intervention
1	The agitator does not start up	1a	Electric power supply absent or insufficient	Check if the electrical power is present and if the available capacity is in agreement with the data on the motor data plate
		1b	Inadequate fuses (low rated current)	Replace the fuses with adequate ones (see instructions in the Motor Manual)
		1c	Blown fuses because of engine or cable damage	Repair the engine and/or replace the cables (see instructions in the Motor Manual)
		1d	Overload protection tripped previously	Reset the protection (if it trips again see Troubleshooting 2)
2	The overload protection trips	2a	Overload setting is incorrect	Check the setting of the overload protection and replace, if necessary
		2b	The motor runs on two phases	Check the power supply and the fuses
		2c	Incrustations on rotating parts or impellers immersed in solid sediments	Remove incrustations and the sediments from the impellers
		2d	The density or viscosity of the agitated product is higher than expected	Contact PRO-DO-MIX for assistance
		2e	Defective bearings	Regrease or change bearings
3	Abnormal sound emission and vibration values	3a	Impellers draw in air or cavitate due to the low liquid level	Increase the liquid level and keep it as constant as possible
		3b	Impellers out of balance (bent, worn or incrusted blades)	Increase the liquid level and keep it as constant as possible or replace the impeller/s
		3c	The agitator shaft is not linear	Check the linearity of the agitator shaft or replace it
		3d	Defective bearings	Regrease or change bearings
		3e	Defective motor fan	Replace motor fan
		3f	The walls of the cylindrical tank are not provided with breakwater	See Paragraph 4.4.2 of this manual
		3g	Defective speed variator or gearbox	Check the oil level and repair or replace the defective part
		3h	Gearbox lubricant inadequate	Replace lubricant following the directions of the Gearbox Manual
4	Insufficient or no mixing effect	4a	Impeller/s with bent, worn or incrusted blades	Check and clean or replace the impeller/s if needed
		4b	Impeller/s installed incorrectly	Check that the impeller/s are installed in a correct way
		4c	Wrong direction of rotation	Reverse the direction of rotation of the motor (according to the instructions in the Motor Manual and in accordance with the direction of rotation indicated on the drive unit)
		4d	The liquid characteristics or the tank dimensions are different from the ones specified in the sales documents	Contact PRO-DO-MIX for assistance
5	Too high temperature in the motor, in the support or in the lantern	5a	The motor is overloaded and the overload protection is defective or overload setting is incorrect	See Troubleshooting 2 and check the overload protection
		5b	Motor fan defective or relative grid too dirty or insufficient space for the passage of cooling air	Check the motor fan, clean the relative grid and make sure that the cooling air can freely circulate
		5c	Mechanical variator or gearbox lubricated too less, too much or with inappropriate lubricant	Fill, reduce or replace the lubricant
		5d	Temperature values of the product to be agitated or of the operating	Check and reduce the temperature values of the product and/or the ambient and

Table 12 : Troubleshooting

			ambient not conform with what is specified in the sales documents	contact PRO-DO-MIX for assistance
		5e	Excessive axial stresses on the shaft	Check and reduce the tank internal pressure
		5f	Anomaly of the lantern bearing	Replace the bearing

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CHAPTER 8
Maintenance

8 Maintenance

It will be the task of the company using the machine to set up a system (if not yet existing) to record all the maintenance operations performed.
Failure to record an intervention is to be considered as 'Maintenance not performed'.

NOTE

AN INTERVENTION FORM FACSIMILE IS PROVIDED BELOW: ONCE THE SETUP IS ESTABLISHED, IT IS RECOMMENDED TO PHOTOCOPY THE RELEVANT FORM AND COMPLETE THE COPY (DO NOT USE THE ORIGINAL EMPTY FORMS).

Intervention Form FACSIMILE			
MACHINE:			
SERIAL:			
INSTRUCTIONS FOR USE:			
INTERVENTION TIME:			
Control Interventions			
CHECK DONE BY:		on the:	
Intervention description	**Outcome**		
CHECK			
Maintenance Interventions			
RESPONSIBLE			
INTERVENTION	**MAINTENANCE DONE BY**	**DATE**	
		____ / ____ / _____	

Notes:

8.1 Warnings

CAUTION

THE OPERATORS IN CHARGE OF MAINTENANCE MUST **ONLY** DO THE MAINTENANCE OPERATIONS POINTED OUT IN THIS CHAPTER.

It is considered essential to draw the attention of the **responsible for health and safety** and of the **operators in charge of the machine maintenance**, recommending the strict observance of all the provisions issued by the security institutions, in addition to the specific operations listed in this Chapter.

All maintenance information relates exclusively to routine maintenance, where the interventions aim at the correct daily operation of the machine.

Maintenance must be carried out by the following categories of people:

- **Qualified mechanical maintenance technician**: Qualified technician able to drive the machine in normal conditions, to operate it with disabled safeguardings, to intervene on the mechanical parts to carry out all the necessary adjustments, maintenances and repairs;

CAUTION

THE SKILLED MECHANICAL MAINTENANCE TECHNICIAN IS NOT ENABLED TO INTERVENE ON ELECTRICAL SYSTEMS UNDER VOLTAGE.

- **Qualified electrical maintenance technician**: Qualified technician able to operate the machine under normal conditions and to operate it with disabled safeguardings; he is in charge of all electrical adjustment, maintenance and repair operations. he is able to operate in the presence of voltage inside electrical cabinets and junction boxes

Check that the tools available are suitable for use; avoid absolutely the improper use of tools or implements.

If additional instructions are needed or if particular problems arise, do not hesitate to contact the responsible for health and safety. It is very important, in order to avoid malfunctions which could themselves directly or indirectly cause serious accidents or damage to people and things, to observe all the instructions on the machine, on the diagrams, in the attached documentation and in this document.

8.2 Measures for starting the routine maintenance

Maintenance personnel must be aware that by performing these operations there may be hazards. It is therefore necessary to comply with all the warnings given in these instructions for use, starting with the general indications for putting the machine into maintenance status.

It is crucial:

- To use the **Personal Protective Equipment** described in Paragraph **Errore. L'origine riferimento non è stata trovata.**;
- To void physical contact with moving parts of the machine;
- That the assembly and adjustment (ordinary maintenance) operations are carried out by a single person, under the **supervision of the 'Responsible' for maintenance**;
- That the unqualified and unauthorized personnel do not access the operation area of the machine when it is in state of maintenance;

PROHIBITION

NO ACCESS TO THE WORKING AREA OF THE MACHINE FOR UNQUALIFIED AND UNAUTHORIZED PERSONNEL.

- that maintenance operations are carried out with sufficient lighting; in the case of maintenance located in areas that are not sufficiently illuminated, portable lighting devices must be used, taking care to avoid shadow cones that prevent or reduce the visibility of the point where you are going to work or the surrounding areas (follow the instructions in Paragraph 3.5. 4).

The operator should always consider also the following:

ELECTRIC SHOCK HAZARD

MAINTENANCE OPERATIONS REQUIRING THE PRESENCE OF ELECTRICITY **MUST ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL FOLLOWING INTERNAL SAFETY PROCEDURES OF THE PLANT WHERE THE MACHINE IS INSTALLED**.

CHECK THAT GUARDS AND SAFEGUARDINGS ARE EFFICIENT

THE GUARDS AND SAFETY DEVICES CAN BE REMOVED IN PART OR ALL DURING THE MAINTENANCE OPERATIONS BY SPECIALIZED AND/OR AUTHORIZED PERSONNEL, WHICH WILL RE-ASSEMBLE THEM IN THE ORIGINAL POSITION AS SOON AS THE MAINTENANCE OPERATIONS ARE COMPLETE: DISASSEMBLING THE MAINTENANCE PROTECTION MUST ONLY BE CARRIED OUT WITH AUTHORIZATION AND SUPERVISION OF THE 'RESPONSIBLE' FOR MAINTENANCE. AT THE END OF MAINTENANCE THE 'RESPONSIBLE' FOR MAINTENANCE MUST ENSURE THAT THE SAFEGUARDINGS THEMSELVES ARE CORRECTLY ASSEMBLED AND EFFICIENT. THE MACHINE CANNOT BE STARTED AFTER A MAINTENANCE INTERVENTION UNLESS THE SAVEGUARDINGS AND THE OTHER DEVICES HAVE BEEN REFITTED.

CAUTION

EVERY **TECHNICAL MODIFICATION** THAT HAS AN EFFECT ON THE OPERATION OR SAFETY OF THE MACHINE MUST BE CARRIED OUT BY THE MANUFACTURER'S TECHNICAL PERSONNEL ONLY OR BY TECHNICIANS FORMALLY AUTHORIZED BY THE MANUFACTURER ITSELF. OTHERWISE, PRO-DO-MIX S.R.L. DECLINES ALL LIABILITY FOR ANYTHING CONNECTED WITH CHANGES OR DAMAGES THAT MAY EXIST.

8.3 PPE for the operator in charge of maintenance

8.3.1.1 PPE for the operator in charge of maintenance

Table 13: PPE for the operator in charge of maintenance

Identification pictogram	Description	Notes
	FOOTWEAR	Use of safety footwear to avoid the risks generated by falling materials during maintenance operations (especially when disassembling parts).

Table 13: PPE for the operator in charge of maintenance		
	PROTECTION GLOVES	Hand protection gloves available in case of manipulation of objects that can cause damage.
	APPROPRIATE CLOTHING	Appropriate clothing, such as overalls; the use of clothing with wide sleeves and/or attachments that can be easily held by mechanical components is prohibited.
	HELMET Mechanical maintenance	Protection helmet available in the event of lifting parts with significant masses.
	FACE SHIELD Electric maintenance	**Protection face shield during intervention on electrical parts, especially if under tension.**
	PROTECTION MASK	**Wear the protective mask in accordance with the provisions of the Safety Manual of the machine installation system to avoid the risks generated by the contact of potentially hazardous chemical or biological substances.**

8.4 Procedures for placing in state of maintenance

8.4.1 Maintenance without power supply

Proceed as follows:

1. Complete the current work cycle.
2. Stop the machine and disconnect the power supplies as described in Chapter 6
3. Apply the security padlock to the GENERAL SWITCH.
4. Fence the machine and put the 'MACHINE IN MAINTENANCE' sign.
5. Check that the tank or vessel is clean and dry in case of maintenance of wet parts.
6. Check the total absence of gas, vapor or aerosol residuals that could be dangerous for the operators (for this purpose, refer to the Safety Manual of the machine installation system).
7. Check that the surfaces of the machine are dry and are not characterized by extreme temperatures.
8. Verify the correct preparation of collective and personal safety devices for the safety of the operators.

NO PASSING TO UNAUTHORIZED PEOPLE

MAKE SURE NO UNAUTHORIZED PEOPLE APPROACH THE MACHINE DURING MAINTENANCE.

APPLY SIGNALS IN THE PROXIMITY OF THE SWITCHES TO INFORM THE MACHINE DETENTION DUE TO MAINTENANCE IN ORDER TO AVOID ACCIDENTAL AND DANGEROUS MANEUVERS.

8.5 Periodic maintenance

Table 14 : Maintenances			
Maintenance	**Timing**	**Machine state**	**Symbol**
Machine cleaning:	Weekly or where appropriate in	Isolation for	

machine body; motor fan; impellers.	case of troubleshooting	maintenance	
Check the locking system tightening (screws, bolts, …)	Weekly or where appropriate in case of troubleshooting	Isolation for maintenance	
Check the locking system tightening (screws, bolts, …)	After approx. 100 working hours from the first start-up and Weekly or where appropriate in case of troubleshooting	Isolation for maintenance	
Replace gearbox oil (see Gearbox Manual)	Check in the Gearbox Manual or contact PRO-DO-MIX	Isolation for maintenance	
Replace the bearings on the stabilization lantern	Every 15.000 hours of use or contact PRO-DO-MIX	Isolation for maintenance	
Add a suitable quantity of specific grease for agitators with stabilization lantern	Every 5.000 hours of use or contact PRO-DO-MIX	Isolation for maintenance	
Check for product or gas leaks from inside the tank	Weekly or where appropriate in case of troubleshooting	Isolation for maintenance	

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CHAPTER 9
Demolition and disposal

9 Demolition and disposal

CAUTION

REFER TO THE APPLICABLE LAW IN THE COUNTRY OF THE USER IN THE FIELD OF DEMOLITION TO KNOW EVENTUAL PROCEDURES OF 'SUPERVISORY AUTHORITY INSPECTION' OR 'VERBALIZATION' TO BE ACTIVATED.

CAUTION

IN PERIODS DURING WHICH THE MACHINE IS OUT OF FUNCTION FOR PROLONGED TIMES WAITING FOR THE DISMANTELING, IT IS APPROPRIATE TO SIGNAL THE ACCESS PROHIBITION TO UNAUTHORIZED PEOPLE.

The machine is built with materials that do not present, to the effects of the demolition, particular aspects of danger for the operator.
The operator or persons in charge of disposal must take into consideration that the materials of which the machine is made are not of a hazardous nature and they consist essentially of:
- steel;
- electric motor;
- polypropylene and various plastics;
- electric cables with relative sheaths;
- rubber gaskets.

In case of demolition and disposal of the machine, the operator must take all the necessary precautions to avoid generating risks associated with the dismantling of the equipment, similarly to what is prescribed for the installation/disassembly phases (see Chapter 4).
In particular, special precautions must be taken during the phases of:

- Disassembling the machine from the operating area.
- Transport and handling.
- Separation of materials.

The operator will have to manage the waste (i.e. the substance or object that the holder discards or has decided or is obliged to discard) as required by community directives 91/156 / EEC on waste, 91/689 / EEC on hazardous waste and 94/62 / EEC on packaging and packaging waste (for Italy see Legislative Decree 152 of 13/04/2006 'Environmental regulations') so that waste can be recovered or disposed of without danger for human health and without using processes or methods that could harm the environment, in particular:

- without determining risks for water, air, soil, fauna and flora;
- without causing problems trough noise or odors;
- without damaging the landscape and places of special interest, protected according to the current legislation.

CAUTION

ALL PLASTIC PARTS MUST BE RECOVERED AND DISPOSED IN COMPLIANCE WITH THE LAWS DEFINED FOR THE TYPE OF MATERIAL, IN COMPLIANCE WITH THE LAWS IN FORCE, FOR ENVIRONMENTAL SAFEGUARD AND PROTECTION.

DISPOSAL OF ELECTRICAL AND ELECTRONIC EQUIPEMENT (WEEE) SUBJECT TO THE RoHS DIRECTIVE

ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) WITH THIS SYMBOL MUST BE SUBJECT TO SEPARATE COLLECTION.

NOTE

FOR ANY QUESTIONS OR DOUBT ABOUT THE DEMOLITION/DISPOSAL OF THE MACHINE ON ARGUMENTS NOT COVERED IN THIS TECHNICAL DOCUMENT, CONTACT THE DISPOSAL SPECIALISTS

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CHAPTER 10
Attached documents

10 Attached documents

10.1 Documents of the machine

Table 15 : Documents of the machine

Code	Description	Date
Agitator motor instructions.pdf	Agitator Motor Manual of Use	//
Agitator gearbox instructions.pdf	Agitator Gearbox Manual of Use	//
…….	…….	//
…….	…….	//
…….	…….	//
…….	…….	//
…….	…….	//
		//

10.2 EC declaration of conformity

CE DECLARATION OF CONFORMITY

of a machine

(2006/42/EC, Annex II, let. A, p. 1)

The manufacturer and
Name and address of the person authorized to constitute the technical file:

PRO-DO-MIX s.r.l.
Via I Strada 5
35026 Conselve - Padova (PD) Italia

Declares
Under his own responsibility that the machine:

VERTICAL AGITATOR

Machine type:	VERTICAL AGITATOR
Function:	AGITATE LIQUIDS
Model:	See PRO-DO-MIX data plate
Serial:	See PRO-DO-MIX data plate
Year of manufacturing:	See PRO-DO-MIX data plate
Voltage / Frequency	See motor manufacturer data plate

complies with all relevant provisions of the following Community directives:
Machine Directive 2006/42/EC, EMC Directive 2004/108/EC

and to the following harmonized standards, standards and/or technical specifications applied:
EN ISO 12100:2010
EN 60204-1:2006

Place: Padova

Date: 01/06/2019

PRO-DO-MIX S.R.L. PRODUZIONE DOSAGGIO MISCELAZIONE

Stamp and Signature

Name Surname
(Legal Representative)

Figure 10-1 EC declaration of conformity.

10.3 EC conformity data plate

Example of PRO-DO-MIX metal data plate:

Example of motor data plate:

Example of a data plate fixed with metal rivets on the drive unit:

Depending on specific requests and agreements with the customer, additional identification plates can be placed as photos below:

Figure 10-2 EC conformity plate

ANNEX A
Technical glossary

11 Annex A - Glossary

11.1 Glossary (terms complying with the EN ISO 12100 standard)

Machine reliability (Reliability / Fiabilité / Zuverlässigkeit)
The ability of a machine, component or appliance to perform a required function without failing, under specified conditions and for a given period of time.

Machine (Machine / Machine / Maschine)
assembly of linked parts or components, at least one of which moves, with the appropriate machine actuators, control and power circuits, joined together for a specific application, in particular for the processing, treatment, handling or packing of a material.
The term 'machinery' also covers an assembly of machines which, in order to achieve the same goal, are arranged and controlled so that they function as an integral whole.

Maintainability of a machine (Maintainability of a machine / Maintenabilité d'une machine / Instandhaltbarkeit einer Maschine)
The ability of a machine to be maintained in conditions such as to perform its function under the intended conditions of use, or to be restored in such conditions, when the necessary interventions (maintenance) are carried out with specified procedures and instruments.

Hazard (Hazard / Danger / Gefahr)
Source of possible injuries or damage to health. (The term 'hazard' is generally used together with other words that define its origin or the injury or damage to health expected: for example 'hazard of crushing').

Safeguarding (Safeguarding / Protection / Schutzmaßnahmen (Technische))
Safety measures which consist in the use of specific technical means called safeguarding (guards, safety devices) to protect people from hazards that cannot reasonably be eliminated or sufficiently limited through design.

Guard (Guard / Protecteur / Trennende Schultzeinrichtung)
Element of a machine used specifically to provide protection through a physical barrier.

Risk (Risk / Risque / Risiko)
Combination of probability and severity of possible injury or harm to health in a hazardous situation.

Hazardous situation (Hazardous situation / Situation dangereuse / Gefährdungssituation)
Any situation in which a person is exposed to one or more hazard.

Intended use of a machine (Intended use of a machine / Utilisation normale d'une machine / Bestimmungsgemäße Verwendung einer Maschine)
Use for which the machine is intended in accordance with the instructions provided by the manufacturer, or which is deemed customary in relation to its design, construction and function.

Risk assessment (Risk assessment / Risque (estimation du) / Risikobewertung)
Overall assessment of the likelihood and severity of possible injury or health damage in a hazardous situation in order to choose the appropriate safety measures.

Hazard zone (Hazard zone / Zone dangereuse / Gefahrbereich)
Any area inside and/or near a machine in which a person is exposed to risks of injury or damage to health.

11.2 Glossary (terms compliant with EN 60204-1)

Controlgear
General term applicable to operation devices and their combinations with control, measurement, protection and regulation devices, and to the units of such devices with the related electrical interconnections, accessories, enclosures and associated support structures, intended primarily for control of appliances that use electricity.

Controlled stop

Stop of the movement of a machine obtained, for example, by reducing the electrical control signal to zero, from the moment the stop signal was recognized, but conserving the machine actuators electric power during the shutdown procedure.

Uncontrolled stop
Stop of a movement of the machine obtained by interrupting the power supply to the relative machine actuators, with all the brakes and/or other mechanical stop devices activated.

Actuator
Part of the mechanism of the control device on which the external maneuvering force is applied.

Fault
State of an element characterized by the inability to perform a requested function, excluding inability during preventive maintenance or during other programmed actions or due to the lack of external sources.

Control circuit (of a machine)
Circuit used for the command and control of the machine operation and for the protection of power circuits.

Power circuit
Circuit used to supply the power from the power supply network to the equipment elements that use it in the production process, and to the transformers that supply the control circuits

Direct contact
Contact of persons or animals with active parts.

Indirect contact
Contact of persons or animals with exposed conductive parts that are in tension due to a fault.

Control device
Device inserted in a command and control circuit and used to control the operation of the machine (e.g. position sensor, manual control switch, relay, etc.).

Failure
End of an element's aptitude to perform the requested function.

Marking
Signs or writings for the identification of the component or device type, placed by the component or device manufacturer.

Exposed conductive part
Conductive part of an electrical equipment, which can be touched and which is not live in ordinary conditions, but which can go live under fault conditions.

(Electrically) skilled person
Person with in-depth knowledge and experience that allows him to perceive the risks and avoid the hazards that can derive from electricity.

Overcurrent
Any current that exceeds the nominal value. For conductors the nominal value corresponds to the current capacity.

Ambient temperature
Air temperature or other cooling medium where the equipment is used.

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ANNEX B
Safety signs

12 Annex B – Safety signs

Table 16: Hazard symbols					
	CAUTION		FORKLIFT PASSAGE		FALL: if the safety belt is not used
	SLIPPERY SURFACE		SIDE CRUSHING		CRUSHING FROM THE TOP
	TRAPPING UPPER EXTREMITIES		CRUSHING HANDS AND FEET		CRUSHING OF HANDS
	EXPLOSIVES		RADIATIONS		HAZARDOUS SUBSTANCE
	SUSPENDED LOADS		FALL MATERIALS FROM THE TOP		NOISE GREATER THAN 90 dBA
	PRESSURE SYSTEM		POTENTIALLY EXPLOSIVE ATMOSPHERE		ELECTRIC SHOCK

Table 17: Prohibition symbols					
	NO SMOKING		NO ACCESS TO UNAUTHORIZED PEOPLE		PROHIBITION TO REMOVE SAFEGUARDINGS
	DO NOT INSERT THE HANDS BETWEEN THE ROLLERS		DO NOT NSERT THE UPPER EXTREMITIES AMONG THE GEARS		DO NOT INSERT THE HANDS: HAZARD OF CRUSHING
	NO TRANSIT TO FORKLIFTS		NO STOPPING UNDER THE FORKS		DO NOT TRANSPORT PEOPLE WITH THE FORKLIFT
	NO TOUCHING		DO NOT INTERVENE ON MOVING COMPONENTS		DO NOT USE FREE FLAMES
	**NOSTOPPING OR PASSING**		**DO NOT PASS OR STOP INTO THE RANGE OF ACTION OF THE CRANE**		**DO NOT USE WATER TO PUT OUT A FIRE**

Table18: Symbols of obligation					
	APPROPRIATE CLOTHING		PROTECTION HELMET		SAFETY FOOTWEAR
	PROTECT YOUR HEARING WITH ANTI-NOISE HEADSET OR EARPLUGS		PROTECTION GLOVES		PROTECT THE EYES
	PROTECT THE EYES WITH FILTRED LENSES		WASH HANDS		USE THE HANDRAIL
	PROTECT THE HAIR		WEAR THE RESPIRATOR		PROTECTION FACE SHIELD
	WEAR HIGH VISIBILITY CLOTHES		WEAR THE MASK		MASK FOR WELDING
	FASTEN SAFETY BELT		WEAR THE BARRIER CREAM		USE THE PEDESTRIAN BRIDGE
	PROTECTIVE CLOTHING FOR CHEMICAL RISKS		SAFETY HARNESS		GENERAL OBLIGATION
	USE THIS PEDESTRIAN PATH		PROTECT CHILDREN WITH FILTRED EYEWEAR		USE THE PROTECTIVE APRON
	GROUND CONNECTION		PROTECT MOVING COMPONENTS		DISCONNECT THE MACHINERY BEFORE ...
	SET THE SUPPORT ACCORDING TO THE WEAR OF THE WHEEL		UNPLUG		PROTECT THE FAN
	USE THE EYEBOLT		FORKLIFT MAXIMUM SPEED OF …		FORKLIFTS DEAD SLOW
	MANUAL TROLLEY		SUSPENDED LOADS		READ INSTRUCTIONS

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