

AGITATEURS **TIMSA**[®]

- FAR
- FAV
- FET

MANUEL D'INSTALLATION, MISE EN MARCHE ET ENTRETIEN

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- Général
- **AVANT DE DEMARRER**
- Recommandations de sécurité

MODÈLES

- FAR. Floculateur vitesse fixe
- FAV. Floculateur à vitesse variable
- FET. Floculateur bipale

RECOMMANDATIONS GÉNÉRALES

- Moteurs
- Réducteurs
- Variateurs de vitesse électronique
- Variateurs de vitesse mécanique
- Huilage
- Fixation d'hélices, efforts et poids
- Couple de serrage vis
- Déflecteurs – antivortex
- Réception et stockage
- Identification, pièces de rechange et réparations
- Garanties

GENERAL - AGITATORS**Date** 25.02.02

- This technical manual contains the instructions necessary to install, start and maintain TIMSA® agitators and must be in the power of the personal in charge of these tasks.
- **Before the mounting, disassembles or start-up of mixers**, in order to avoid risks of accidents and damages to persons, to machines and installations, and to attain the best performances, **IT'S IMPERATIVE**:
 - To **READ** this manual.
 - To keep all instructions on the section "**SAFETY RECOMMENDATIONS**"
 - To carry out all the verifications detailed on the section "**BEFORE STARTING**"
- In the repairs accomplished by the user himself / herself, use only original spare parts. Ask TIMSA for information about recommended spare parts and agitators section plans.
- It is advisable that the user keeps in his stockroom spare parts recommended by TIMSA to be able to repair the machine as soon as possible.

A mixer is not a machine, it is an equipment to be integrated in a machine, therefore according to the current CE normative, it is forbidden to start up the mixer before the machine to which it form part, has the conformity statement complying with the dispositions of the Council Directive 89/392/CE. TIMSA declines all responsibilities derived from the unfulfillment of this requirement.

Before starting IS ESSENTIAL to check the following points:

- The motor voltage which is written on the characteristics plate and which depends on the connection way must be the same that the one that we have in the grid.
- The mechanic and thermal protections of the motor must be the ones needed.
- The motor frame must always be connected to ground.
- Take apart the fan protection of the motor and turn the fan with your hand to check that there are no hard points and that the propeller turns free. Assemble the fan protection verifying that the vent is free of obstructions.
- Check that the speed reducer (if there is one) has a suitable oil level.
- Check that the screws that fix the flange or the support plate of the agitator to the structure are correctly tightened.
- In case of agitator with sealing system check the following points:
 1. Stuffing box system, the tightening of the press cover screws must be the least necessary to avoid leaks of vapour or liquid. Besides, if the agitator has a greasing system or refrigerating connections plan the means necessary to carry out the lubrication or refrigeration.
 2. Simple mechanical seal system in case of horizontal agitator, check that the liquid level in the tank is over the seal, since the refrigeration is carried out by the product itself.
 3. Double mechanical seal system, take apart the transport fixation that has the shaft jacket (small plates, screws, etc.) and plan a lubrication or refrigeration system.
- Check that the screws of the coupling that join the agitator head with the shaft are appropriately tightened. In case of rigid coupling plates, before accomplishing the assembly it is necessary to remove any trace of paint, varnish or dirt from the faces which are going to be in contact.
- Check the correct tightening of the screws that fasten the propeller.
- In case of several propellers on the same shaft check up that the distance from each propeller to the flange are the ones programmed in the specific documentation.

SAFETY RECOMMENDATIONS - AGITATORS	Date	25.02.02
<p>Motor:</p> <ul style="list-style-type: none"> • Always observe the regulation in force. • Verify that the mechanic and thermal protections of the motor are suitable. <u>A motor burnt due to the lack of protection is not covered by the guarantee</u> • Motors must always work with the fan cover assembled on its position; the cover vent must be free of obstructions to avoid the motor heating. • The wire inlet in the terminal box will be made by a stuffing box of characteristics appropriate to the installation. Once the connection has been made the terminal box cover will be assembled with its specific joint to avoid accidental contacts with the terminals. • <u>Always</u> connect the motor frame to a ground connection. 		
<p>Mobile parts:</p> <ul style="list-style-type: none"> • Mobile parts outside the container: pulleys, belts, transmission shafts, couplings, etc. must always be properly protected with grilles or plates that prevent from accidental contact. They will only be removed to accomplish the agitator maintenance after having made sure that the electric current has been disconnected safely and that there has been indicated at the disconnection point that the agitator is in maintenance. "Avoid the introduction of hand and/or objects through the windows of mixers and hopper screw reducers" in the case that there was not protected with one grill due to the reduced or irregular form. • Always assemble all protections before re-establishing current.. • In open tanks with agitator you must install the protections necessary to avoid the fall of objects or people inside the tank. • No work will be done inside the tank without having made sure that the electric current has been disconnected and that there has been indicated at the disconnection point the work that is being done. • Before going into a tank make sure that there are not any noxious or explosive gases inside. • A mixer is an equipment to be integrated in a tank that must have enough rigidity to: <ol style="list-style-type: none"> 1. Avoid its vibrations and oscillations 2. Avoid bottom and/or shell perforation if the shaft and/or the propeller(s) may become detached from its anchorage by accident and/or damage, even turning at high speed, with the possibility that could cause a toxic and/or corrosive liquid leak. TIMSA does not assume any responsibility for breakage of a tank which design must obligatory contemplate and foresee forcibly this possibility of accident. 		Saf/Agit. 1

AGITATEURS TYPE	FAR (Floculateur vitesse fixe)	Date 13.08.99
Description:		
<ul style="list-style-type: none"> • Agitateurs avec moteur électrique ou pneumatique et réducteur de vitesse. • Fixation par bride carrée (en quelque cas spécial bride circulaire). • Mobile profil axial tripale T25 (ou bipale) de grand rendement de pompage. • Arbre et hélice(s) en acier carbone, acier inoxydable, aciers spéciaux ou revêtus. 		
Applications:		
<ul style="list-style-type: none"> • Floculation 		
Montage et mise en marche:		
<ul style="list-style-type: none"> • S'assurer de qu'il existe un support suffisamment rigide sur la cuve; la manque de rigidité peut causer des vibrations et des pannes à l'agiteur. • Fixer la bride sur le structure parmi les correspondants vis et écrous (non inclus à la fourniture). • Fixer la bride de l'arbre agiteur sur l'accouplement parmi les vis inclus à la fourniture en éliminant préalablement quelque reste de peinture ou de vernis que ait pu rester entre les faces d'appui (voir section « COUPLES DE SERRAGE »). • Monter l'/les hélice(s) à l'arbre parmi une des systèmes suivantes (selon la taille des hélices): <ul style="list-style-type: none"> 1. S'il s'agit de petites hélices d'une seule pièce la fixation sera serrée au bout de l'arbre (ou en niveau supérieur en cas de plusieurs hélices sur le même arbre) et l'entraînement avec prisonnier(s) ou clavette. 2. Les hélices triples ou bipales de grande taille seront fixées parmi des moyeux à pression en trois ou deux éléments visés en leur même (vis, rondelles et écrous inclus à la fourniture) (voir section « COUPLES DE SERRAGE »). • Au cas de plusieurs hélices sur le même arbre, celles-ci doivent être placées en respectant les positions de montage prévues au projet (consulter l'offre et les feuilles de données respectives) • Remplir complètement la cuve d'eau pour réaliser la premier essai. • Brancher le moteur selon les instructions indiquées à la section "MOTEURS" et/ou les spécifiques que peuvent aller avec le moteur. 		
		FAR 1

- Faire tourner l'agitateur en vérifiant que le sens de rotation soit l'indiqué au trait du réducteur pour hélice en position soufflante(*) et en sens contraire pour hélice en position aspirante(*); au cas de sens de rotation contraire inverser deux phases au moteur.
- **En aucun cas on doit soumettre l'arbre de l'agitateur aux coups ou aux efforts pour lesquels il n'est pas calculé, par exemple l'utilisant comme palanque ou pour supporter des poids.**
- Quand l'exécution de l'agitateur soit en acier revêtu l'hélice forme une seule pièce avec l'arbre. Manipuler ces pièces avec le maximale attention parce que le revêtement est extrêmement fragile et il ne peut pas être soumis à aucun coup ni écorchure qui risque d'apparition immédiate de points de corrosion que lèveraient progressivement le revêtement protectrice endommageant le matériel base.

(*) Pour expliquer les termes hélice “aspirante” ou “impulsante” consulter la section “*FIXATION HÉLICES*”

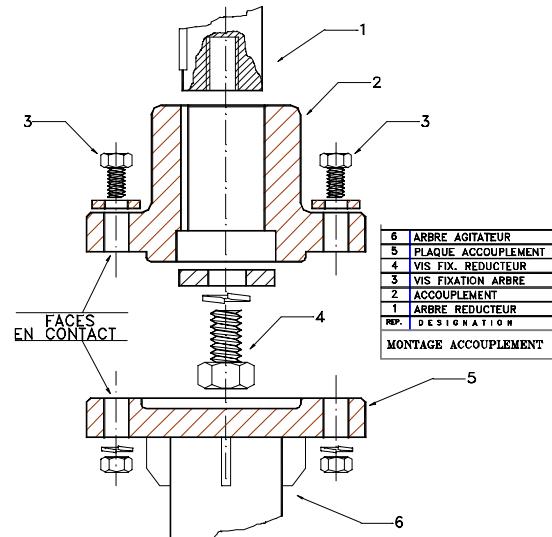
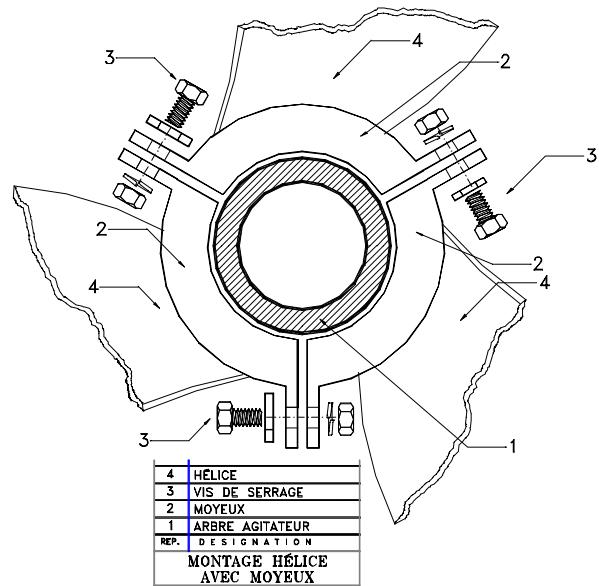
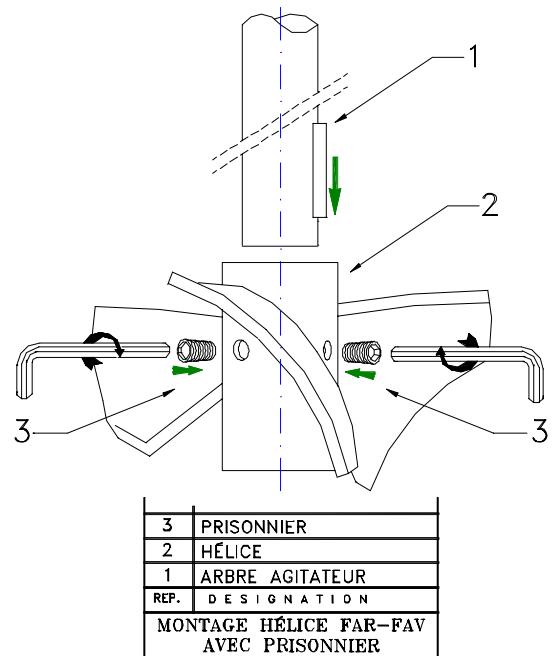
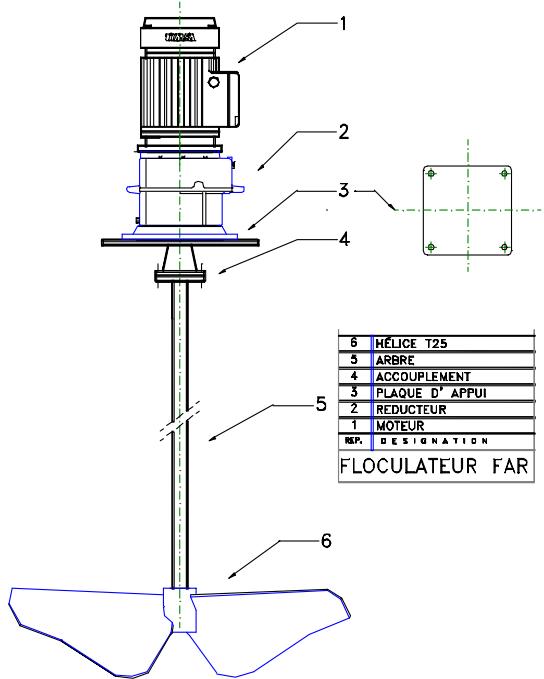
Entretien:

- Moteur: Entretien caractéristique d'un moteur électrique ou pneumatique. Voir la section “*MOTEURS*”
- Réducteur: Vérifier à l'étiquette adhérée au réducteur s'il s'agit d'un modèle graissé “par vie” et, par conséquent, libre ‘entretien ou bien il est “plein d'huile”, alors les intervalles de substitution de lubrifiant sont les indiqués à la section “*RÉDUCTEURS*”
- L'apparition de vibrations anormales est un symptôme de déséquilibre à l'arbre ou à l'hélice au bien à une grande usure du guidage. Substituer la(les) pièce(s) défectueuses en demandant à TIMSA une liste de pièces de rechange.

DESSINS

FAR
(Floculateur vitesse fixe)

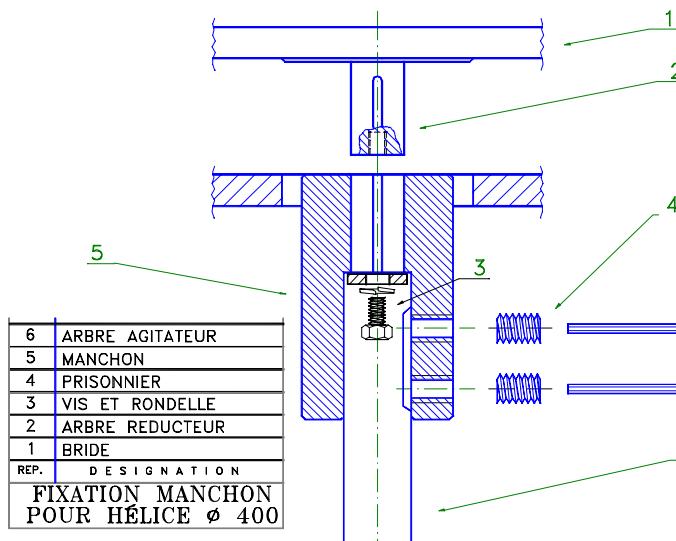
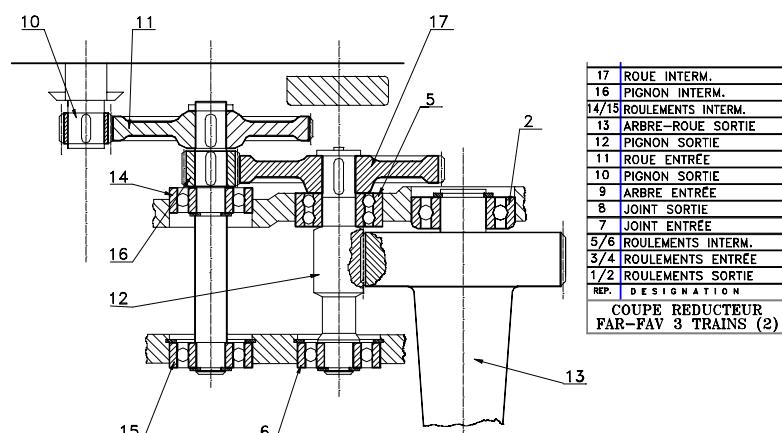
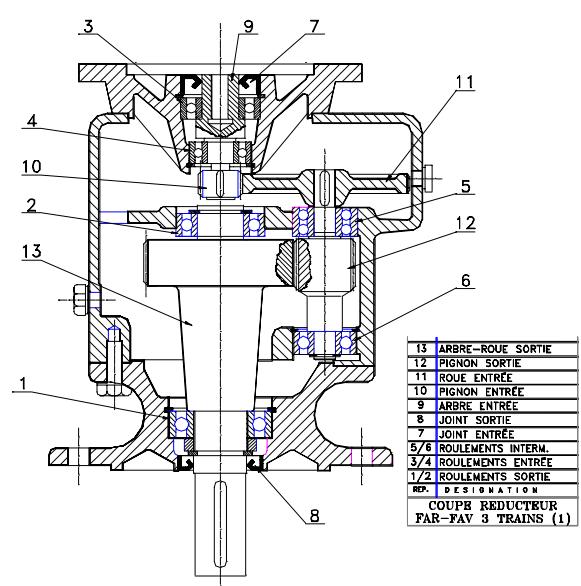
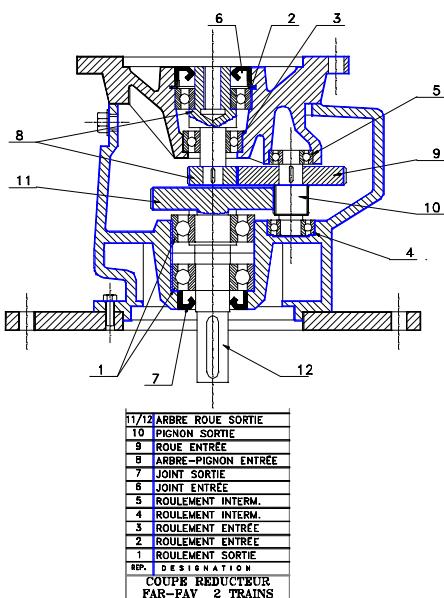
Date 23/06/99



DESSINS

FAR
(Floculateur vitesse fixe)

Date 23/06/99



AGITATEURS TYPE	FAV (Floculateur vitesse variable)	Date 20.08.99
Description:		
<ul style="list-style-type: none"> • Agitateurs avec moteur électrique ou pneumatique, réducteur et variateur électronique de vitesse. • Fixation par bride carrée (en quelque cas spéciale bride circulaire). • Mobile profil axial tripale T25 (ou bipale) de grand rendement de pompage. • Arbre et hélice(s) en acier carbone, acier inoxydable, aciers spéciaux ou revêtus. 		
Applications:		
<ul style="list-style-type: none"> • Floculation 		
Montage et mise en marche:		
<ul style="list-style-type: none"> • S'assurer de qu'il existe un support suffisamment rigide sur la cuve; la manque de rigidité du support peut causer des vibrations et des pannes à l'agicateur. • Fixer la bride sur la structure parmi les correspondants vis et écrous (non inclus à la fourniture). • Fixer la bride de l'arbre agitateur sur l'accouplement parmi les vis inclus à la fourniture en éliminant préalablement quelque reste de peinture ou de vernis que ait pu rester entre les faces d'appui (voir section « COUPLES DE SERRAGE »). • Monter l'/les hélice(s) à l'arbre parmi une des systèmes suivantes (selon la taille des hélices): <ul style="list-style-type: none"> 1. S'il s'agit de petites hélices d'une seule pièce la fixation sera serrée au bout de l'arbre (ou en niveau supérieur en cas de plusieurs hélices sur le même arbre) et l'entraînement avec prisonnier(s) ou clavette. 2. Les hélices triples ou bipales de grande taille seront fixées parmi des moyeux à pression en trois ou deux éléments visés en leur même (vis, rondelles et écrous inclus à la fourniture) (voir section « COUPLES DE SERRAGE »). • Au cas de plusieurs hélices sur le même arbre, celles-ci doivent être placées en respectant les positions de montage prévues au projet (consulter l'offre et les feuilles de données respectives) • Remplir complètement la cuve d'eau pour réaliser la premier essai. 		
		FAV 1

- Connecter le variateur électronique de vitesse suivant les instructions spécifiques que peuvent aller avec le variateur. **ATTENTION** à la fourniture électrique que peut être monophasé (petites puissances) ou triphasé. Voir la section « **VARIATEURS DE VITESSE ÉLECTRONIQUES** »
- Brancher le moteur selon les instructions indiquées à la section “**MOTEURS**” et/ou les spécifiques que peuvent aller avec le moteur.
ATTENTION: L'alimentation du moteur doit provenir **exclusive et directement** du variateur de vitesse, sans interrupteurs intermédiaires. Voir la section “**VARIATEURS DE VITESSE ÉLECTRONIQUES**”
- Faire tourner l'agitateur en vérifiant que le sens de rotation soit l'indiqué au trait du réducteur pour hélice en position impulsante(*) et en sens contraire pour hélice en position aspirante(*); au cas de sens de rotation contraire inverser deux phases au moteur.
- **En aucun cas on doit soumettre l'arbre de l'agitateur aux coups ou aux efforts pour lesquels il n'est pas calculé, par exemple l'utilisant comme palanque ou pour supporter des poids.**
- Quand l'exécution de l'agitateur soit en acier revêtu l'hélice forme une seule pièce avec l'arbre. Manipuler ces pièces avec le maximale attention parce que le revêtement est extrêmement fragile et il ne peut pas être soumis à aucun coup ni écorchure qui risque d'apparition immédiate de points de corrosion qui lèveraient progressivement le revêtement protectrice et endommageant le matériel base.

(*) Pour expliquer les termes hélice “aspirante” ou “impulsante” consulter la section “**FIXATION HÉLICES**”

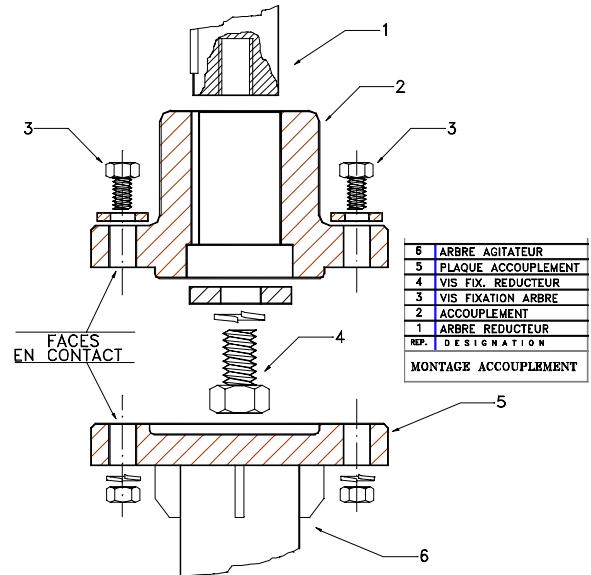
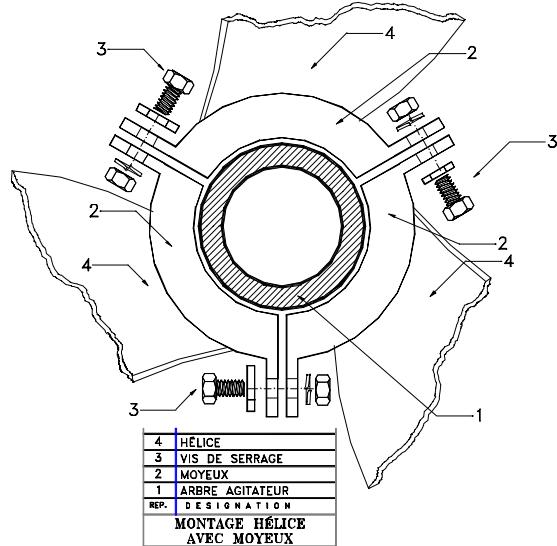
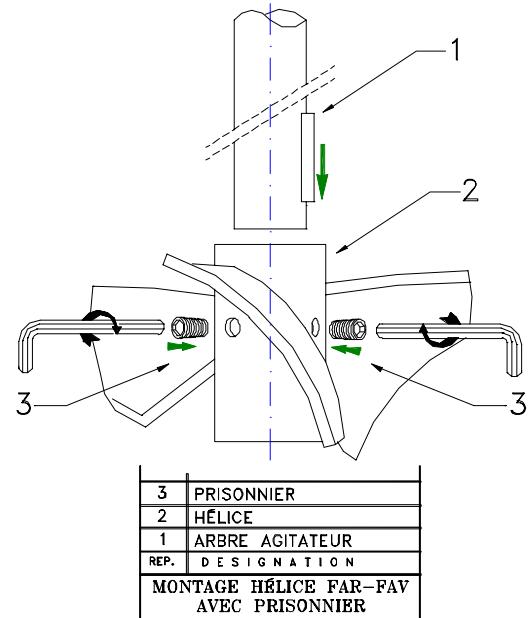
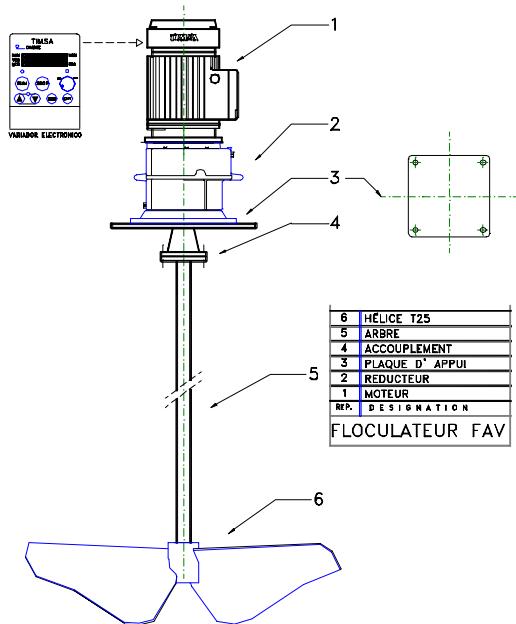
Entretien:

- Moteur: Entretien caractéristique d'un moteur électrique ou pneumatique. Voir section “**MOTEURS**”
- Variateur électronique : Aucin entretien. Voir section « **VARIATEURS ELECTRONIQUES** »
- Réducteur: Vérifier à l'étiquette adhérée au réducteur s'il s'agit d'un modèle graissé “à vie” et, par conséquent, libre d'entretien ou bien il est “plein d'huile”, alors les intervalles de substitution de lubrifiant sont les indiqués à la section “**RÉDUCTEURS**”
- L'apparition de vibrations anormales est un symptôme de déséquilibre à l'arbre ou à l'hélice au bien à une grande usure du guidage. Substituer la(les) pièce(s) défectueuses en demandant à TIMSA une liste de pièces de rechange.

DESSINS

FAV
(Floculateur vitesse variable)

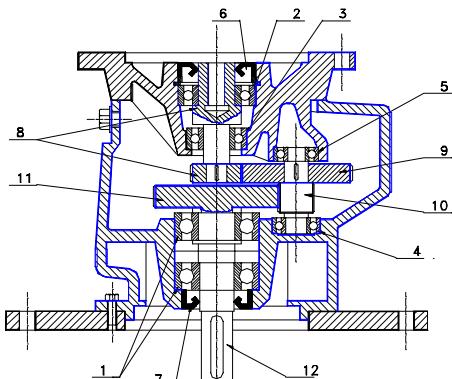
Date 23/06/99



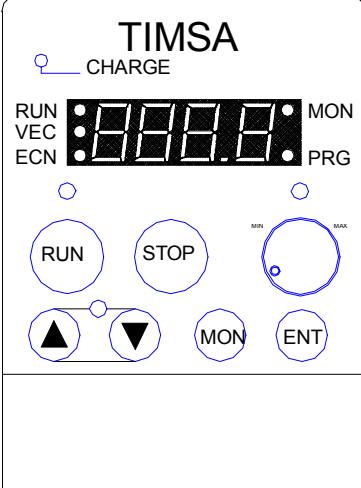
DESSINS

FAV
(Floculateur vitesse variable)

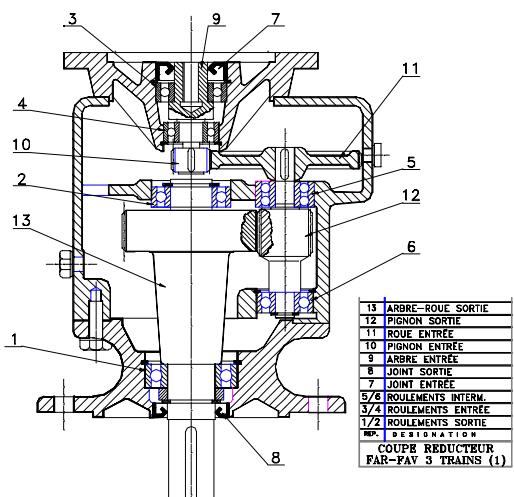
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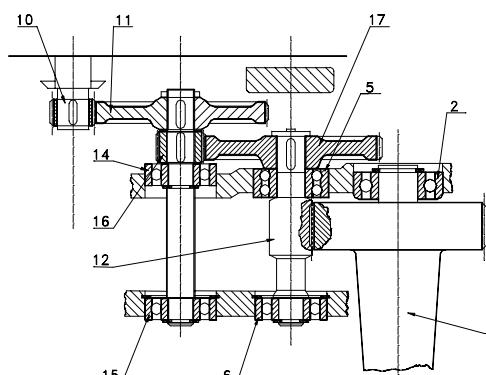
11/12	ARBRE ROUE SORTIE
10	PIGNON SORTIE
9	ROUE ENTRÉE
8	ARBRE-PIGNON ENTRÉE
7	JOINT SORTIE
6	JOINT ENTRÉE
5	ROULEMENT INTERM.
4	ROULEMENT INTERM.
3	ROULEMENT ENTRÉE
2	ROULEMENT ENTRÉE
1	ROULEMENT SORTIE
REP.	DESIGNATION
	COUPE REDUCTEUR FAR-FAV 2 TRAINS



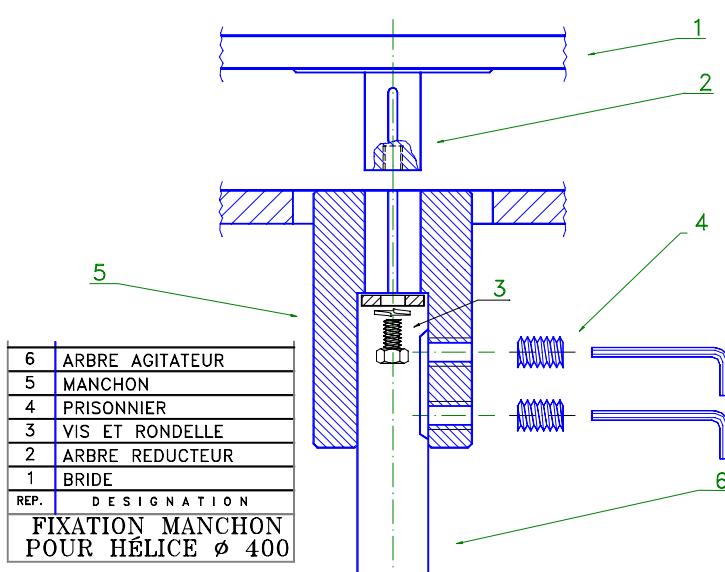
VARIATEUR ÉLECTRONIQUE



13	ARBRE-ROUE SORTIE
12	PIGNON SORTIE
11	ROUE ENTRÉE
10	PIGNON ENTRÉE
9	ARBRE ENTRÉE
8	JOINT SORTIE
7	JOINT ENTRÉE
6/7	ROULEMENTS INTERM.
3/4	ROULEMENTS ENTRÉE
1/2	ROULEMENTS SORTIE
REP.	DESIGNATION
	COUPE REDUCTEUR FAR-FAV 3 TRAINS (1)



17	ROUE INTERM.
16	PIGNON INTERM.
14/15	ROULEMENTS INTERM.
13	ARBRE-ROUE SORTIE
12	PIGNON SORTIE
11	ROUE ENTRÉE
10	PIGNON ENTRÉE
9	ARBRE ENTRÉE
8	JOINT SORTIE
7	JOINT ENTRÉE
5/6	ROULEMENTS INTERM.
3/4	ROULEMENTS ENTRÉE
1/2	ROULEMENTS SORTIE
REP.	DESIGNATION
	COUPE REDUCTEUR FAR-FAV 3 TRAINS (2)



TIMSA®

AGITATEURS TYPE	FET (Floculateur bipale)	Date 23.09.99
Description:		
<ul style="list-style-type: none"> • Agitateurs avec moteur électrique ou pneumatique et réducteur de vitesse. • Fixation par bride carrée (en quelque cas spécial bride circulaire). • Mobile profil axial bipale T25 de grand rendement de pompage. • Arbre et hélice(s) en acier carbone, acier inoxydable, aciers spéciaux ou revêtus. 		
Applications:		
<ul style="list-style-type: none"> • Floculation 		
Montage et mise en marche:		
<ul style="list-style-type: none"> • S'assurer de qu'il existe un support suffisamment rigide sur la cuve; la manque de rigidité peut causer des vibrations et des pannes à l'agiteur. • Fixer la bride sur le structure parmi les correspondants vis et écrous (non inclus à la fourniture). • Fixer la bride de l'arbre agiteur sur l'accouplement parmi les vis inclus à la fourniture en éliminant préalablement quelque reste de peinture ou de vernis que ait pu rester entre les faces d'appui (voir section « COUPLES DE SERRAGE »). • Monter les pales de la/des turbine(s) sur les pièces de fixation soudées à cet effet au bout de l'arbre parmi les vis, écrous et rondelles inclus à la fourniture (voir section « COUPLES DE SERRAGE »). • Au cas de plusieurs hélices sur le même arbre, celles-ci doivent être placées en respectant les positions de montage prévues au projet (consulter l'offre et les feuilles de données respectives) • Remplir complètement la cuve d'eau pour réaliser la premier essai. • Brancher le moteur selon les instructions indiquées à la section "MOTEURS" et/ou les spécifiques que peuvent aller avec le moteur. • Faire tourner l'agiteur en vérifiant que le sens de rotation soit l'indiqué au trait du réducteur pour hélice en position soufflante(*) et en sens contraire pour hélice en position aspirante(*); au cas de sens de rotation contraire inverser deux phases au moteur. 		
		FET 1

- En aucun cas on doit soumettre l'arbre de l'agitateur aux coups ou aux efforts pour lesquels il n'est pas calculé, par exemple l'utilisant comme palanque ou pour supporter des poids.
- Quand l'exécution de l'agitateur soit en acier revêtu l'hélice forme une seule pièce avec l'arbre. Manipuler ces pièces avec le maximale attention parce que le revêtement est extrêmement fragile et il ne peut pas être soumis à aucun coup ni écorchure qui risque d'apparition immédiate de points de corrosion qui lèveraient progressivement le revêtement protectrice endommageant le matériel base.

(*) Pour expliquer les termes hélice “aspirante” ou “impulsante” consulter la section “*FIXATION HÉLICES*”

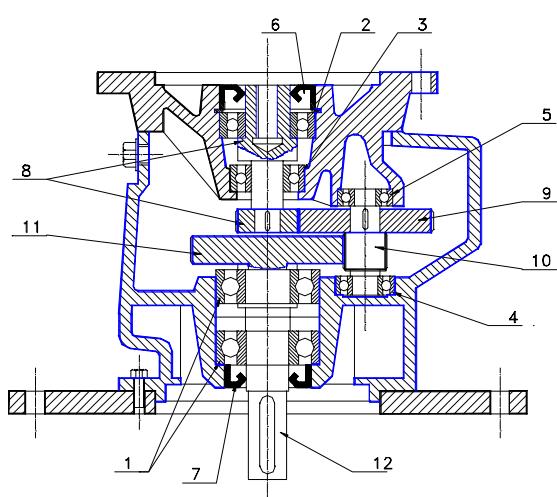
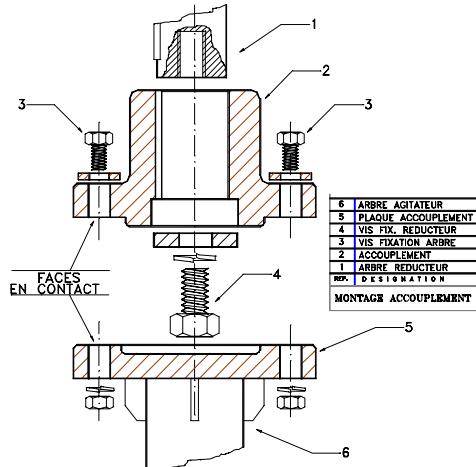
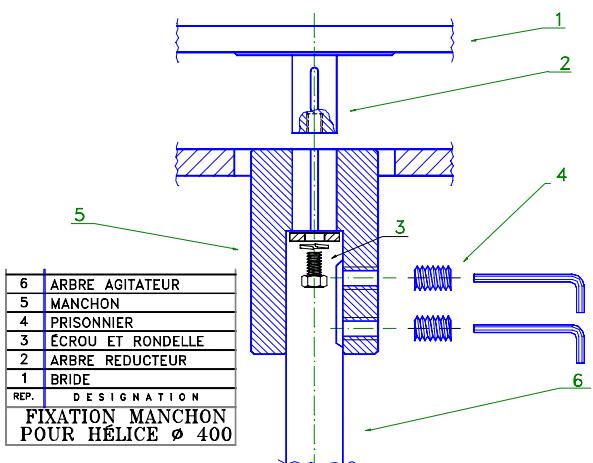
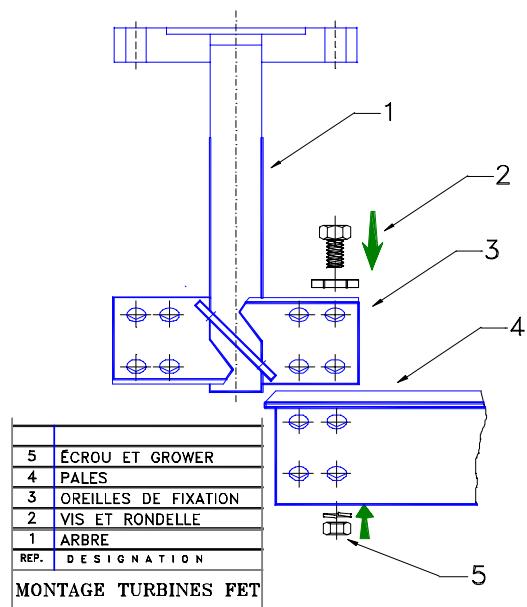
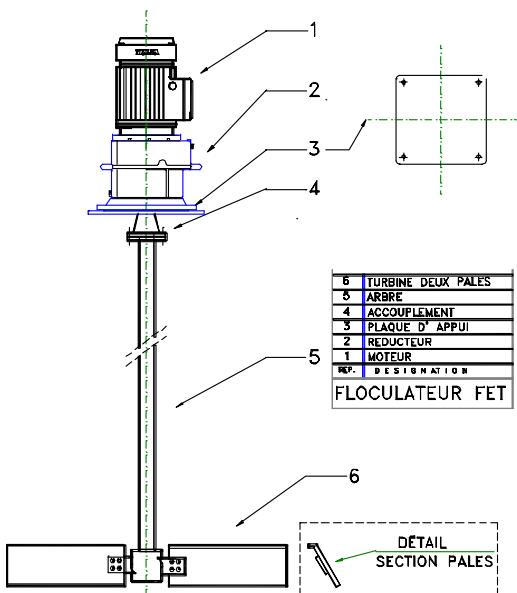
Entretien:

- Moteur: Entretien caractéristique d'un moteur électrique ou pneumatique. Voir la section “*MOTEURS*”
- Réducteur: Vérifier à l'étiquette adhérée au réducteur s'il s'agit d'un modèle graissé “par vie” et, par conséquent, libre ‘entretien ou bien il est “plein d'huile”, alors les intervalles de substitution de lubrifiant sont les indiqués à la section “*RÉDUCTEURS*”
- L'apparition de vibrations anormales est un symptôme de déséquilibre à l'arbre ou à l'hélice au bien à une grande usure du guidage. Substituer la(les) pièce(s) défectueuses en demandant à TIMSA une liste de pièces de rechange.

DESSINS

FET
(Floculateur à deux pales)

Date 14/09/99



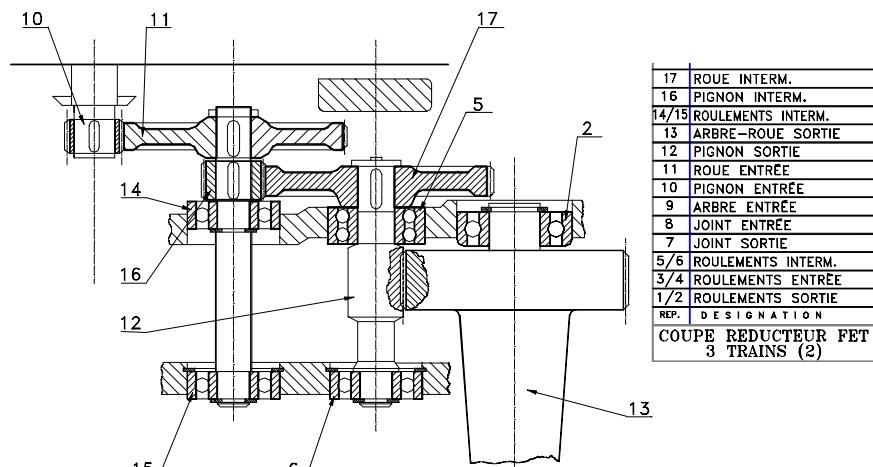
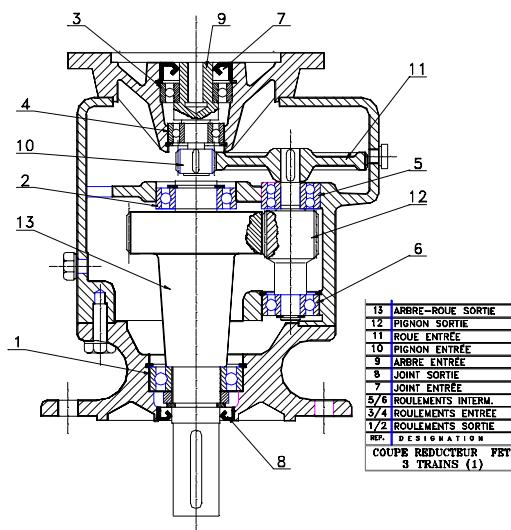
11/12 ARBRE ROUE SORTIE
10 PIGNON SORTIE
9 ROUE ENTRÉE
8 ARBRE-PIGNON ENTRÉE
7 JOINT SORTIE
6 JOINT ENTRÉE
5 ROULEMENT INTERM.
4 ROULEMENT INTERM.
3 ROULEMENT ENTRÉE
2 ROULEMENT ENTRÉE
1 ROULEMENT SORTIE

 **TIMSA®**

DESSINS

FET
(Floculateur à deux pales)

Date 14/09/99



MOTORS	Date 30.08.99
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Description:

All agitators are driven by a motor that can be:

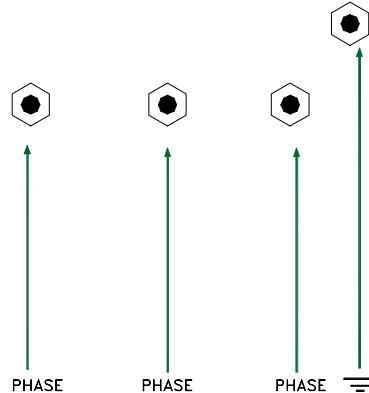
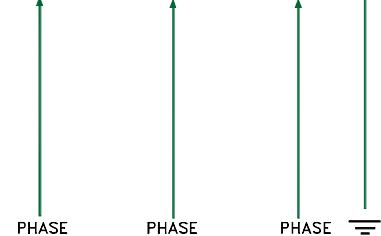
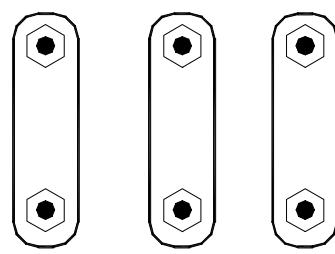
- Electric, pneumatic or oleohydraulic
- In this manual we will see electric motors because they are the most used in most applications.
- In case of pneumatic or oleohydraulic motors bear in mind the specific instructions of operation and maintenance that must go with the machine.

Connection and starting:

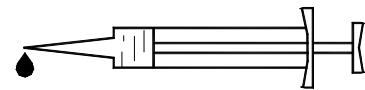
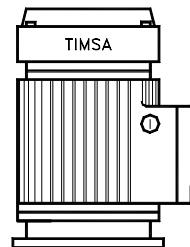
- **Before connecting** any verify that the voltage and the frequency available are the ones indicated on the motor characteristics plate and check that the motor turns loosely moving with your hand the fan blades.
- Verify that the wire section used is the one suitable for the voltage, power and distance from the motor to the connection board.
- Verify that the motor isolation and protection are suitable for the installation and for the security rules in force. **ATTENTION:** TIMSA refuses any responsibility for machines that have not been installed respecting the security rules in force. This circumstance invalidates the agitator guarantee
- Normal motors are supplied with a connection box of 6 terminals, allowing a star or delta connection depending on the bars position. In case of special motors (singlephase, two-speed, etc ...), with different terminal box or with star/delta starters consider the specific operation and maintenance documentation that must go with the machine.
- Connect correctly the terminal to the ground that can be inside the terminal box or outside on the motor frame.
- Start the equipment verifying the absence of vibrations and noise.
- Normal conditions for continuous service are:
 - Room temperature till +40°C
 - A higher room temperature reduces the nominal power (to approximately the 80% for a temperature of 60°C)
 - Height over the sea level up to 1000 m
 - A bigger height reduces the nominal power to approximately 8% for each supplementary 1000 m.
- The maximum temperatures in the hottest points of the winding are for class B: 125°C, class F: 155°C and class H: 180°C.

Maintenance:

- Most motors with frame smaller than 160 or 200 (see the marks) have got "for life" oiled bearings.
- Motors with bigger frame have got oiler(s). This systems allows to renew the grease with the motor working, lubrication is recommended each 1000 hours with normal operation conditions. Consult "*RECOMMENDED OILS AND GREASES*" section
- Keep the ventilator cover free from strange objets to assure a correct refrigeration for the frame blades.

DETAIL DRAWINGS**MOTORS****Date** 23/07/99**STAR CONNECTION** **DELTA CONNECTION** 

MOTOR TYPE		VOLTAGE		
		220	380	660
220/380		△	Y	X
380△		X	△	X
380/660		X	△	Y



Lubricate motors with frame bigger than 160-200

REDUCERS	Date 04.06.03
Description:	
<p>Reducers for agitators can be:</p> <ul style="list-style-type: none"> • Coaxial with helicoidal gears, series TA and TS • Hollow shaft with helicoidal gears, series TDX • Right-angled with hollow shaft and helicoidal gears, series TKX • Worm gear, series TL and TLA • "Tandem" type with parallel shafts for high torque and bending moment 	
Use:	
<ul style="list-style-type: none"> • It can be assembled on any type of agitator either vertical or horizontal when the turning speed required for the shaft is different to the motor speed and constitutes one of the main pieces of these machines. • In most cases the reducer bearings are the ones which support the radial and axial stresses generated with the turning of the propeller(s) whether this is vertical or whether it is horizontal. That is why these reducers are always specially designed, not only to transmit a torque but to be able to absorb axial stresses and bending moments. • When the agitator shaft is very long or the power to transmit are high a guided lantern is required after the reducer; in this case the bearings of that lantern are the ones that absorb the stresses and the reducer must be exclusively designed to transmit a twisting torque with your specific service factor. • The service factor of a reducer is the relation between the maximum transmissible power and the power absorbed by the mobile when it turns inside a liquid. Anyway the transmissible power for the reducer must be higher than the installed power motor. • The maximum <u>normal</u> temperature in the frame for reducers with cylindrical gears is 65/70 °C and for worm gear reducers till 85 °C. For higher temperatures consult TIMSA. • The maximum noise level must not exceed 85 dB for powers less to 37 kw. 	
Reducer 1	

Assembly and starting:

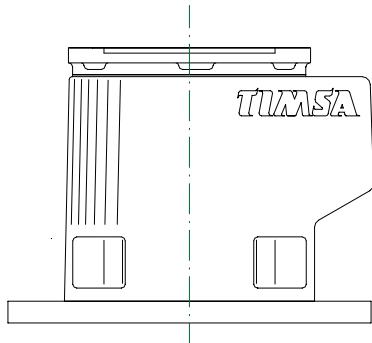
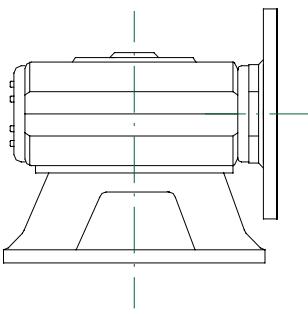
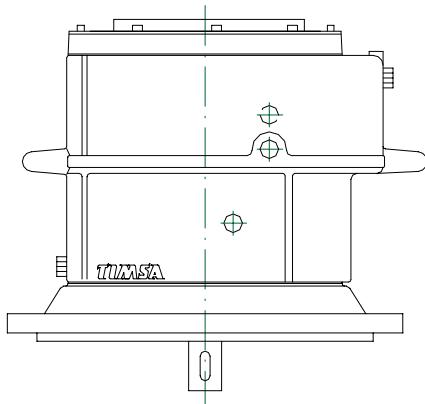
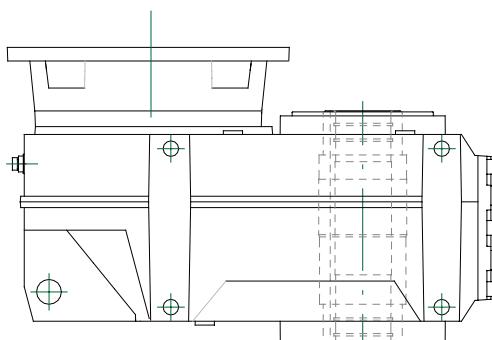
- After having verified the points detailed on "MOTORS" section check that the reducer is firmly anchored and that it has got the specific oil inside. See "LUBRICATION" section.
- The type of lubrication recommended is shown on a label stuck to the reducer where it will be indicated "Full of oil" or "For life lubricated".
- All reducers are supplied with the oil needed; nevertheless if for any reason the lubricant is sent apart that will be indicated on the reducer to fill it before starting.
- In reducers lubricated by oil verify that the level is suitable to the mounting position. In the lubricant input hole it is necessary to put a drilled plug, supplied with the equipment, to allow the degassing. In any work position the tankful plug must be the one with the degassing hole.
- Once the equipment is on service verify the absence of abnormal noises or vibrations in the reducer, as well as its tightness and observe if there is any leak of lubricant. The frame temperature must be controlled after some time of work.

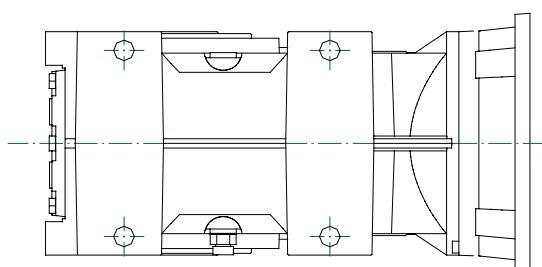
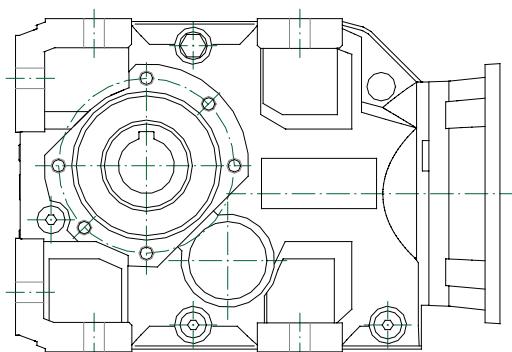
Maintenance:

- No maintenance with "for life lubricated" reducers
- For reducers lubricated with oil empty after the first 500 hours of work pouring the new oil and letting it wring by the outlet hole till all the impurities produced by the tread have been dragged. After this period change each 2500 hours of work or every 6 months, what happens first using **mineral oils**. Using **synthetic oils** (see tables on "LUBRICATION" section) the period to change is 12000 hours of work (always after the first 500 hours) or every 30 months, what happens first.
- In case of apparition of vibrations or abnormal noises substitute the faulty piece(s) asking TIMSA for a spare parts list.

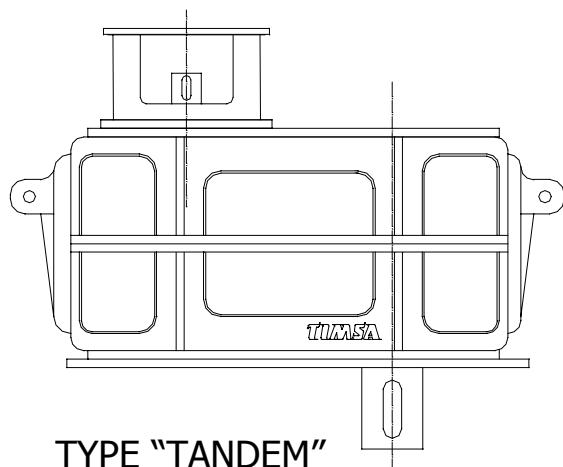
DETAIL DRAWINGS**TYPES OF REDUCER**

Date 05.06.03

**SERIE "TI"****SERIES "TL" y "TLA"****SERIE "TS"****SERIE "TDX"**



SERIE "TKX"



TYPE "TANDEM"

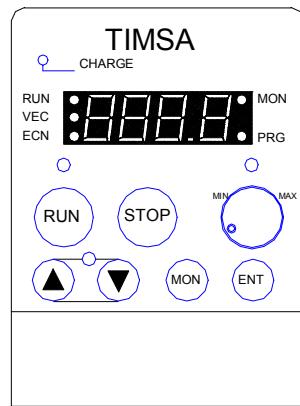


SPEED VARIATORS	ELECTRONIC	Date: 31.08.99
Description:		
<ul style="list-style-type: none"> • Programmable electronic variator. 		
Applications:		
<ul style="list-style-type: none"> • It is installed in those equipments where it is necessary to adjust the turning speed with accuracy depending on the process. • It can be placed near the agitator, in a control house or in an electric panel. 		
Assembly and starting:		
<ul style="list-style-type: none"> • Put the electronic speed converter in an ventilated place without humidity or dust, exempt from metallic particles, vibrations, electromagnetic influences and far from fluorescent lamps. • Use the variator with a room temperature between –10°C and +40°C • Always connect the variator to ground to avoid accidents and operation problems. • Verify that the voltage available coincides with the one necessary and it does not have oscillations higher to the 10% of the nominal. In powers up to 1.5 kW. the feed voltage to the variator is usually singlephase; the output voltage is always three-phase. Pay attention to the feeding connection of the variators because if they are singlephase and they are connected as triphase, damages are irreparable and under no circumstance they would be under TIMSA's guarantee. Check in the variator manual of the manufacturer included with the equipment the connection schemes. • Connect the three phases of the motor to the converter terminal. The motor must be fed exclusively from the variator and any type of switch or commutator must be avoided in the wire that connects them. • Always connect the motor to ground through the converter terminal. • Start the converter and verify the maximum and minimum range of speed attainable (measured with a tachometer). This range must coincide with the one specified on the equipment offer. If it is not like that, immediately contact TIMSA because if the agitator turns at a higher or lower speed than the ones scheduled that could lead to serious damages to it and to the installation. 		
V.electr. 1		

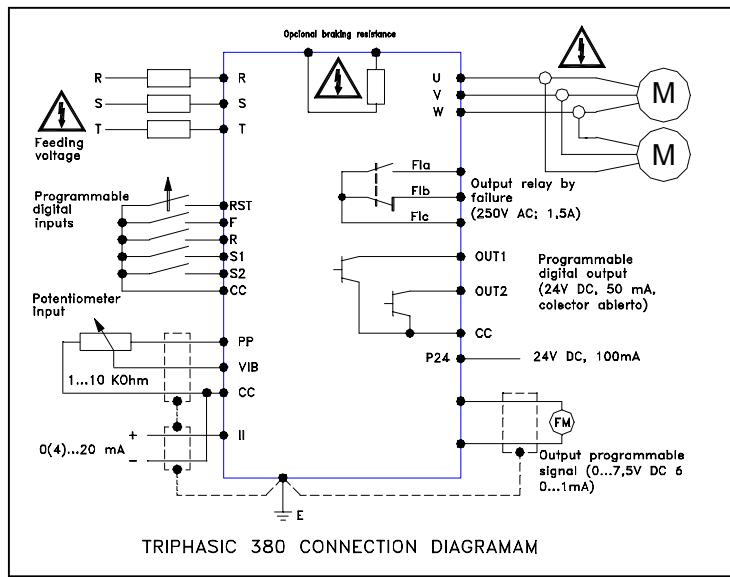
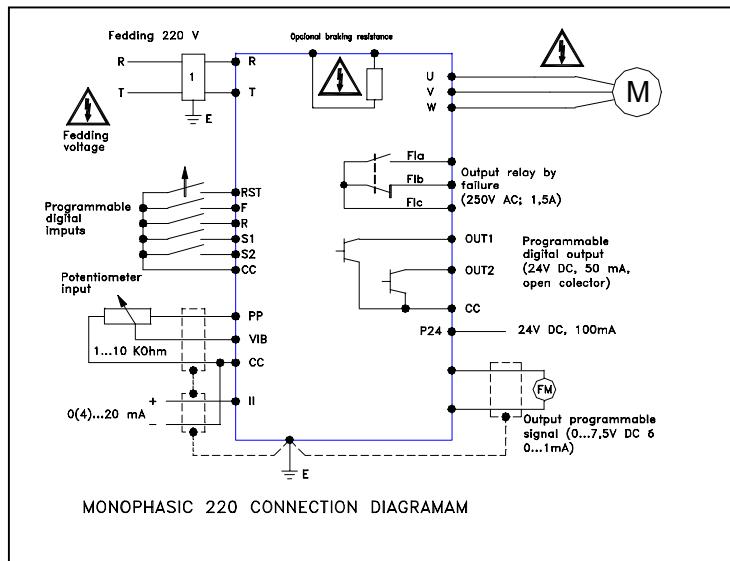
- All speed converters supplied by TIMSA are programmed and the program is protected against accidental manipulation.
- For special operation conditions or for automatic speed regulation from signals of 0-5(10) v or of 0(4)-20mA, contact with the technical department of TIMSA who will supply the convenient program.

Maintenance:

- No maintenance.



ELECTRONIC VARIATOR



SPEED VARIATORS	MECHANIC	Date 06.10.99
Description:		
The main types of mechanic variators used in agitators are:		
<ul style="list-style-type: none"> • Pulleys and belt variators • Planetary friction variators 		
Applications:		
<ul style="list-style-type: none"> • It is installed in some equipments in which it is necessary to adjust the turning speed depending on the process placing it below the electric motor. 		
Assembly and starting:		
<ul style="list-style-type: none"> • After having verified the points detailed on "MOTORS" section and on "REDUCERS" section check that the variator has the specific oil inside or that it is "for life" oiled. Pulley variators have got armoured bearings and do not need lubrication (except for very big sizes or special executions in which case the specific maintenance instructions enclosed with the machine must be observed). • All friction speed variators are supplied with the oil or grease required, however, if for any reason the lubricant was sent apart it would be indicated on the variator to fill it before starting. • In friction variators verify that the oil level is suitable to the assembly position. A drilled plug, supplied with the equipment, must be put in the input hole of lubricant to ease degassing. At any working position the filling plug must be the one that has the degassing drill. • Never move the regulation wheel with the motor stopped. • Once the equipment is started verify the absence of abnormal noises or vibrations in the variator as well as its tightness by observing any possible leak of lubricant. The frame temperature must be controlled after some time of working. 		
V.mech. 1		

- Verify by moving the regulation wheel (always softly, never forcing it) the maximum and minimum range of speed attainable (measured with a tachometer). This range must be the one specified on the equipment offer. If it is not like that, immediately contact TIMSA because if the agitator turns at a higher speed than the one scheduled that could lead to serious damages to it and to the installation.
- It is advisable to change the machine turning speed frequently to avoid the formation of preferential tracks on the pulleys.

Maintenance :

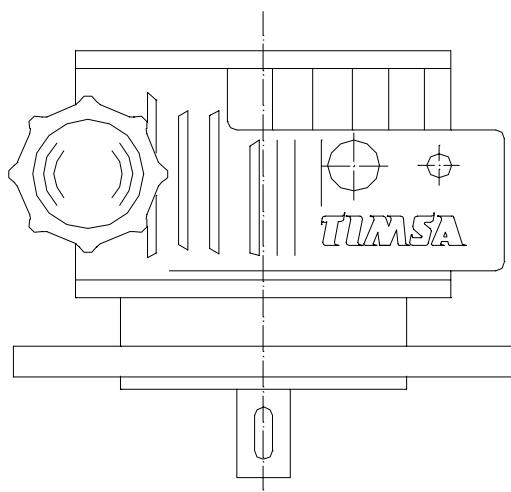
- In **pulleys variators** no maintenance in relation to lubrication is needed. It is advisable to verify periodically the state of the belt replacing it if necessary.
- In **friction variators** with “life lubrication” no maintenance is needed.
- In **friction variators** oil-lubricated empty after the first 200 hours of work pouring the new oil and letting it wring by the outlet hole till all the impurities produced by the tread have been dragged. After this period change every 1000 hours of work or every six months, what happens first. See above characteristics chart of oil types.
- In case of vibrations or abnormal noises substitute the faulty piece(s) asking TIMSA for a spare parts list.

<i>Recommended oils</i>	
AGIP	A.T.F.DEXRON
BP	AUTRAN DX
CHEVRON	A.T.F.DEXRON
ESSO	A.T.F.DEXRON
FINA	A.T.F.DEXRON
MOBIL	A.T.F. 220
SHELL	A.T.F. DEXRON
CASTROL	TQ DEXRON II

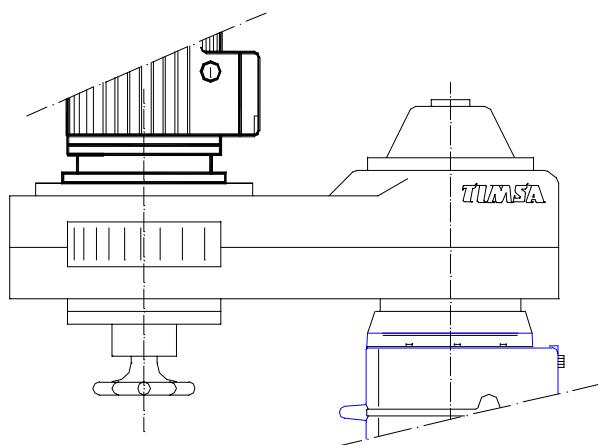
DETAIL DRAWINGS

MECHANIC SPEED VARIATOR

Date 23/06/99



PLANETARY MECHANIC VARIATOR



PULLEYS MECHANIC VARIATOR



LUBRICATION											Date	06.06.03																			
Description:																															
<ul style="list-style-type: none"> Next, we describe the oils recommended for the agitator reducers. There are two types of lubrication, "for life" lubrication for certain reducers that don't have plugs for filling, emptying or level, and lubrication "with oil" (mineral or synthetic). For these last models oil levels must be respected, they are different depending on to the position of work of the machine. 																															
Lubrication "for life":																															
<ul style="list-style-type: none"> Some type of reducers (the smallest) are delivered with permanent oil FL IBERIA - FL BAKU TO 4/50, and it's not required any service. This reducers are of type TI, TDX until size 502 and TKX until size 503. 																															
Lubrication with oil:																															
<table border="1"> <thead> <tr> <th rowspan="2">Ambient temperature °C</th> <th colspan="3">Viscosity (cSt a 40°C)</th> </tr> <tr> <th>Entry speed 500-1000 rpm</th> <th>Entry speed 1000-1500 rpm</th> <th></th> </tr> </thead> <tbody> <tr> <td>-10 a +5</td> <td>VG 100</td> <td>VG 100</td> <td></td> </tr> <tr> <td>0 a +40</td> <td>VG 320</td> <td>VG 220</td> <td></td> </tr> <tr> <td>+35 a +60</td> <td>VG 460</td> <td>VG 320</td> <td></td> </tr> </tbody> </table>											Ambient temperature °C	Viscosity (cSt a 40°C)			Entry speed 500-1000 rpm	Entry speed 1000-1500 rpm		-10 a +5	VG 100	VG 100		0 a +40	VG 320	VG 220		+35 a +60	VG 460	VG 320			
Ambient temperature °C	Viscosity (cSt a 40°C)																														
	Entry speed 500-1000 rpm	Entry speed 1000-1500 rpm																													
-10 a +5	VG 100	VG 100																													
0 a +40	VG 320	VG 220																													
+35 a +60	VG 460	VG 320																													
Mineral oil, adequate for reducers series TS all sizes and TDX from model 600.																															
Viscosity (cSt a 40°C)	FL	Brugarolas	BP	Esso	Mobil	Shell	Cepsa	Klüber	Repsol	ARAL	Castrol	DEA	TRIBOL																		
	FL Iberia	Extra Gear	BP Energol	Spartan	Mobil gear	Shell Omala Oil	Engr. HP	Klüber Oil GEM 1	Super Tauro	ARAL Degol	Castrol Alpha	Falcon	TRIBOL																		
VG 320	-	320	GR-XP 320	EP 320	632	320	320	320	320	BG 320	MW 320	CLP 320	1100/320																		
VG 220	FL BAKU TO 4/50	220	GR-XP 220	EP 220	630	220	220	220	220	BG 220	MW 220	CLP 220	1100/220																		
VG 150	-	150	GR-XP 150	EP 150	629	150	150	150	150	BG 150	MW 150	CLP 150	1100/150																		
VG 100	-	100	GR-XP 100	EP 100	627	100	100	100	100	BG 100	MW 100	CLP 100	1100/100																		
Notes:																															
<ul style="list-style-type: none"> For entry speed lower than 200 rpm please ask to Timsa Admissible tolerance VG=±10% of the indicated values The highest temperature of work for a lubricant without variation of its characteristics is approximately of 95°C 																															
											Lubrication 1																				

Propellers fixation to the shaft:

The propeller(s) fixation to the shaft is made by:

- Welding; for example for agitators that must be rubberised or plasticized.
- Pressure screws.
- Screwed on ailerons
- Cores of two or three elements under pressure on the shaft

Precautions:

- **Verify that the propeller assembly position, sucking or blowing, is the scheduled.** Unless the contrary has been specified, every axial flow propeller will be assembled in blowing position, that is to say, with the propeller entering edge in the upside and turning clockwise looking from the motor to the propeller so that, when turning, they produce a blowing flow that helps to sweep the bottom of the tank.
- Agitators provided with axial flow helicoidal profile mobiles **do not have reversible flow**. To change to sucking position we do not only have to reverse the motor turning direction but also to turn the propeller 180° before fastening it to the shaft, so that the entering edge keeps on the underside. See figures.
- Agitators provided with pitch blade turbines **do certainly have reversible flow**. To make them work sucking, it is only necessary to reverse the turning direction.
- Verify the angular position in the moment of the assembly when you want to place several propellers on the same shaft. See figures.
- In case of assembling two or three elements on pressure cores, loosenesses must be evenly distributed when the cores are tightened..

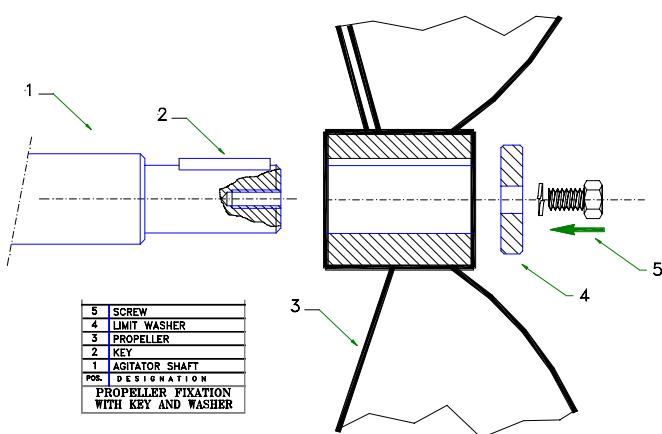
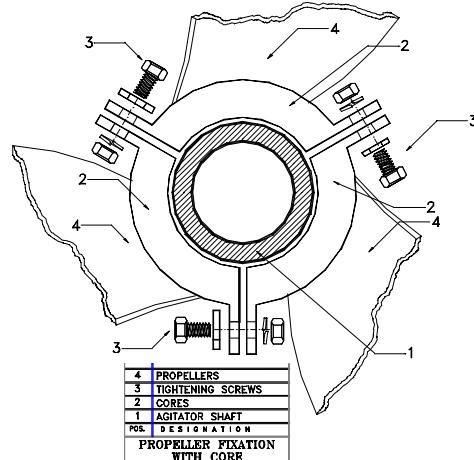
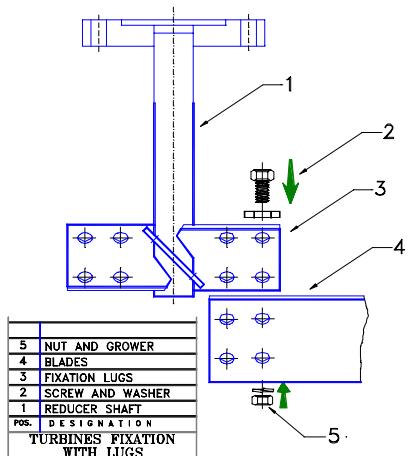
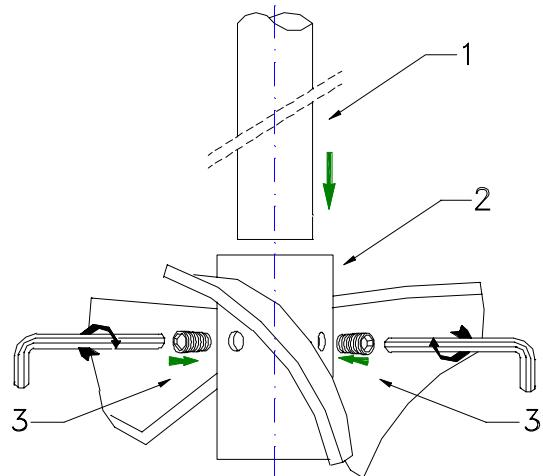
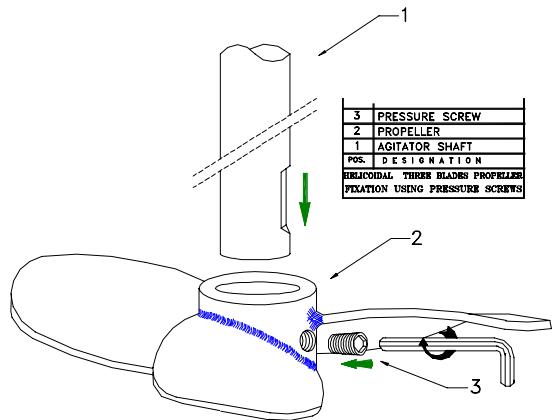
Stresses and weights:

- Due to turbulence and other kind of hydrodynamic complex phenomena, each propeller produces a resultant radial stress perpendicular to the agitator shaft and applied to its end. This stress multiplied by the shaft length give us the bending moment that must be considered to calculate the support structure. **On this account it is essential to respect during the assembly the distances from the propellers to the agitator support plate, as the machine has been calculated on this hypothesis; placing the mobiles at a distance from the support plate bigger than the scheduled one, can cause serious mechanical damages that in no case will be covered by TIMSA guarantee.**
- In case of axial flow mobiles an axial vertical stress is produced too and it is upward in case of propellers turning in blowing position or downward in case of sucking propellers. If the axial stress is upward it will compensate completely or partially the agitator weight, it can even be superior to such weight. If the stress is downward it will be added to the weight, which will be considered to calculate the suitable support structure.

DETAIL DRAWINGS

PROPELLER FIXATION
STRESSES AND WEIGHTS

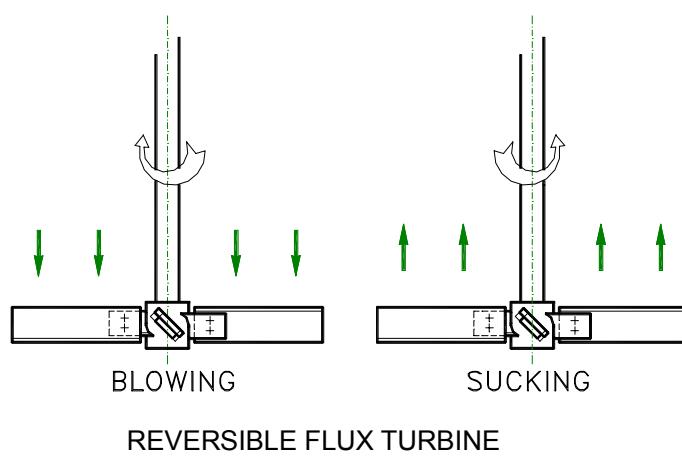
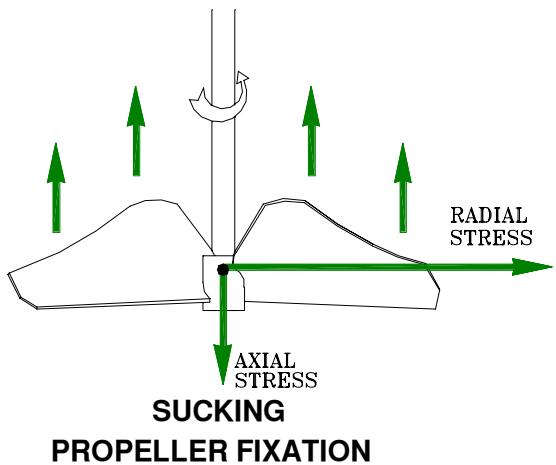
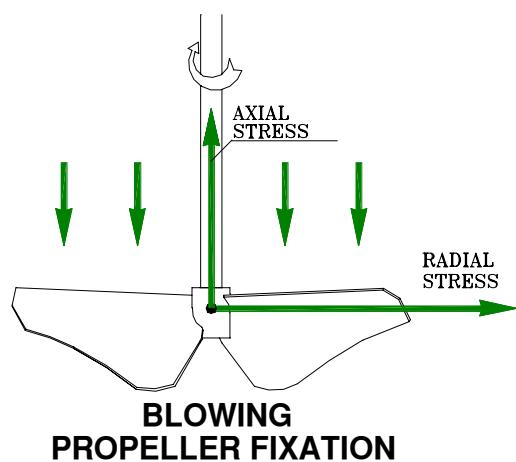
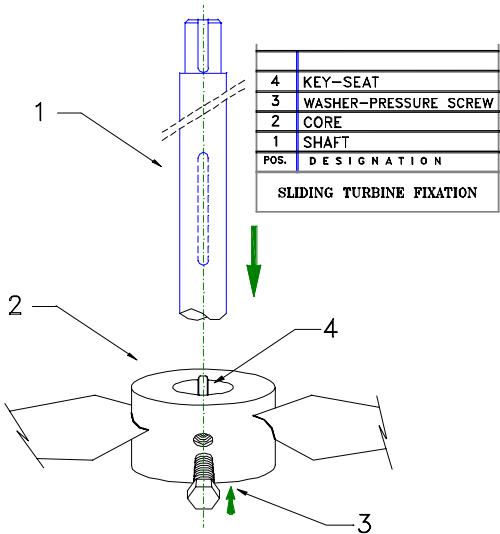
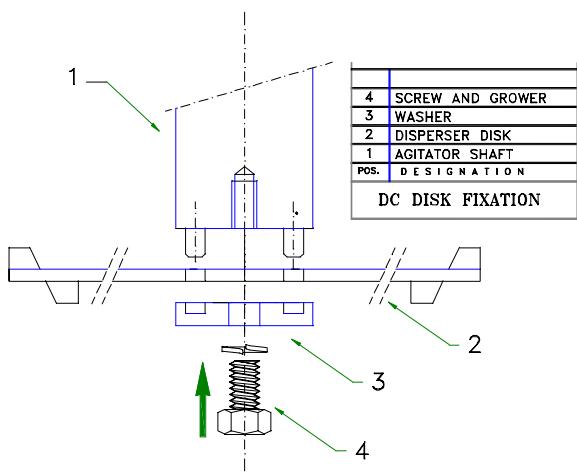
Date 21/09/99



DETAIL DRAWINGS

**PROPELLERS FIXATION
STRESSES AND WEIGHTS**

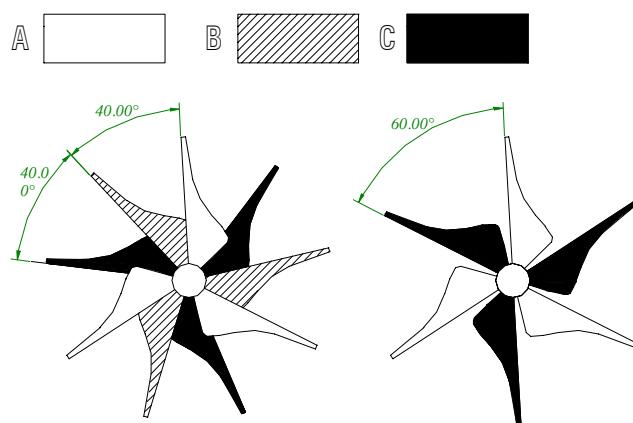
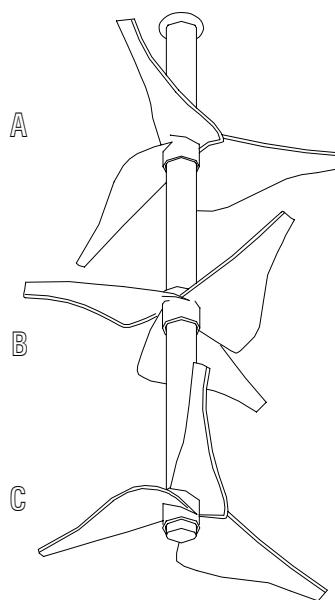
Date 21/09/99



DETAIL DRAWINGS

**PROPELLER FIXATION
STRESSES AND WEIGHTS**

Date 21/09/99



MULTIPLE PROPELLERS ASSEMBLY



TIGHTENING TORQUE FOR SCREWS**Date** 29.05.01**Description:**

- It is the torque necessary to tighten one screw and it is defined by the screw material, its diameter and used quality.
- The tightening torque for the screws delivered by Timsa are:

Carbon steel screws		S.Steel screws	
Screw diameter mm	Tightening torque Nm	Screw torque mm	Tightening torque Nm
1.6	0.12	1.6	0.45
2	0.25	2	0.55
2.5	0.53	2.5	0.80
3	0.91	3	1.85
4	2.09	4	4.1
5	4.14	5	8.0
6	7.1	6	13.9
8	17.4	8	33.9
10	34	10	69
12	59	12	117
14	95	14	188
16	148	16	291
18	205	18	411
20	291	20	586
22	400	22	
24	500	24	
27	741	27	
30	1005	30	
33	1366	33	

DEFLECTORS – ANTIVORTEX**Date** 31.08.99**Description:**

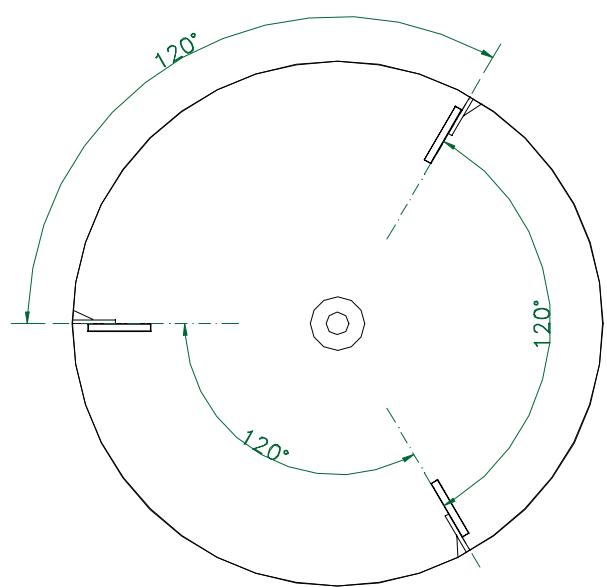
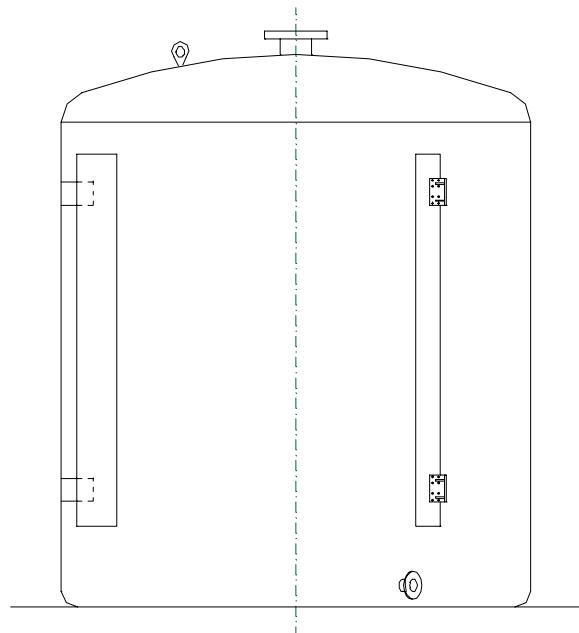
- In case of centred placing of vertical agitators in cylindrical tanks it is recommended to place three deflectors at 120° with a height equivalent to the 75% of the hoop height and the rest of dimensions according to the enclosed table. In case of tanks with dish bottom the deflector must go, at most, till the tangent line.

Tank diameter	Deflector width	Wall separation
500	40	5
600	50	10
800	60	10
1000	80	10
1200	100	20
1600	120	20
2000	150	30
2500	160	30
3000	180	30
3500	190	35
4000	200	40
4500	250	50
5000	300	60
6000	350	70
8000	400	80
10000	500	100
12000	600	120

DETAIL DRAWINGS

ANTIVORTEX

Date 23/07/99



RECEPTION AND STORAGE	Date 31.08.99
Reception:	
<ul style="list-style-type: none"> • <u>When receiving the material it is essential to check the following points:</u> <ul style="list-style-type: none"> • Check the transport delivery note with the material, number of packages, point of departure, etc... • Specify in writing to the forwarder who delivers any fault observed in the external of the packing such as strokes, breakings, humidity, rips, etc. opening immediately the package with faults and verifying its content. In case of receiving damaged goods, immediately inform the forwarder and TIMSA. In case of not doing like that the eventual claims would be invalidated. 	
Storage:	
<ul style="list-style-type: none"> • Store the device in its packing, in a dry place protected against strokes and dust making sure previously that this packing is the suitable to support the environmental conditions in the place. Any storage before and after the use under special environmental conditions (humidity, salinity, dust, vibrations, corrosion, etc.) restricts the conditions of the guarantee. • Before starting an agitator that has been mounted but has not worked or has been stopped for a long time, check that there are no leaks of lubricant and the sealing of the motor since, keeping the agitator out of work, specially if it is outdoors, can lead to damage or hardening of the joints leading to leaks of lubricant and water flood of the motor. • Shafts must be located on an even surface, with its corresponding protections or packings. Never use the agitator shaft as a lever or put weight on it. • <u>In case of assemblies shaft-propeller(s) coated with plastic or rubber consider the previous precautions</u> since just the rub with the floor can cause an exposed metallic point by which the corrosion will start; remind that coating is usually fragile and it is easy to deteriorate if there is not a very careful manipulation during storage and assembly. 	
	Recep. 1

IDENTIFICATION, SPARE PARTS AND REPAIRS**Date** 31.08.99**Identification:**

- Each agitator has got a characteristic plate in stainless steel with the following information (except for small special models integrated in equipments):
 - Agitator model
 - TIMSA reference (P-xxxxx).
 - Fabrication date
 - Fabrication number
- In case of asking for spare parts or information about our machines, and in order to avoid mistakes, you will have to give us the data of the characteristics plate, specially TIMSA reference and the fabrication number..

Spare parts:

- It is essential to use original spare parts for TIMSA agitators.
- To avoid mistakes when asking for spare parts it is necessary to give the data of the characteristics plate, specially TIMSA reference (P-xxxxx) and the machine fabrication number.

Repairs:

- TIMSA has got a repair service in our workshop. We will give you a quotation once the machine has been checked and before repairing it.
- In case of breakdown, please, contact TIMSA to try to solve the problem by phone. If this were not possible it is necessary that you send the machine to us, **always freight prepaid**, together with a note explaining the damage. Machines under guarantee are repaired and sent back as soon as possible and for those which are not under guarantee we give quotation and wait for its acceptance.
- If there are big machines which dismounting or transport invalidate the previous system, our technicians would move to the installation, subject to the acceptance of the quotation in writing.

DETAIL DRAWINGS

**IDENTIFICATION, SPARE PARTS AND
REPAIRS**

Date 23/07/99



GUARANTEES	Date 31.08.99
General:	
<ul style="list-style-type: none"> • TIMSA guarantees its supply during 12 months after the delivery against any defect of design, material or execution. This guarantee covers the substitution or repair by our charge and in our workshops of all faulty parts, being the buyer who must prove the mentioned defects. <u>The substitution of one or several parts during the guarantee period does not extend this period.</u> • Timsa guarantee only covers the supplied machine(s); no reclamation is admitted in case of breakdown for possible damages caused to the installation, to the product or to the quality of the production or for a decrease of it. 	
What the guarantee do not cover:	
<ul style="list-style-type: none"> • Costs resulting from dismounting, assembly and transport operations • Damages caused by an incorrect installation • Deterioration due to from negligence • Damages caused by maintenance defects • Parts submitted to wear • Working after modifying the service or exploitation conditions • Deterioration resulting from storage in unsuitable conditions • Installation of spare parts or accessories different from TIMSA supply • Dismounting by the user of subsets such as mechanical seal cartridges, reducers or motors invalidates the guarantee. • Wear in the shaft and propellers coating, rubber or plastic, because it is considered as normal. 	
Guarantee 1	