

# **FAV VERTICAL AGITATOR**

INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS



# CONTENTS

|   |           |
|---|-----------|
| <b>1. GENERALITIES</b>                            | <b>3</b>  |
| a. INSTRUCTIONS MANUAL                            | 3         |
| b. COMPLIANCE WITH THE INSTRUCTIONS               | 3         |
| c. WARRANTY                                       | 3         |
| <b>2. SAFETY</b>                                  | <b>3</b>  |
| a. WARNING SYMBOLS                                | 3         |
| b. GENERAL SAFETY INSTRUCTIONS                    | 3         |
| <b>3. GENERAL INFORMATION</b>                     | <b>5</b>  |
| a. DESCRIPTION                                    | 5         |
| b. OPERATING PRINCIPLE                            | 5         |
| c. APPLICATION                                    | 5         |
| <b>4. INSTALLATION</b>                            | <b>5</b>  |
| a. RECEPTION OF THE AGITATOR                      | 5         |
| b. TRANSPORT AND STORAGE                          | 5         |
| c. LOCATION                                       | 6         |
| d. ELECTRICAL INSTALLATION                        | 6         |
| e. ASSEMBLY                                       | 6         |
| <b>5. START-UP</b>                                | <b>7</b>  |
| <b>6. TROUBLESHOOTING</b>                         | <b>8</b>  |
| <b>7. MAINTENANCE</b>                             | <b>8</b>  |
| a. GENERAL CONSIDERATIONS                         | 8         |
| b. MAINTENANCE                                    | 8         |
| c. LUBRICATION                                    | 9         |
| d. SPARE PARTS                                    | 9         |
| e. CONSERVATION                                   | 9         |
| f. DISASSEMBLY AND ASSEMBY OF THE AGITATOR        | 9         |
| <b>8. TECHNICAL SPECIFICATIONS</b>                | <b>10</b> |
| a. MATERIALS                                      | 10        |
| b. OTHER FEATURES                                 | 10        |
| c. CAPACITY                                       | 10        |
| d. DIMENSIONS                                     | 10        |
| e. FAV AGITATOR'S EXPLODED DRAWING AND PARTS LIST | 11        |

# 1. Generalities

## a. INSTRUCTIONS MANUAL

This manual contains information about the reception, installation, operation, assembly, disassembly and maintenance of the FAV vertical agitator.

Carefully read the instruction prior to starting the agitator, familiarize yourself with the installation, operation and correct use of the agitator and strictly follow the instructions. These instructions should be kept in a safe location near the installation area.

The information published in the instruction manual is based on updated data.

FLUSSMANN reserves the right to modify this instruction manual without prior notice.

## b. COMPLIANCE WITH THE INSTRUCTIONS INSTRUCTIONS MANUAL

Not following the instructions may impose a risk for the operators, the environment and the machine, and may result in the loss of the right to claim damages.

This non-compliance may result in the following risks:

- Failure of important machine/plant functions,
- Failure of specific maintenance and repair procedures,
- Possible electrical, mechanical and chemical hazards,
- Risk to the environment due to the type of substances released.

## c. WARRANTY

Any warranty will be void immediately and lawfully and, additionally, FLUSSMANN will be compensated for any civil liability claims submitted by third parties, in the following cases:

- The service and maintenance work have not been carried out in accordance with the service instructions, the repairs have not been carried out by our personnel or have been carried out without our written authorisation.
- Modifications have been carried out on our material or equipment without written authorisation.
- The parts or lubricants used are not original FLUSSMANN parts and products.
- The material or equipment has been improperly used, has been used negligently, or has not been used according to the instructions and their intended.

The General Conditions of Delivery already in your possession are also applicable.



The machine may not undergo any modification without prior approval from the manufacturer. For your safety, only use original spare parts and accessories.

The usage of other parts will relieve the manufacturer of any liability.

Changing the service conditions can only be carried out with prior written authorization from FLUSSMANN

Please do not hesitate to contact us in case of doubts or if further explanations are required regarding specific data (adjustments, assembly, disassembly, etc.).

# 2. SAFETY

## a. WARNING SYMBOLS



Safety hazard for people in general and/or for equipment



Electric hazard

ATTENTION Important instruction to prevent damage to the equipment and its functions

## b. GENERAL SAFETY INSTRUCTIONS



Read the instruction manual carefully before installing and starting the agitator.  
Contact FLUSSMANN in case of doubt.

### **b. a. DURING THE INSTALLATION**

The Technical Specifications of chapter 9 should always be observed.

The installation and use of the agitator should always be in accordance with applicable regulations in regard to health and safety.



Before starting up the agitator, check that it is properly anchored and its shaft is perfectly aligned. Incorrect alignment and/or excessive stress during coupling can cause serious mechanical problems in the agitator.

Take all possible precautions when lifting the agitator. Always use properly attached slings when moving the agitator with a crane or other lifting device.

Keep the motor and the switchboard under control, particularly in areas where there is a risk of fire or explosion.



When cleaning, do not spray directly on the engine.

Do not disassemble the agitator until the switchboard has been disconnected. Remove the fuses and disconnect the power cable supplying the motor.

All electric work should be carried out by specialised personnel.

### **b. b. DURING OPERATION**

The Technical Specifications of chapter 9 should always be observed. Under no circumstances can the specified limit values be exceeded.



Before starting up the agitator, remove all the tools used during the assembly.

Do not operate the agitator when the rotating parts are not equipped with their guards or are not properly assembled.

The agitator has rotating parts. Do not place hands or fingers in the agitator while it is operating. This may cause serious injuries.



Do not touch the parts of the agitator that are in contact with the fluid when in operation. When the agitator operates with hot fluids (temperatures above 50°C), there is a risk of skin burning. In such cases, collective-protection means (in this order or priority: separation, protective screen, heat-insulating material) or, in the absence of this, individual protection gear (gloves) must be used.

The agitator and its installation can generate sound levels above 85 dB(A) under unfavourable operating conditions. In such cases, the operators must use devices for protection against noise.

### **b. c. DURING MAINTENANCE**

The Technical Specifications of chapter 9 shall always be observed.



The agitator cannot operate without fluid. Standard agitators are not designed to work during the filling or emptying of tanks.

The maximum operating conditions of the agitator should not be exceeded. Nor should the operating parameters for which the agitator was initially designed be modified without written authorisations from FLUSSMANN.



Do not leave loose parts on the floor.

Do not disassemble the agitator until the switchboard has been disconnected. Remove the fuses and disconnect the power cable supplying the motor.

All the electric work should be carried out by specialised personnel.

### 3. GENERAL INFORMATION

#### a. DESCRIPTION

The agitators of FAV series are direct motor-driven agitators with a stainless steel base. In spite of being very compact, these agitators have a bearing support that is completely independent of the motor. The half shaft is guided by two bearings that support the axial and radial forces transmitted by the agitation elements. The agitator shaft is attached directly to the half shaft with two allen pins.

#### b. OPERATING PRINCIPLE

The agitators are normally installed inside the tank either centrally with current deflectors, or offset, so that the offsetting itself prevents the rotation of the stirred product.

The rotation of the propeller makes the fluid flow to the bottom and then up to the surface of the product along the walls of the tank. The effect is promoted if the bottom of the tank is curved.

The Lineflux vigorously agitates the content of the tank promoting the mixing of the product while the saw tooth propeller promotes its dispersion.

#### c. APPLICATION

Its application is for agitation and mix processes on tanks with a maximum volume of 1.500 l and to work with low-viscosity products.

These agitators are used in the processes of mixing, dissolution, dispersion and maintenance whenever powerful and high-speed agitation is required in the food processing, cosmetics, pharmaceutical or chemical industries.



Each agitator has performance limits. The agitator was selected for a given set of mixing conditions when the order was placed. FLUSSMANN shall not be held responsible for any damage that might be suffered or malfunctioning of the equipment if the information provided by the buyer is incomplete or incorrect. (e.g. nature of the fluids or installation details).

### 4. INSTALLATION

#### a. RECEPTION OF THE AGITATOR



FLUSSMANN is not liable for any deterioration of the material caused by its transport or unpacking. Visually check that the packaging has not been damaged.



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

When receiving the agitator, check the packaging and its content to ensure that it matches the delivery note. FLUSSMANN packs the agitators in their fully assembled form or disassembled on a case-by-case basis. Ensure that the agitator has not been damaged in any way. If it is not in good condition and/or any parts are missing, the carrier must submit a report as soon as possible.

The following documentation is included with the agitator:

- Shipping documents,
- Instructions and servicing manual for the agitator,
- Instructions and servicing manual for the gear-motor when the agitator is supplied with a motor by FLUSSMANN.

#### b. TRANSPORT AND STORAGE



##### ATTENTION

According to the model, the agitators are too heavy to be stored or installed manually. Use an appropriate mode of transport. Do not handle the agitator by the shaft as this may become deformed.



##### ATTENTION

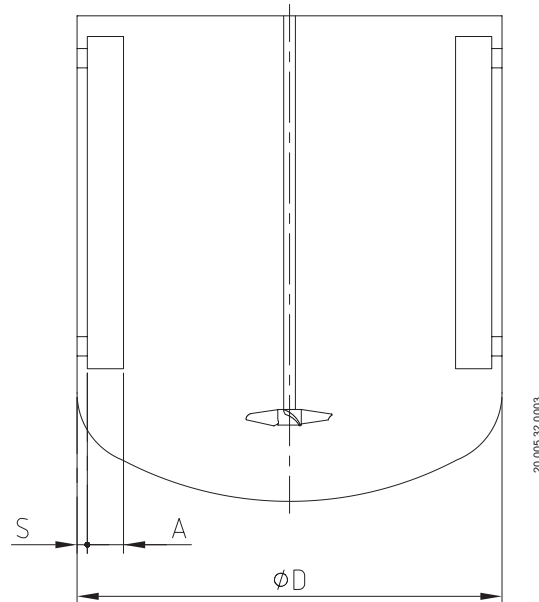
Take all possible precautions when lifting the agitator. Always use properly attached slings when moving the agitator with a crane or other lifting device.

If the agitator is not to be installed immediately, it must be stored in an appropriate place. The shaft must be stored in a horizontal position and placed on wooden supports or for a similar material. In this position, the shaft will not become deformed but it must not be subject to any type of load.

### c. LOCATION

Place the agitator in such a way as to facilitate inspections and checks. Leave enough room around the agitator for service, disassembly and maintenance operations. It is very important to be able to access the electric connection device of the agitator, even when in operation.

For a good agitation process, it may be necessary to place a deflector in the tank. Ask our Technical Department for information on any particular application. If required, the approximate dimensions for the deflector for different tank diameter are shown in the next figure and the next table:



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

### d. ELECTRICAL INSTALLATION

Before connecting the electrical motor to the mains, check local regulations on electrical safety as well as the applicable standards.

Check the instructions manual of the manufacturer of the motor for information on how to connect it to the mains.



Take the connection of the electrical motors must be performed by qualified personnel.  
Take the appropriate measures to prevent any fault.

The motor must be provided with devices for protection against power overload and short-circuits. The agitator cannot be used in areas where there is a risk of fire or explosion when this has not been specified in the order.

### e. ASSEMBLY

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

1. Place a spirit level against the shaft.
2. Check 4 points at 90° to each other around the circumference of the shaft and at the same height.
3. Once the shaft is level, firmly tighten the fixing nuts and screws. Finally the propeller is mounted on the end of the shaft. Be careful when assembling the shaft not to hit or strain it so as to avoid it being bent.



#### ATTENTION

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



#### ATTENTION

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

## 5. START-UP

### a. RECEPTION OF THE AGITATOR



The start-up of the agitator can be carried out provided the instructions indicated in the chapter 5. Installation have been followed.

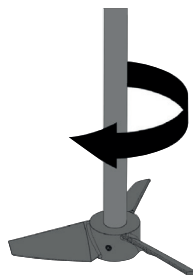
- Check that the power supply matches the rating indicated on the motor plate.
- Check the alignment of the agitator shaft.
- Check the level of fluid in the tank. When not specified in the order, the agitator cannot be operated during the filling or emptying of the tank.



#### ATTENTION

The agitator can NEVER operate without fluid. The agitation elements may only be submerged to a height equal to 1,5 times its diameter.

- All the guards must be in place.
- Start up the agitator.
- Check that the direction of rotation of the propellers is correct (it must rotate clockwise when seen from the drive side). See the next figure:



Follow the direction of rotation of the agitation components as indicated by the arrow attached to the engine. An incorrect direction of rotations results in a loss of agitation performance.

- Check the electrical consumption of the motor.

#### ATTENTION

Do not modify the operating parameters for which the agitator was initially designed without written authorisation from FLUSSMANN (risk of damage and user hazard).



Follow the instructions for use and the safety requirements described in the instructions manual for the tank in which the agitator is mounted.

Mechanical risks (e.g. drag, shear, cutting, impact, flattening and pinching). If the agitation element is accessible from the top or the tank inspections hatch, then the user will be exposed to the above-mentioned risks.

The tank must be fitted with protective devices and safety equipment. Consult the manufacturer's instructions manual.



#### ATTENTION

Introducing an object or solid raw material may cause the agitation component and other mechanical parts to break and compromise its safety or guarantee.

## 6. TROUBLESHOOTING

The attached table lists solutions to problems that may arise while operating the agitator. It is assumed that the agitator has been properly installed and that it has been selected correctly for the specific application.

Contact FLUSSMANN if technical assistance is required.

[illegible]

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

## 7. MAINTENANCE

### a. GENERAL CONSIDERATIONS

This agitator, just like any other machine, requires maintenance. The instructions contained in this manual cover the identification and replacement of spare parts. The instructions are aimed at maintenance personnel and those responsible for the supply of spare parts.

Carefully read chapter 9. Technical Specifications.

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



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

All parts or materials that are replaced must be properly disposed of/recycled in accordance with the current directives applicable in each area.



Before beginning maintenance work, ensure that the agitator is disconnected.

## **b. MAINTENANCE**

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

Motor or gear motor maintenance shall be carried out in accordance with the manufacturer's instructions, see the instructions manual.



### c. LUBRICATION

The FAV vertical agitators are mounted on permanently greased bearings, which do not need maintenance. The bearings can be re-greased by stripping the support, cleaning the previous grease off the bearings or by replacing them. The bearing houses are also cleaned and finally re-greased with a 50%-70% grease.

When re-greasing, use only special grease for ball bearings with the following properties:

- Lithium-based or made up of high quality lithium,
- Viscosity 100-140 cSt at 40°C,
- Consistency NLGI grade 2 or 3,
- Continuous work temperature -30°C to 120°C.

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

### d. SPARE PARTS

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

### e. CONSERVATION

If the agitator is out of service for a considerable period of time, clean and treat the parts with VG46 mineral oil. The shaft must be stored in the horizontal position and on wooden supports or on supports of a similar material.

### f. DISASSEMBLY AND ASSEMBLY OF THE AGITATOR



The disassembly and assembly of the agitators should only be carried out by qualified personnel using only appropriate tools. Ensure that staff read these instructions manual attentively, particularly the instructions that relate to their work.



Stop the motor from starting up when carrying out assembly and disassembly work on the agitator. Place the agitator switch in the "off" position.  
Lock out the electrical switchboard or place a warning sign.  
Remove the fuses and take them to the workplace.

#### f. a. DISASSEMBLY OF THE AGITATOR

Once the motor has been disconnected, disassembly work of the agitator may begin:

- Take the agitator out of the tank.
- Disassemble the propeller (02) and the agitator shaft (05), removing their respective Allen pins (55, 55A).
- Remove the V-ring (81).
- Remove the Allen screws (51) and take out the IEC motor (93).
- Release the elastic ring (66) with appropriate pliers. Hit the lower end of the head half shaft (26) with a nylon hammer and take out the unit formed by the head half shaft and the ball bearings (70, 70A).
- Remove the lip seal (88), which is housed in the bottom part of the head (06).
- Finally, remove the countersunk screws (50) in order to remove the base plate (42), depending on the version of the agitator.

#### f. b. ASSEMBLY OF THE AGITATOR

- Insert the lip seal (88) into the head (06).
- Put the upper ball bearings (70) and the lower ones (70A) in the head half shaft (26).
- After the half shaft and ball bearings unit has been assembled, put it in the head until it butts below with the lower ball bearings and fix the unit with the elastic ring (66).
- Place the IEC motor (93) and tighten the Allen screws (51) and the flat washers (53) that hold it in place.
- Put the base plate (42) in the head (06) with the countersunk screws (50).
- Assembly the V-ring (81).
- Join the agitator shaft (05) with the head half shaft using the Allen pins (55A).
- Place the propeller (02) in the agitator shaft and tighten the Allen pins (55).
- Fit the agitator over the tank.

## 8. TECHNICAL SPECIFICATIONS

### a. MATERIALS

|                                   |           |
|-----------------------------------|-----------|
| Parts in contact with the product | AISI 316L |
| Other steel parts                 | AISI 304  |
| V-ring and retainer               | NBR       |
| Bearing support                   | Aluminium |

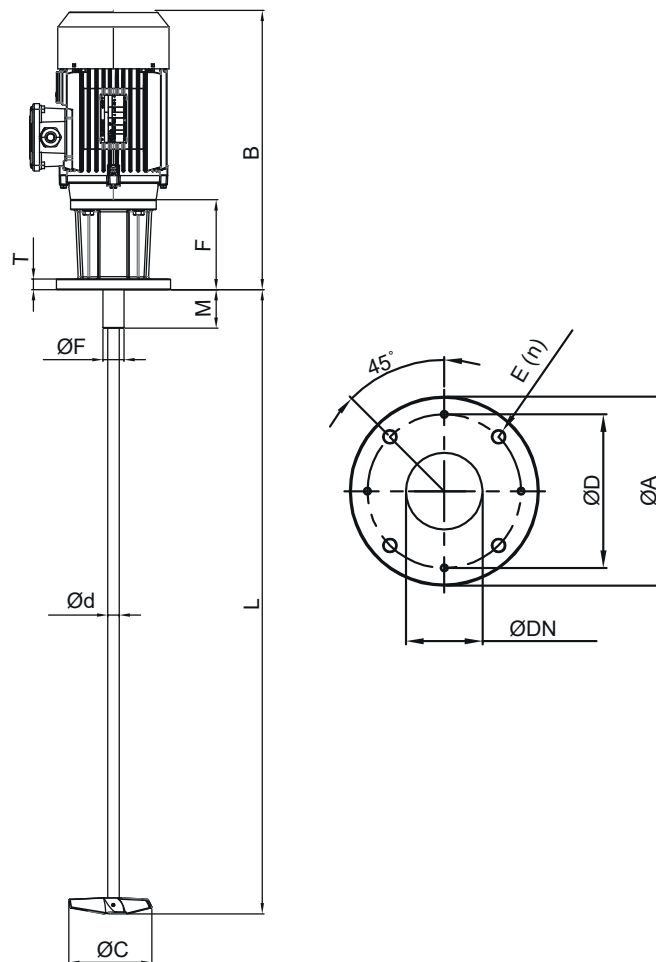
### b. OTHER FEATURES

|                         |                                    |
|-------------------------|------------------------------------|
| Motor                   | IEC B14, IP 55, F class insulation |
| Speed (rpm)             | 1500                               |
| Motor power (kW)        | 0,75 kW                            |
| Shaft length (mm)       | 1250 (max.)                        |
| Shaft diameter (mm)     | 16                                 |
| Propeller diameter (mm) | 100 – 130 – 150                    |
| Propeller               | Lineflux (type 18)                 |

### c. CAPACITY

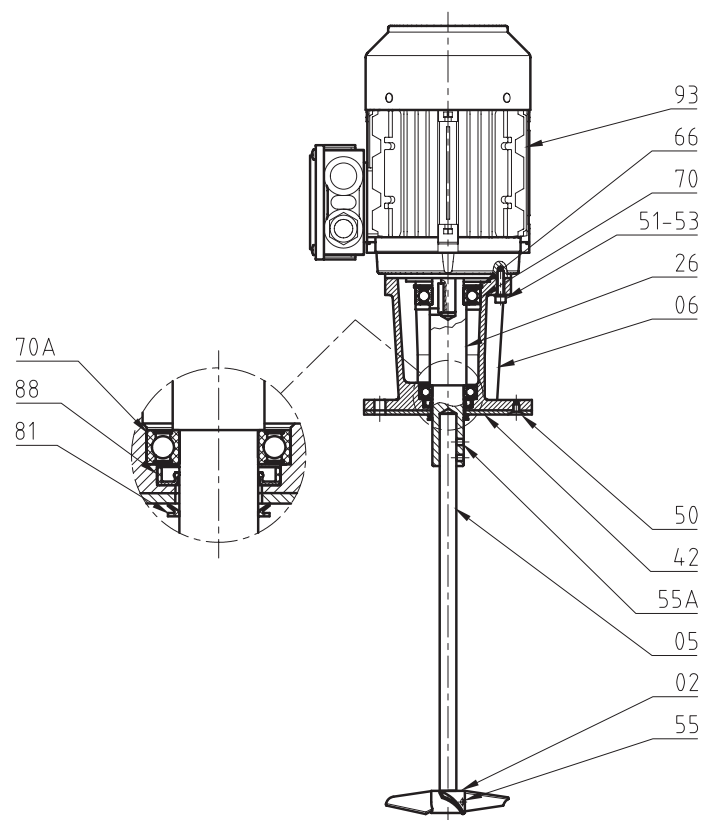
| TYPE           | Capacity (cm3) |
|----------------|----------------|
| FAV 15-007-130 | 0,1-0,7        |
| FAV 10-005-130 | 0,2-0,8        |

### d. DIMENSIONS



| TYPE           | Ø DN | F   | ØA  | L (max) | B   | ØC  | Ød | ØF | M  | ØD  | T  | E (n)    |
|----------------|------|-----|-----|---------|-----|-----|----|----|----|-----|----|----------|
| FAV 15-007-130 | 65   | 126 | 160 | 1250    | 390 | 130 | 16 | 30 | 54 | 130 | 15 | 10,5 (4) |
| FAV 10-005-130 | 65   | 126 | 160 | 1250    | 390 | 130 | 16 | 30 | 54 | 130 | 15 | 10,5 (4) |

## e. FAV AGITATOR'S EXPLODED DRAWING AND PARTS LIST



| Position | Description            | Quantity | Material  |
|----------|------------------------|----------|-----------|
| 02       | Propeller              | 1        | AISI 316L |
| 05       | Agitator shaft         | 1        | AISI 316L |
| 06       | Head                   | 1        | Aluminium |
| 26       | Head half shaft        | 1        | AISI 316L |
| 42       | Base plate             | 1        | AISI 316L |
| 50       | Countersunk screw      | 4        | A2        |
| 51       | Allen screw            | 4        | A2        |
| 53       | Flat washer            | 4        | A2        |
| 55       | Allen pin              | 2        | A2        |
| 55A      | Allen pin              | 2        | A2        |
| 66       | Elastic ring           | 1        | Steel     |
| 70       | Upper ball bearing     | 1        | Steel     |
| 70A      | Lower ball bearing     | 1        | Steel     |
| 81       | V-ring                 | 1        | NBR       |
| 88       | Lip seal               | 1        | NBR       |
| 93       | IEC Motor / Gear motor | 1        | -         |