

SMD, SMG, SFG mixers and flowmakers

60 Hz, North America

Installation and operating instructions



English (US) Installation and operating instructions

Original installation and operating instructions

These installation and operating instructions describe Grundfos SMD, SMG, SFG mixers and flowmakers.

Sections 1-8 give the information necessary to unpack, install and start up the product in a safe way.

Sections 9-13 give important information about the product, as well as information on service, fault finding and disposal of the product.

CONTENTS

	Page
1. Limited warranty	3
2. General information	3
2.1 Symbols used in this document	3
3. Safety instructions	4
3.1 General safety instructions	4
3.2 Potentially explosive environments	4
3.3 Explosion-proof versions	4
3.4 Receiving the product	5
3.5 Installing the product	5
3.6 Starting up the product	5
3.7 Servicing the product	5
3.8 Fault finding the product	5
4. Receiving the product	6
4.1 Inspecting the product	6
5. Installing the product	6
5.1 Torques	7
5.2 Positioning of mixers and flowmakers	7
5.3 Installing a mixer	8
5.4 Installing a flowmaker	10
6. Electrical connection	15
6.1 Motor protection	15
6.2 Gearbox or shaft seal housing protection	16
6.3 Starting method	16
6.4 Wiring diagrams for SMG and SFG	17
6.5 Wiring diagrams for SMD	18
6.6 Direction of rotation	19
6.7 Protection against electro-chemical corrosion	19
6.8 Frequency converter operation	19
7. Starting up the product	20
8. Handling and storing the product	20
8.1 Transporting the product	20
8.2 Storing the product	20
9. Product introduction	21
9.1 Applications	21
9.2 Identification	22
9.3 Approvals (cFMus)	24
10. Servicing the product	24
10.1 Explosion-proof mixers	24
10.2 Contaminated mixer or flowmaker	24
10.3 Service chart	25
10.4 Oil	26
10.5 Oil change	26
11. Fault finding the product	27
12. Technical data	29
12.1 General technical data	29
12.2 Motor	29
12.3 Gearbox, SMG, SFG only	29
12.4 Shaft seals	29
12.5 Propeller	29
12.6 Sound pressure level	29
13. Disposing of the product	29



Read this document before installing the product. Installation and operation must comply with local regulations and accepted codes of good practice.



The use of this product requires experience with and knowledge of the product.

Persons with reduced physical, sensory or mental capabilities must not use this product, unless they are under supervision or have been instructed in the use of the product by a person responsible for their safety.

Children must not use or play with this product.

1. Limited warranty

New equipment manufactured by seller or service supplied by seller is warranted to be free from defects in material and workmanship under normal use and service for a minimum of twelve (12) months from date of installation, eighteen (18) months from date of shipment, unless otherwise stated in product warranty guide (available upon request). In the case of spare or replacement parts manufactured by seller, the warranty period shall be for a period of twelve months from shipment. Seller's obligation under this warranty is limited to repairing or replacing, at its option, any part found to its satisfaction to be so defective, provided that such part is, upon request, returned to seller's factory from which it was shipped, transportation prepaid. Parts replaced under warranty shall be warranted for twelve months from the date of the repair, not to exceed the original warranty period. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect, or from improper operation, maintenance, installation, modification or adjustment. This warranty does not cover parts repaired outside seller's factory without prior written approval. Seller makes no warranty as to starting equipment, electrical apparatus or other material not of its manufacture. If purchaser or others repair, replace, or adjust equipment or parts without seller's prior written approval, seller is relieved of any further obligation to purchaser under this paragraph with respect to such equipment or parts, unless such repair, replacement, or adjustment was made after seller failed to satisfy within a reasonable time seller's obligations under this paragraph. Seller's liability for breach of these warranties (or for breach of any other warranties found by a court of competent jurisdiction to have been given by seller) shall be limited to: (a) accepting return of such equipment exw plant of manufacture, and (b) refunding any amount paid thereon by purchaser (less depreciation at the rate of 15 % per year if purchaser has used equipment for more than thirty [30] days), and canceling any balance still owing on the equipment, or (c) in the case of service, at seller's option, redoing the service, or refunding the purchase order amount of the service or portion thereof upon which such liability is based. These warranties are expressly in lieu of any other warranties, express or implied, and seller specifically disclaims any implied warranty of merchantability or fitness for a particular purpose, and in lieu of any other obligation or liability on the part of the seller whether a claim is based upon negligence, breach of warranty, or any other theory or cause of action. In no event shall seller be liable for any consequential, incidental, indirect, special or punitive damages of any kind. For purposes of this paragraph, the equipment warranted shall not include equipment, parts, and work not manufactured or performed by seller. With respect to such equipment, parts, or work, seller's only obligation shall be to assign to purchaser the warranties provided to seller by the manufacturer or supplier providing such equipment, parts or work. No equipment furnished by seller shall be deemed to be defective by reason of normal wear and tear, failure to resist erosive or corrosive action of any fluid or gas, purchaser's failure to properly store, install, operate, or maintain the equipment in accordance with good industry practices or specific recommendations of seller, including, but not limited to seller's installation and operation manuals, or purchaser's failure to provide complete and accurate information to seller concerning the operational application of the equipment.

2. General information

This booklet includes instructions for installation, operation and maintenance of Grundfos SMD and SMG mixers as well as SFG flowmakers in the non-explosion-proof version and SMD mixers in the explosion-proof version. The Ex instructions must be followed for the explosion-proof SMD. We recommend that you also follow these instructions for standard mixers and flowmakers. These products are designed for applications involving the mixing, i.e. the homogenization and suspension of liquids of low to medium viscosity (≤ 500 cP (500 mPas)).



There are separate installation and operating instructions for the AMD.07.18.1410 mixer. See publication number 96526302 on www.grundfos.com.

2.1 Symbols used in this document

2.1.1 Warnings against hazards involving risk of death or personal injury



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The text accompanying the three hazard symbols DANGER, WARNING and CAUTION will be structured in the following way:



SIGNAL WORD

Description of hazard

Consequence of ignoring the warning.
- Action to avoid the hazard.

2.1.2 Other important notes



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

3. Safety instructions

3.1 General safety instructions

DANGER

Electric shock



Death or serious personal injury

- Before starting any work on the product, make sure that the fuses have been removed or the main switch has been switched off. Make sure that the power supply cannot accidentally be switched on.



To reduce the risk of ignition of hazardous atmospheres, do not open while circuits are live.

Follow these safety instructions as well as the instructions in each individual section when transporting, storing, handling and operating the mixer or flowmaker.



The mixer or flowmaker must be installed, connected, started up and serviced by qualified persons.

Beware of rotating parts.

Make sure that persons cannot accidentally fall into the tank, e.g. by installing a cover or railing.

3.2 Potentially explosive environments

Use explosion-proof Grundfos mixers in potentially explosive environments.



The explosion protection classification of the SMD mixer is Class I, Division 1, Groups C and D, T4. The classification of the installation must be approved by the local authorities in each individual case.

3.3 Explosion-proof versions

When using explosion-proof mixers, observe the following safety regulations.



The motor temperature must always be monitored via the built-in PTC or PTO (Klixon) sensors. The associated relay must be certified for this use with safety level SIL 1. If the relay is built in as part of a frequency converter, the converter must also fulfil SIL.

Power cable

The factory-fitted power cable must not be shortened.



Mixers and flowmakers must not be dismantled in an explosive atmosphere.

Soft starter and frequency converter

Only use soft starters and frequency converters if the FM classification of these is higher than the one applying to the mixer, and they are installed in accordance with the FM regulations.

Accessories

Only use the mixer together with accessories supplied and approved by Grundfos.

Maintenance, service and repair

Only Grundfos or service workshops approved by Grundfos are allowed to dismantle mixers. This also applies to the cable entry. Use only components produced by Grundfos for repair purposes. For inspection and maintenance, the standard ANSI/IEC 60079-17 must be considered and met.

Service log

Spare parts must be registered in a service log in order to have 100 % traceability during the product life.

3.4 Receiving the product



Make sure that the mixer or flowmaker cannot roll or fall over.



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

3.5 Installing the product

DANGER



Electric shock

Death or serious personal injury

- Make sure the power supply to the control cabinet has been switched off.

DANGER



Electric shock

Death or serious personal injury

- Before making any electrical connections, make sure that the fuses have been removed or the main switch has been switched off. Make sure that the power supply cannot accidentally be switched on.

3.6 Starting up the product

DANGER



Electric shock

Death or serious personal injury

- When adjusting the relay, beware of electric voltage.

CAUTION



Pressurized system

Minor or moderate personal injury

- As pressure may have built up in the oil chamber, do not remove the oil level screw until the pressure has been fully relieved.



Make sure that no persons can fall into the tank.

3.7 Servicing the product

Before starting work on the mixer or flowmaker,



- make sure that the fuses have been removed or the main switch has been switched off
- make sure that the power supply cannot accidentally be switched on
- make sure all rotating parts have stopped moving.

CAUTION



Biological hazard

Minor or moderate personal injury

- Flush the mixer or flowmaker thoroughly with clean water and rinse the mixer or flowmaker parts in water after dismantling.

CAUTION



Pressurised system

Minor or moderate personal injury

- As pressure may have built up in the oil chamber, do not remove the oil level screw until the pressure has been fully relieved.

3.8 Fault finding the product

Before starting work on the mixer or flowmaker,



- make sure that the fuses have been removed or the main switch has been switched off
- make sure that the power supply cannot accidentally be switched on
- make sure all rotating parts have stopped moving.

4. Receiving the product

The individual components of the mixer or flowmaker are packed carefully from the factory to prevent any damage to the surface protection during transportation.



Make sure that the mixer or flowmaker cannot roll or fall over.



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



All lifting equipment must be rated for the purpose and checked for damage before attempting to lift the components. The lifting equipment rating must under no circumstances be exceeded.

4.1 Inspecting the product

On delivery, check the mixer or flowmaker and any accessories supplied with it for transport damage. This also applies when the equipment is delivered to the installation site.



Do not install a damaged mixer or flowmaker.

If the mixer, flowmaker or any accessories have been damaged, contact your local Grundfos company before installing the product. Do not unpack a damaged new component for further inspection, unless instructed by your local Grundfos company. Dispose of packaging material according to local regulations.

5. Installing the product

During installation, only lift the mixer or flowmaker using the suspension point. See figs 1 and 2.

Do not use the lifting equipment supplied with the mixer or flowmaker as well as the wire used for lifting and lowering the mixer or flowmaker into the tank as universal lifting equipment.



Never hang the mixer or flowmaker by the power cable.

Never let the mixer or flowmaker run while suspended from the lifting equipment.

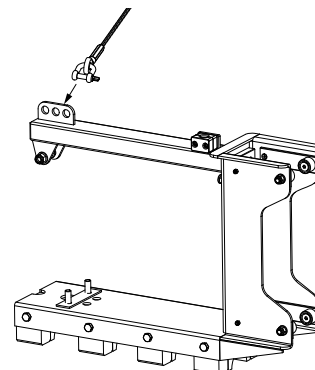


Fig. 1 Mounting of lifting wire on motor bracket

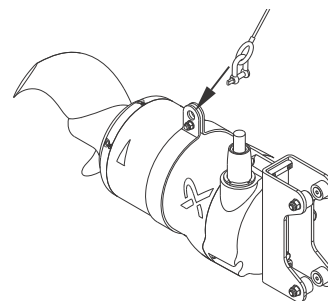


Fig. 2 Mounting of lifting wire on SMD



Use the lifting equipment supplied with the product only for lifting the mixer or flowmaker.

See pages 31-33 for details about weights.

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TM06 5306 4315

5.1 Torques

All nuts and bolts used for the installation must be made of stainless steel.

Use grease, alu-paste, together with a spring washer or locking nut. Otherwise, use Loctite or a similar product for lubrication and locking.

Tighten all nuts and bolts to the following torques:

Size	Bolts ASTM F593 (V/W) [lbf (Nm)]
1/4" (M6)	6.5 (8.8)
5/16" (M8)	15.8 (21.4)
7/16" (M10)	32.5 (44)
1/2" (M12)	54.6 (74)
5/8" (M16)	135 (183)
3/4" (M20)	273 (370)

5.1.1 Anchor bolts

Anchor bolts used for mounting components in concrete must have the following pull-out strength:

Size	Pull-out strength [kipf (kN)]
1/2" (M12)	1.35 (6)
5/8" (M16)	3.15 (14)

5.2 Positioning of mixers and flowmakers

Correct positioning of mixers and flowmakers is essential to ensure trouble-free operation and long life.

5.2.1 Mixers

Submerge the mixer as deeply as possible.

- Place the mixer in such a way that you obtain a good mixing of the liquid in the entire tank. If more mixers are installed in the same tank, the mixers must not generate opposite flows.
- The distance between the propeller tip and the bottom of the tank, H_{MIN} in fig. 3, must be half of the propeller diameter.
- SMG:** The distance from the propeller tip to the liquid surface, H_{ABOVE} in fig. 3, must be at least equal to the propeller diameter.
- SMD:** The distance from the propeller tip to the liquid surface, H_{ABOVE} in fig. 3 must be at least 1.5 times the propeller diameter.
- The distance between the propeller tip and the wall behind the mixer, L_{MIN} in fig. 3, must be at least 1.5 times the propeller diameter.

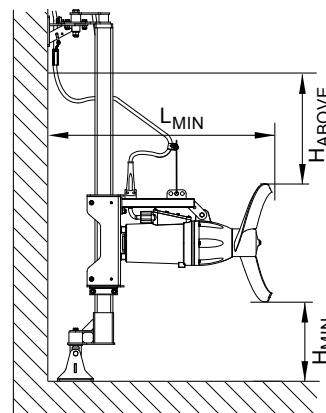


Fig. 3 Positioning sketch for mixers

5.2.2 Flowmakers

Submerge the flowmaker as deeply as possible.

- The distance between the propeller tip and the bottom of the tank, H_{MIN} in fig. 4, must be 20 in (50 cm).
- The distance from the propeller tip to the liquid surface, H_{ABOVE} in fig. 4, must be at least 0.75 times the propeller diameter.
- The distance between the propeller tip and the wall behind the flowmaker, L_{MIN} in fig. 4, must be at least twice the propeller diameter.
- The sideways distance between the propeller tip and the tank wall must be at least 1.6 ft (0.5 m).
- If more flowmakers are to be installed in parallel, the distance between their propellers must be larger than half the propeller diameter.
- The distance from a bend in the channel to the propeller and from the propeller to aeration areas must be at least the larger value of channel width and water level.

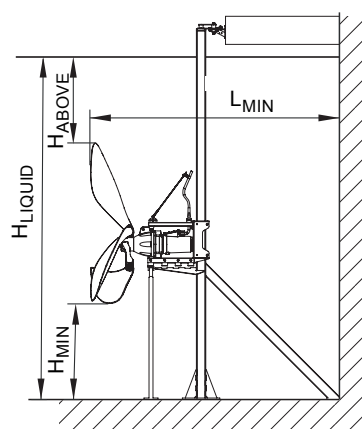


Fig. 4 Positioning sketch for flowmakers

TM02 5917 4914

TM02 5417 4708

5.3 Installing a mixer

You can mount the mixer in different ways depending on the accessories:

- fixation bracket and tube for suspended mounting. See fig. 5
- fixation bracket for wall mounting. See fig. 5
- fixation base for floor mounting. See fig. 5
- motor bracket for mounting on column profile tube. See fig. 6.

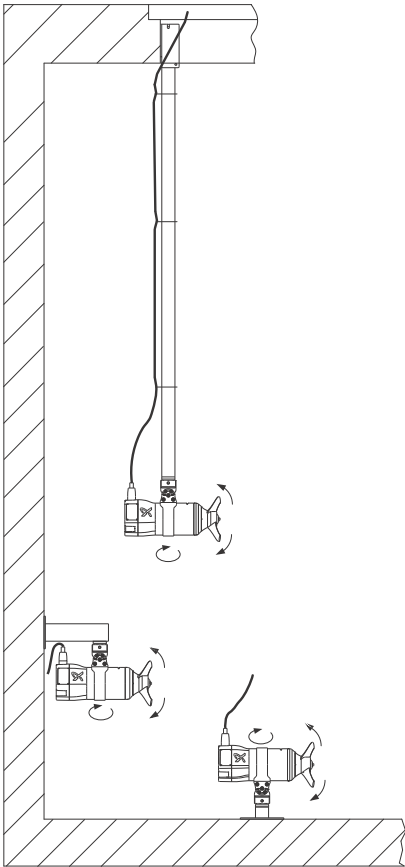


Fig. 5 SMD.13 - 23.xx.xxxx.T

TM06 5286 4315

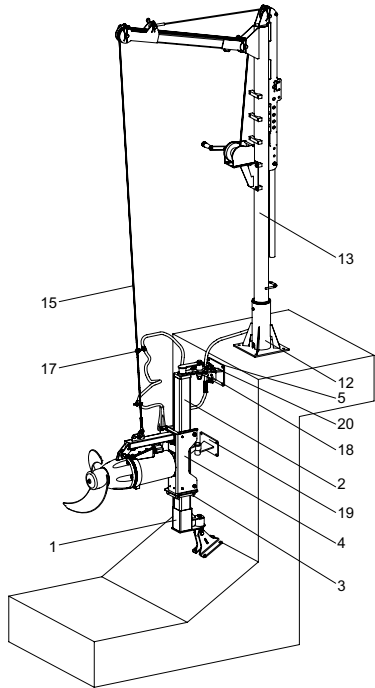


Fig. 6 SMD and SMG mixer installed on column profile

Position numbers in figs 6 to 10

Pos.	Description
1	Bottom fixation bracket
2	Column profile
3	Depth blocker
4	Motor bracket
5	Top fixation bracket incl. safety wire
12	Crane foot
13	Crane with winch
15	Lifting wire incl. shackle and wire clamp
17	Cable clamp
18	Cable sock incl. shackle
19	Intermediate fixation bracket
20	Wire clamp
31	Hole for fastening of safety wire

TM04 2711 4914

Procedure

See fig. 6.

Torques appear from section 5.1 *Torques*.

1. Drill the holes for the anchor bolts for the top fixation bracket.
2. Mount the anchor bolts, and fit the top fixation bracket.
3. Place the bottom fixation bracket in the right position, vertically below the top fixation. You can mount the bottom fixation bracket in any angle from vertical to horizontal position.
4. Drill the holes for the anchor bolts for the bottom fixation bracket.
5. Mount the anchor bolts, and fit the bottom fixation bracket.
6. Depending on the length of the column profile, weld the turnable part of an intermediate fixation bracket (19, fig. 6) to the column profile.
7. Position and align the column profile in the bottom fixation bracket. Shorten the column profile (2) to the correct length to match the position of the insulator (C) at the top fixation bracket. A gap of 0.2 to 0.4 in (5 to 10 mm) between the collar of the insulator and the column profile is optimal. See fig. 7.

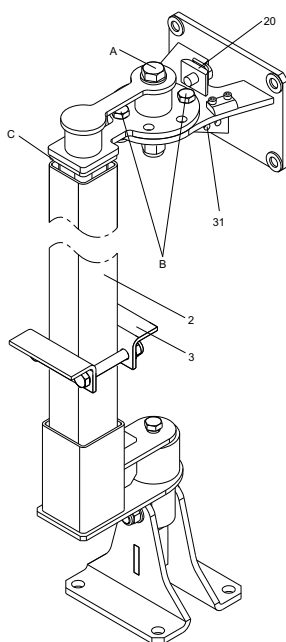


Fig. 7 Fixation

8. Remove the insulator and the turnable metal part by removing the center bolt (A) and the two fixation bolts (B).
9. Adapt the outside of the square insulator to the inside of the column profile. The insulator must fit tightly inside the column profile.
10. Insert the column profile into the bottom fixation bracket, and mount the top end with the insulator and the turnable metal part on the already installed top fixation bracket. Tighten the three bolts (A and B) in the desired position. You can adjust the angle in steps of 7.5 °.

11. If you use an intermediate fixation bracket (19), fit it to the turnable part welded on to the column profile in step 6. Drill holes in the tank wall, fit bolts in the bracket and tighten the bolts.



Make sure that the mixer cannot be turned so much that the propeller touches the tank wall.

12. Fasten the depth blocker (3) in the right position.
13. Drill the holes for the anchor bolts for the crane foot (12, fig. 6).
14. Mount the crane foot, and fit and tighten the bolts.
15. Mount the lifting wire (15) on the motor bracket using the shackle. See fig. 9.
16. Mount the top end of the safety wire to the hole (31) of the top fixation bracket using a shackle. The other end of the safety wire ends in a shackle through which the lifting wire must run.

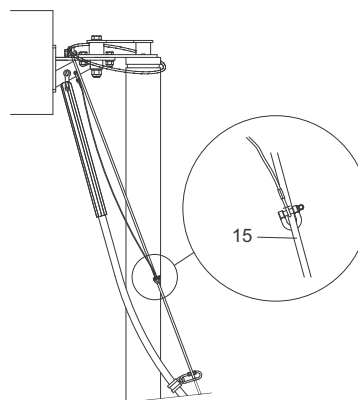


Fig. 8 Safety wire

17. Fix the power cable to the lifting wire by means of a cable clamp approximately 2.6 ft (0.8 m) above the mixer. This will prevent the cable from falling down and becoming entangled in the propeller during operation. Connect the cable clamp to the lifting wire above the wire clamp by means of a snap hook. See fig. 9. Attach the power cable to the lifting wire by means of cable clamps placed at 1 m intervals.

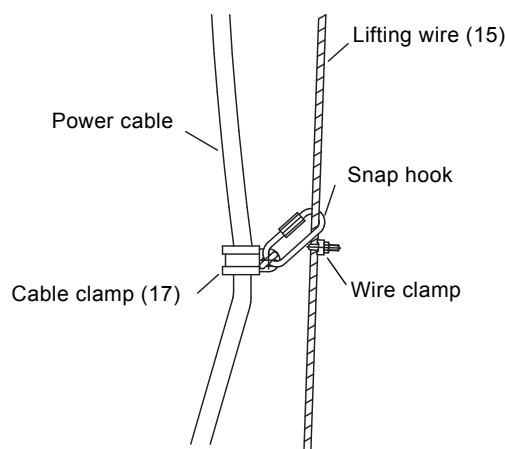


Fig. 9 Attaching the power cable to the lifting wire

TM04 3932 0409

TM04 2712 2713

TM02 4938 1802

18. Position the crane in the foot, and mount the lifting wire in the drum of the winch.



Always leave at least three turns of wire on the drum. Otherwise the wire may break loose from the drum fixation.



Follow the separate installation and operating instructions for cranes.

19. Lift the complete mixer and motor bracket with motor, using the crane and slide it over the column profile.
20. Slowly lower the mixer into the tank and down to its position on the depth blocker.
21. Mount the cable sock (18) to the top fixation bracket using the shackle, and pull the power cable through it to the desired position. See fig. 10. The power cable must be slightly tightened.

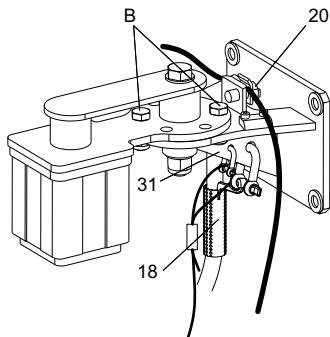


Fig. 10 Top fixation bracket with lifting and safety wires and cable sock



Remove the lifting wire from the crane before starting the mixer.

22. Remove the lifting wire from the winch and fit it to the wire clamp (20, fig. 10) on the top fixation bracket. Use the lifting wire as a relief for the power cable. For this reason, always tighten the lifting wire.
23. Check the distance between the propeller and the wall and the propeller and the bottom of the tank when the motor bracket is resting on the depth blocker. The mixer must under no circumstances touch other installations, the bottom or the wall. This also applies when the mixer is turned. See section [5.2 Positioning of mixers and flowmakers](#).

DANGER

Electric shock

Death or serious personal injury

- Before making any electrical connections, make sure to remove the fuses or switch off the main switch. Make sure that the power supply cannot accidentally be switched on.

24. Connect the power cable to the terminals in the control cabinet.

5.4 Installing a flowmaker

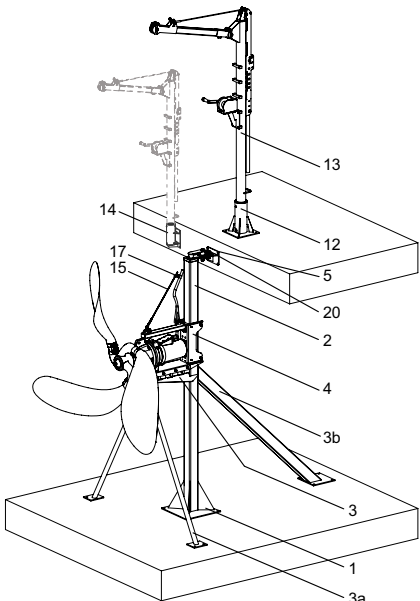


Fig. 11 SFG flowmaker installed on column profile

Position numbers in figs 11 and 19

Pos.	Description
1	Bottom fixation plate
2	Column profile
3	Depth blocker
3a	Front support leg
3b	Back support leg
4	Motor bracket
5	Top fixation bracket incl. safety wire
12	Crane foot
13	Crane with winch
14	Crane foot for vertical installation
15	Lifting wire incl. shackle and wire clamp
17	Cable clamp
20	Wire clamp
31	Hole for fastening of safety wire

Procedure

Torques appear from section [5.1 Torques](#).



You can mount the propeller blades before installing SFG.xx.71/91/102 or after you have installed the crane.

5.4.1 Mounting the propeller blades of SFG.xx.71 - 91

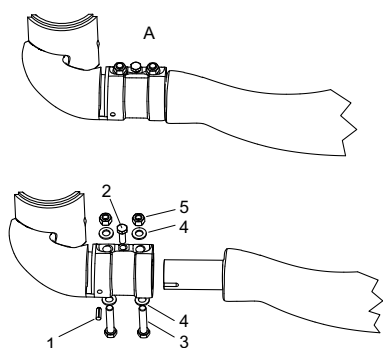


Fig. 12 SFG.xx.71 - 91



The fixation of the propeller blades is ensured by the pressure of the clamping jaws formed by the bolts (3) and nuts (5). The function of the pin (1) is to position the blades in the right angle before tightening the clamping jaws.

1. Check the premounted pins (1). These are only for positioning.
2. Tighten the screw (2) to widen the opening of the clamping jaws.
3. Insert the blade from above. Turn it slightly and let it rest on the pin. Turn the blade back until the blade slides down and is flush with the hub.
4. Remove the screw (2).
5. Put Loctite 243 threadlocker on the thread of the bolt (3).
6. Mount position 3, 4 and 5 in both holes and tighten by hand.
7. Tighten the nuts (5) with a torque wrench to 74 lbf (100 Nm) (A4-80).
8. Check visually that the blade actually looks like position A in fig. 12.
9. Apply silicone to the joint between the blade and the hub.

TM04 2715 2908

5.4.2 Mounting the propeller blades of SFG.xx.102

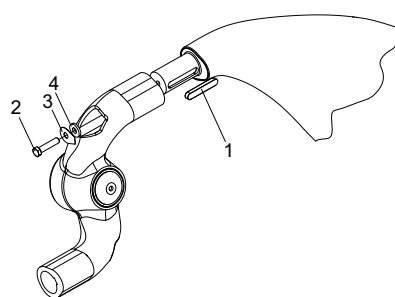


Fig. 13 SFG.xx.102

1. Drive the key (1) into the keyway for correct positioning of the blades.
2. Apply a little oil to the blade shaft and the hole in the hub.
3. First put the cover plate (3) and then the washer (4) on the screw (2).
4. Put Loctite 243 threadlocker on the thread of the screw (2).
5. Turn the hub, and insert the blade from above.
6. Turn the blade to correct position and let it slide into the hub.
7. Screw in the screw (2) by hand and tighten it with a torque wrench to 135 lbf (183 Nm) (A2-70).
8. Carry out a visual check.
9. Apply silicone to the joint between the blade and the hub and between the cover plate (3) and the hub.

5.4.3 All flowmakers

1. Weld the bottom fixation plate on the end of the column profile in a workshop.

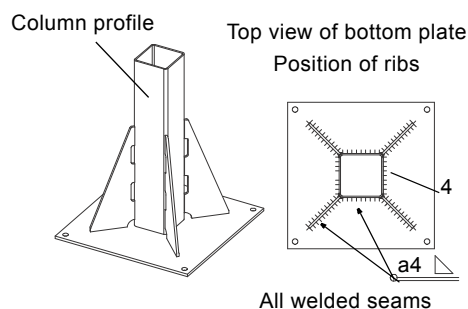


Fig. 14 Welding the column profile on to the bottom fixation plate



The SFG.xx.51 bottom fixation plate does not have ribs.

TM04 2716 2908

TM04 9089 3113

2. SFG.xx.102:

Place the depth blocker (3), the back support leg (3b) and the front support legs (3a) in the right position, and weld them on the column profile (2). See position numbers in fig. 16.

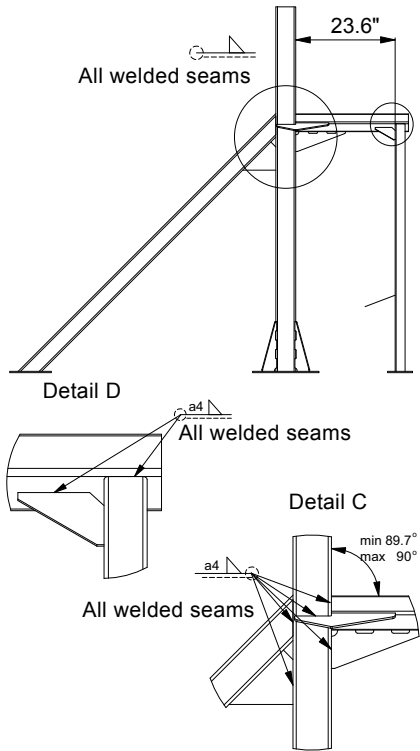


Fig. 15 SFG.xx.102, profile and support legs, side view

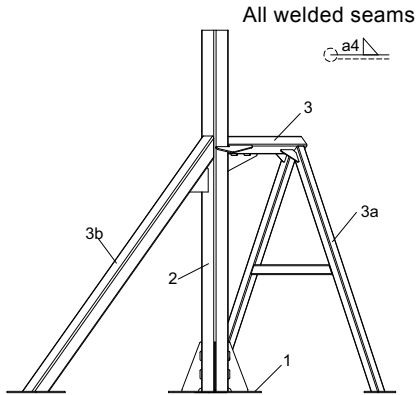


Fig. 16 SFG.xx.102, profile and support legs, back view

3. SFG.xx.71 and SFG.xx.91:

Place the depth blocker (3), the back support leg (3b) and the front support legs (3a and 3c) in the right position, and weld them to the column profile (2) in a workshop. See position numbers in fig. 17.

Calculate the required height of the SFG depth blocker according to the positioning rules for flowmakers. See section 5.2.2 Flowmakers.

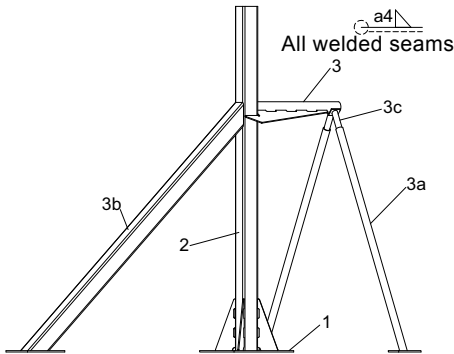
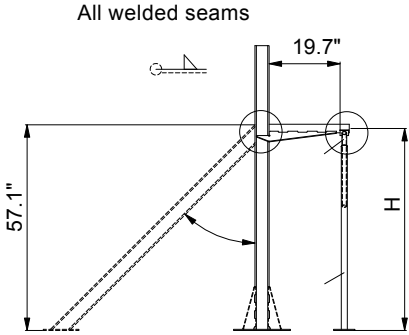


Fig. 17 SFG.xx.71 - 91 profile and support legs



There must be a minimum overlap of 6 in (150 mm) between the front support legs (3a and 3c). See fig. 18.



SFG.xx.51	$37.8 \text{ in (960 mm)} \leq H \leq 66.9 \text{ in (1700 mm)}$
SFG.xx.71	$46.1 \text{ in (1170 mm)} \leq H \leq 66.9 \text{ in (1700 mm)}$
SFG.xx.91	$55.9 \text{ in (1420 mm)} \leq H \leq 66.9 \text{ in (1700 mm)}$

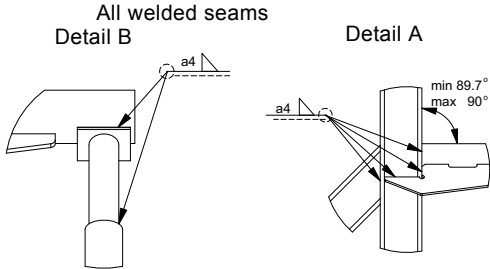


Fig. 18 SFG.xx.51 - 91 profile and support legs

4. SFG.xx.51:

Place the depth blocker (3) and the front support legs (3a and 3c) in the right position, and weld them to the column profile (2) in a workshop. See position numbers in fig. 17. Calculate the required height of the SFG depth blocker according to the positioning rules for flowmakers. See section 5.2.2 Flowmakers.

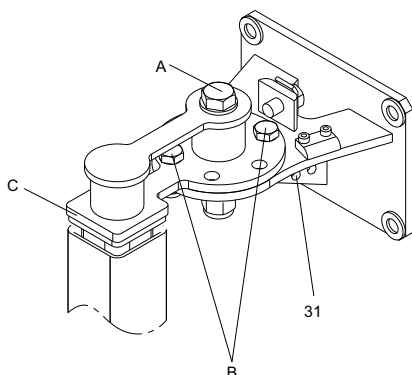


The back support leg (3b) is not supplied for SFG.xx.51.



There must be a minimum overlap of 6 in (150 mm) between the front support legs (3a and 3c). See fig. 18.

5. Drill the holes for the anchor bolts for the top fixation bracket.
6. Mount the anchor bolts, and fit the top fixation bracket.

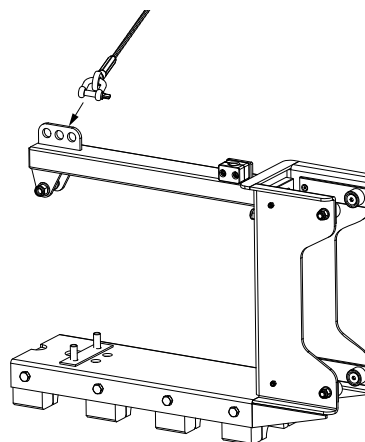


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Fig. 19 Top fixation

7. Shorten the column profile (2 in fig. 16 and fig. 17) to the correct length to match the position of insulator (C, fig. 19) at the top fixation bracket.
A gap of 0.2 to 0.4 in (5 to 10 mm) between collar of insulator and column profile is optimal. See fig. 19.
8. Remove the insulator and the turnable metal part from the top fixation bracket by removing the center bolt (A) and the two fixation bolts (B). See fig. 19.
9. Adapt the outside of the square insulator to the inside of the column profile. The insulator must fit tightly inside the column profile.
10. Fit the turnable metal part, now fitted on top of the column profile, to the already mounted top fixation bracket. Tighten the three bolts (A and B in fig. 19) in the desired position. You can adjust the angle in steps of 7.5 °.

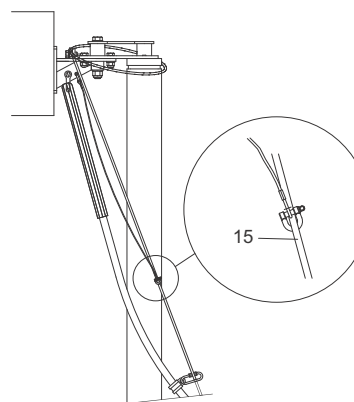
11. Drill the holes for the anchor bolts for the bottom fixation plates in the bottom of the tank, and insert the bolts. See fig. 16.
12. Tighten the anchor bolts in the bottom fixation plate.
13. Drill holes, mount and tighten the anchor bolts of the front and back support legs as well.
14. Drill the holes for the anchor bolts for the crane foot in the concrete.
15. Mount the crane foot, and fit and tighten the anchor bolts.
16. Mount the lifting wire (15) on the motor bracket using the shackle. See fig. 20.



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Fig. 20 Mounting of the lifting wire on the motor bracket

17. Mount the top end of the safety wire to the hole (31 in fig. 19) of the top fixation bracket using a shackle. The other end of the safety wire ends in a shackle through which the lifting wire must run.



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Fig. 21 Safety wire

18. Fix the power cable to the lifting wire by means of a cable clamp approx. 2.6 ft (0.8 m) above the flowmaker. This will prevent the cable from falling down and becoming entangled in the propeller during operation. Connect the cable clamp to the lifting wire above the wire clamp by means of a snap hook. See fig. 22. Attach the power cable to the lifting wire by means of cable clamps placed at 3.3 ft (1 m) intervals.

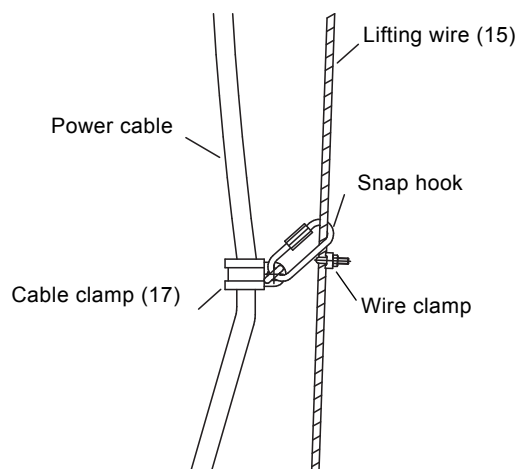


Fig. 22 Attaching the cable to the wire

19. Position the crane in the foot, and mount the lifting wire in the drum of the winch.



Always leave at least three turns of wire on the drum. Otherwise the wire may break loose from the drum fixation.



Follow the separate installation and operating instructions for cranes.

20. Lift the complete flowmaker and the motor bracket with motor, using the crane and slide it over the column profile.
21. Slowly lower the flowmaker into the tank and down to its position on the depth blocker.

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22. Mount the cable sock (18, fig. 23) to the top fixation bracket using the shackle, and pull the power cable through it, to the desired position. See fig. 23. The power cable must be slightly tightened.

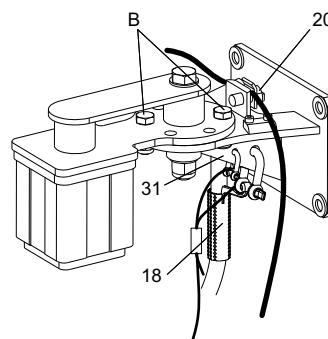


Fig. 23 Top fixation bracket with lifting and safety wires and cable sock



Remove the lifting wire from the crane before starting the flowmaker.

23. Remove the lifting wire from the winch and fit it to the wire clamp (20) on the top fixation bracket.
24. Use the lifting wire as a relief for the power cable. For this reason, always tighten the lifting wire. See fig. 22.
25. Check the distance between the propeller and the wall and the propeller and the bottom of the tank when the motor bracket is resting on the depth blocker. The flowmaker must under no circumstances touch other installations, the bottom or the wall.

DANGER

Electric shock



Death or serious personal injury

- Before making any electrical connections, make sure to remove the fuses or switch off the main switch. Make sure that the power supply cannot accidentally be switched on.

26. Connect the power cable to the terminals in the control cabinet.

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6. Electrical connection

Electrical connection must be carried out by a qualified electrician in accordance with local regulations.

Observe all national and local regulations relating to safety and accident prevention.

DANGER

Electric shock



Death or serious personal injury

- Before making any electrical connections, make sure that the fuses have been removed or the main switch has been switched to off. Make sure that the power supply cannot accidentally be switched on.

The explosion protection classification of the SMD mixer is Class I, Division 1, Groups C and D, T4. The classification of the installation must be approved by the local authorities in each individual case.



For the electrical installation, the standard ANSI/IEC 60079-14 must be met.

The safety instructions in section [3.3 Explosion-proof versions](#) must be observed.

The supply voltage and frequency are marked on the mixer or flowmaker nameplate. Make sure that the mixer or flowmaker is suitable for the power supply available at the installation site.

The mixer or flowmaker is supplied complete with a power cable. Standard cable lengths are 33 or 49 ft (10 or 15 m). Longer cables are available on request. See section [12.1 General technical data](#).

The motor is marked either with a Y, star, or a Δ, delta. For 10- and 11-wire cables, this connection is to be made in an external control panel using conductors 1 to 6 of the power cable.

Figure [24](#) shows a schematic drawing of these star and delta connections. See also section [6.4 Wiring diagrams for SMG and SFG](#).

6.1 Motor protection

Mixers and flowmakers are provided with the following types of motor protection:

- Standard mixers incorporate three bimetallic PTO thermal switches. See [fig. 25](#).
- Standard flowmakers incorporate three PTC sensors. See [fig. 26](#).

Function of thermal switches

The motor is protected against overheating by three thermal switches connected in series, one switch in each winding.

When the maximum winding temperature is reached, the switch will open the circuit and stop the motor.

When the windings have cooled to normal temperature, the switch closes the circuit and you can restart the motor. Manual restarting is necessary.

See wiring diagram in [fig. 25](#).

Thermal switches (F6):

- Two conductors, terminals 11 and 12.
- Maximum operating voltage: 250 V.
- Maximum switching current: 2.5 A at $\cos \varphi = 1$.
- Cutting-out temperature: SMD: 266 °F (130 °C), SMG and SFG: 302 °F (150 °C).

Function of PTC sensors

When overheated, the motor stops. Automatic restarting is not permitted in such cases. This requires a thermistor trigger unit with a reconnection suppressor in the control circuit of the motor contactor.

See wiring diagram in [fig. 26](#).

Ø1, Ø2, Ø3: PTC sensors:

- Two conductors, terminals 31 and 32.
- Maximum voltage at the terminals: $U_{\max.} = 2.5 \text{ V (AC/DC)}$.
- Resistance between terminals 31 and 32:
 - at room temperature $R = 150 \text{ to } 750 \Omega$
 - at cutting-out temperature 266 °F (130 °C) $R \geq 4000 \Omega$.



The voltage at terminals 31 and 32 must not exceed 2.5 V (AC/DC). Use an ohmmeter for testing the voltage.



Explosion-proof mixers must be protected against excess temperature by means of PTC or PTO (Klixon) sensors. The sensors must be connected to a certified signal converter with safety level SIL 1. If the relay is incorporated in a frequency converter, the converter must also fulfil SIL 1.

6.2 Gearbox or shaft seal housing protection

The gearbox or shaft seal housing is monitored for the ingress of water by means of a leakage sensor incorporated in the gearbox or shaft seal housing.

If the monitoring function is required, connect the leakage sensor to a leakage relay. A relay can be ordered as an accessory.

If the gearbox or shaft seal housing is not monitored for the ingress of water, we recommend that you make inspections every 6 months. If the oil contains water, replace the shaft seal.



The cable between the relay and the mixer or flowmaker must not be longer than 164 ft (50 m).

For a longer distance, use an additional, screened cable. Always connect an external alarm indicator, if fitted, to the potential-free outputs, terminals 1 and 3 or 4. Maximum load: 250 V, 5 A.

If you need to lengthen the power cable to the sensor, comply with the FM directive as well as the ANSI/ISA 60079-0 and ANSI/IEC 60079-14 standards for the intrinsically safe circuit.



The terminal connections of the intrinsically safe and the non-intrinsically safe circuits must be separated and be clearly distinguishable.

The operator must make sure that all installation work is done in conformity with the relevant standards.

When the leakage relay is connected, a current of up to 10 mA flows through the leakage sensor. Terminals 5 and 7 in fig. 32 are connected to wires 21 and 22 in fig. 25. In case water penetrates into the oil chamber, the relay will trigger an alarm signal and/or switch off the motor. See fig. 25 or 26.

Leakage sensor

- Two conductors, wires 21 and 22.
- Maximum operating voltage: Approx. 12 V.
- Maximum current: 1 to 10 mA.
- Standard SMD mixer equipped with leakage sensor and wiring connections

DANGER



Electric shock

Death or serious personal injury
- When adjusting the relay, beware of electric voltage.



Do not check the leakage sensor with an ohmmeter or other measuring instruments. The leakage sensor is an electronic component.

Moisture switch

A moisture switch is built into each SMD mixer. The moisture switch monitors the motor housing and is located in the non-drive end of the motor housing. If moisture appears, the switch will be triggered and cause the power to the SMD to be cut out.

Overload relays

Protect the motor against overload via a thermal delay relay according to local regulations. Adjust the relay to the rated current stated on the nameplate.

In the case of star-delta starting, the adjustable value is to be 58 % of rated current.

Incorporate electro-thermal all-pole triggers in all six mains conductors (U1, V1, W1 and U2, V2, W2).

6.3 Starting method

6.3.1 SMD

Continuous operation

You can use direct-on-line starting throughout the entire power range.

Intermittent operation

We recommend that you use a soft starter or a frequency converter for motors of 3 hp (2.2 kW) and higher.

6.3.2 SMG

Continuous operation

You can use direct-on-line starting for motors up to 2.2 hp (1.6 kW).

We recommend that you use star-delta starting, soft starter or a frequency converter for motors of 2.7 hp (2.0 kW) and higher.

Intermittent operation

We recommend that you use a soft starter or a frequency converter throughout the entire power range.

6.3.3 SFG

Continuous operation

We recommend that you use star-delta starting, a soft starter or a frequency converter.

Intermittent operation



It is mandatory to start flowmakers in intermittent operation via a soft starter or a frequency converter.

6.4 Wiring diagrams for SMG and SFG

Three-phase motors

For starting method 1H, wire the motor using the delta connection and for starting method 0H, wire the motor using the star connection. Connection methods are shown in fig. 24. See also section 9.2.2 [Nameplate](#), fig. 37, position 1, and section 9.2.1 [Type key](#) to determine the voltage and starting method of your mixer or flowmaker.

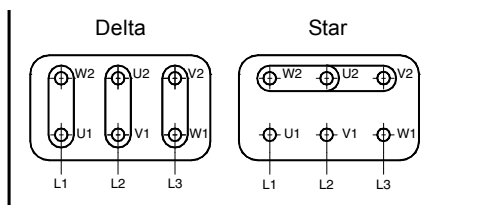


Fig. 24 Schematic drawing of delta and star connection

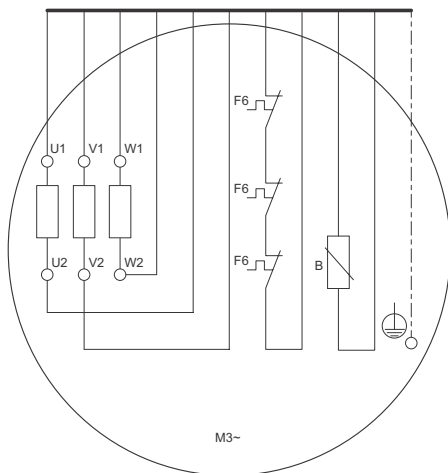


Fig. 25 Three thermal switches (PTO)

Terminals	Description
1, 2, 3, 4, 5, 6	Ends of the three stator windings (U1, U2, V1, V2, W1, W2)
11, 12	Thermal switches (F6)
21, 22	Leakage sensor in gearbox (B)

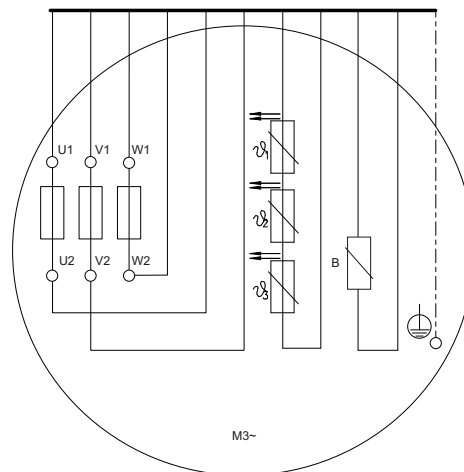


Fig. 26 Three PTC sensors

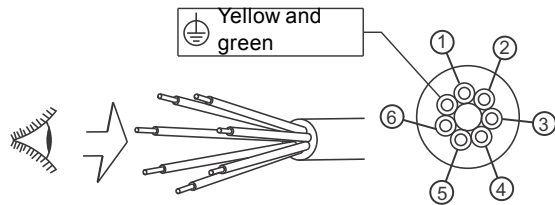
Terminals	Description
1, 2, 3, 4, 5, 6	Ends of the three stator windings (U1, U2, V1, V2, W1, W2)
31, 32	PTC sensors according to DIN 44081 (θ1, θ2, θ3)
21, 22	Leakage sensor in gearbox (B)

6.5 Wiring diagrams for SMD

Marking		Switch and sensor			Maximum load	Connection Relay
Wire 4 / (7*)	Wire 6 / (9*)	Thermal switch	Moisture switch (M)	Leakage sensor (LS)		
11	12	PTO	No	No	2.5 A (250 V)	-
31	32	PTC	No	No	2.5 V	Thermistor
11	13	PTO	Yes	No	2.5 A (250 V)	-
31	33	PTC	Yes	No	2.5 V	Thermistor
11	23	PTO	Yes	Yes	12 V - 11 mA	

* 10-wire cables

7-wire connections



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Fig. 27 SMD, 7-wire cable

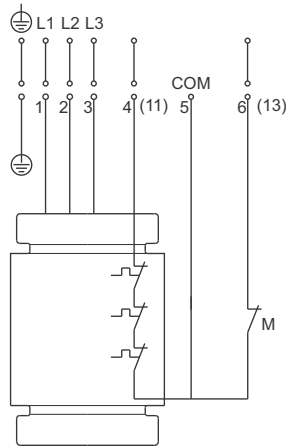


Fig. 28 SMD, 7-wire cable, PTO, moisture switch version

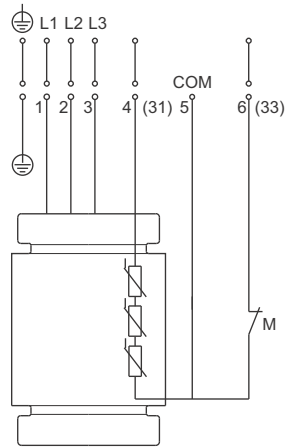


Fig. 29 SMD, 7-wire cable, PTC, moisture switch version

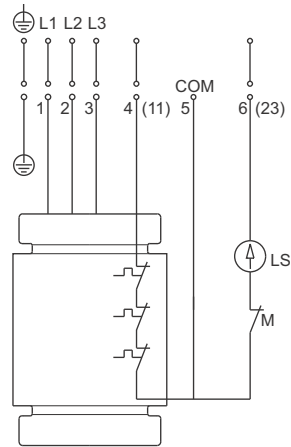


Fig. 30 SMD, 7-wire cable, PTO, moisture switch and leakage sensor version

10-wire connections

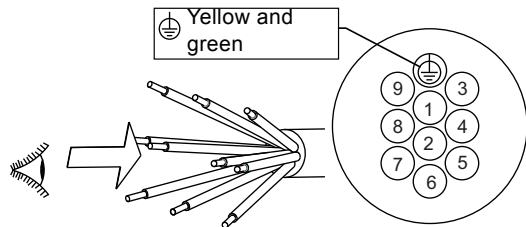


Fig. 31 SMD, 10-wire cable

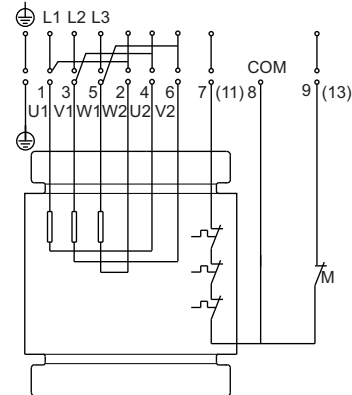


Fig. 32 SMD, 10-wire cable, PTO, moisture switch, standard version

6.6 Direction of rotation

When you have carried out the electrical connections, check that the propeller is rotating in the correct direction. When viewed from the motor, the propeller must rotate clockwise. An arrow on the motor housing shows the correct direction of rotation.

If the propeller rotates in the wrong direction, interchange two phases of the mains supply.

6.7 Protection against electro-chemical corrosion

Two different metals or alloys cause electro-chemical corrosion if they are connected by an electrolyte. This applies if you install more than one mixer or flowmaker in the same tank. We recommend one of the following additional protection methods:

- galvanic separation of the earth conductor from the neutral conductor
- galvanic separation of the mains supply by means of isolation transformer
- anode kit.

Separate the earth conductor in such a way that no direct current can flow through it. It must still function as a protective conductor. You achieve this with a limiting unit, polarization cell, anti-parallel diode or an isolation transformer.

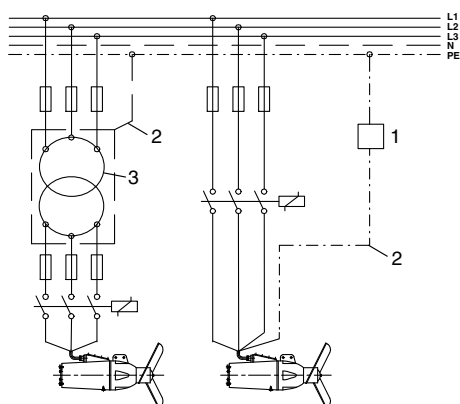


Fig. 33 Protection against electro-chemical corrosion

Pos.	Description
1	Limiting unit
2	Earth conductor
3	Isolation transformer



When you use an isolation transformer, do not alter the ratio between starting current and rated current.

6.8 Frequency converter operation

All mixers and flowmakers are designed for frequency converter operation for energy saving and for soft start. For frequency converter operation, please observe the following:

- Requirements must be fulfilled.
- Recommendations ought to be followed.
- Consequences ought to be considered.

6.8.1 Requirements

- Peak voltage and dU/dt must be in accordance with the table below. The values stated are maximum values supplied to the motor terminals. The cable influence has not been taken into account. See the frequency converter data sheet regarding the actual values and the cable influence on the peak voltage and dU/dt.

Product type	Maximum repetitive peak voltage [V]	Maximum dU/dt [V/μs]
SMD		
SMG.12-55	1500	15000
SFG.xx.51/71/91		
SMG.75-220	1000	3000
SFG.xx.102		

- In case the above values are too high, a dU/dt filter could prevent the voltage peaks.
- The thermal protection of the motor must be connected.



For explosion-proof products, the PTC or PTO sensors placed in the windings must be connected to a suitable relay with the appropriate safety level (SIL 1).

- Do not exceed the frequency indicated on the nameplate. Otherwise, there is a risk of motor overload.
- Local regulations or standards must be fulfilled.

6.8.2 Recommendations

- Do not reduce the motor speed to less than 30 % of the rated speed.
- Do not set any slip compensation, as it may lead to overspeed and therefore to motor overload.
- Set the frequency converter U/f ratio to a linear relation, and use the data from the motor nameplate to set rated current, power, voltage and frequency.
- Use input and output filters on the frequency converter. See data sheet for the frequency converter used.
- Keep the power cable as short as possible. The peak voltage will increase with the length of the power cable. See data sheet for the frequency converter used.
- Use a screened power cable if there is a risk that electrical noise can disturb other electrical equipment. See data sheet for the frequency converter used.

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6.8.3 Consequences

When operating the product via a frequency converter, please be aware of these possible consequences:

- The locked-rotor torque will be lower. How much lower will depend on the frequency converter type. See the installation and operating instructions for the frequency converter used for information on the locked-rotor torque available.
- The working condition of bearings and shaft seal may be affected. The possible effect will depend on the application. The actual effect cannot be predicted.
- The acoustic noise level may increase. See the installation and operating instructions for the frequency converter for advice as to how to reduce the acoustic noise.

7. Starting up the product

Check the oil level in the gearbox or shaft seal housing. The oil must fill up between 50 and 75 % of the gearbox/shaft seal housing.

CAUTION



Pressurised system

Minor or moderate personal injury

- As pressure may have built up in the oil chamber, do not remove the oil level screw until the pressure has been fully relieved.

If required, fill oil into the gearbox or shaft seal housing through the oil-filling hole (2). See figs 39 and 40. For oil quality and quantity, see section 10.4.1 *Oil quality, gearbox or shaft seal housing*.

If the mixer or flowmaker has been stored and not used for a long period before startup, see section 10.3 *Service chart*.

Checks before startup:

1. Check that the propeller is rotating in the correct direction. See section 6.6 *Direction of rotation*.
2. Make sure that the mixer or flowmaker is completely submerged in the liquid.



The mixer or flowmaker must always be submerged during operation.

3. Make sure that there are no solid objects in the tank.
4. Confirm that the mixer or flowmaker is not hanging by the lifting wire or the power cable. The mixer or flowmaker must be resting on the depth blocker.
5. Make sure the mixer or flowmaker is set at the correct depths and angles according to sections 5.3 *Installing a mixer* and 5.4 *Installing a flowmaker*.
6. Start the mixer or flowmaker. Allow the mixer or flowmaker to reach full speed and then confirm current consumption compared to the data for the mixer or flowmaker.



Make sure that no persons can fall into the tank.

8. Handling and storing the product

8.1 Transporting the product

The individual components of the mixer or flowmaker must be packed carefully to prevent any damage to the surface protection during transportation.



Make sure that the mixer or flowmaker cannot roll or fall over.



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



All lifting equipment must be rated for the purpose and checked for damage before any attempts to lift the components are made. The lifting equipment rating must under no circumstances be exceeded.

8.2 Storing the product

Store mixers and flowmakers in a dry location in which the temperature is not subject to major fluctuations.

Do not expose the flowmaker propeller blades to direct sunlight for more than one month.

If the mixer or flowmaker has been stored for more than one year, change the gearbox oil. Change the oil even if the unit has never been in use. This is necessary because of natural aging of mineral oil lubricants.

9. Product introduction

The mixers are fitted with motors of 1 to 25 hp (0.9 to 18.5 kW).
The flowmakers are fitted with motors of 1 to 11 hp (0.7 to 8.0 kW).

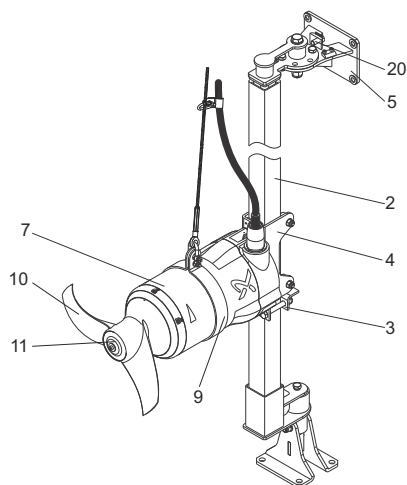


Fig. 34 SMD mixer

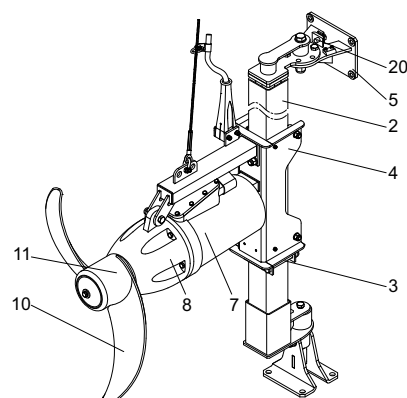


Fig. 35 SMG mixer

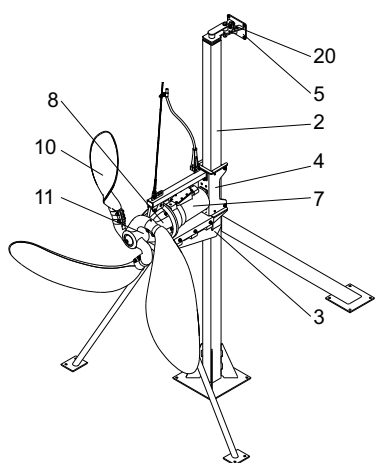


Fig. 36 SFG flowmaker

Pos.	Description
2	Column profile
3	Depth blocker
4	Motor bracket
7	Motor housing
8	Gearbox
9	Clamping ring
10	Propeller
11	Hub

9.1 Applications

Grundfos mixers and flowmakers are designed for mixing applications within these areas:

- municipal and industrial wastewater treatment
- industrial processes
- sludge treatment
- agriculture
- biogas plants.

In order not to overload the mixers and flowmakers and expose them to corrosion, observe the following liquid limitations:

Liquid temperature	41-104 °F (5-40 °C) (140 °F (60 °C))*
pH value	4-10
Maximum dynamic viscosity	SMD 250 cP (mPas) SMG, SFG 500 cP (mPas)
Maximum density	66 lb/ft ³ (1060 kg/m ³)
Chloride content	≤ 200 ppm (200 mg/l) for stainless steel 304 (1.4301)
Chloride content	≤ 1000 ppm (1000 mg/l) for stainless steel 316 (1.4404)

* The liquid temperature range is stated on the nameplate. See section 5. *Installing the product*.

For the mixing of liquids exceeding the values stated above, contact Grundfos.

9.1.1 Mixers

Mixers are suitable for applications involving sludge with a typical dry solids content as stated in the table below. Mixers are also suitable for a wide range of other applications involving similar liquids such as slurry and paper pulp.

	% dry solid
Activated sludge	0.5 % DS
Selector zones	0.5 % DS
Anoxic zones	0.5 % DS
Bivalent zones	0.5 % DS
Anaerobic zones	0.5 % DS
Primary sludge	≤ 3 % DS
Secondary sludge, SMD	≤ 4 % DS
Secondary sludge, SMG and SFG	≤ 6 % DS
Digested sludge, SMD	≤ 4 % DS
Digested sludge, SMG and SFG	≤ 8 % DS
Wastewater tank without screen	≤ 2 % DS
Wastewater tank with sand	≤ 2 % DS

9.1.2 Flowmakers

Flowmakers are suitable for activated sludge with a typical dry solids content of 0.5 to 1.0 % and for other liquids with a dry solids content of maximum 1.5 %.

9.2 Identification

9.2.1 Type key

Code	Example	S	M	G.	75.	34.	264.	6.	1H.
S	Type range SMD, SMG, SFG								
M	Version Mixer								
F	Flowmaker								
G	Drive Gear-driven								
D	Direct-driven								
75	Motor output power P2 Code from type designation / 10 [kW] 7.5 hp								
34	Propeller diameter [in] 34 in								
[.]	Application method Standard								
M	Mud, for higher density								
H	Heavy-duty, biogas plants								
264	Propeller speed [RPM] 264 RPM								
[.]	Installation method Standard								
T	2" threaded connection								
[.]	Explosion protection Non-explosion-proof								
Ex	Explosion-proof								
6	Frequency 60 Hz								
0H	Supply voltage 3 x 460 V, star connection								
1H	3 x 460 V, delta connection								
[.]	Generation First generation								
A	Second generation								
B	Third generation								
Z	Custom-built products								

9.2.2 Nameplate

You can identify all mixers and flowmakers by means of the nameplate on the motor housing. The details on the nameplate are required for ordering of spare parts.

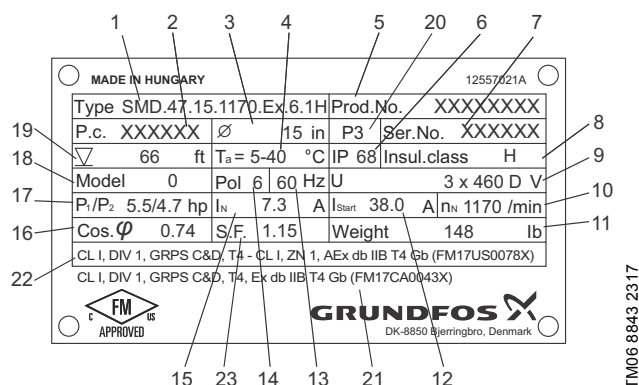


Fig. 37 FM nameplate of SMD mixers

Pos.	Description
1	Type designation
2	Production code
3	Propeller diameter
4	Liquid temperature
5	Product number
6	Enclosure class according to IEC
7	Serial number
8	Insulation class
9	Rated voltage
10	Rated speed, propeller
11	Weight
12	Starting current
13	Frequency
14	Number of poles
15	Rated current
16	Power factor
17	Motor power, P1/P2
18	Model
19	Maximum installation depth
20	Production site
21	FM approval class
22	Certificate number
23	Service factor

The additional nameplate supplied must be fixed in a visible position at the installation site.

9.2.3 FM warning plate with restrictions



Caution: For cord replacement, see instruction manual.



Warning: To reduce the risk of ignition of hazardous atmospheres, do not open while circuits are live.



Fig. 38 FM warning plate

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9.3 Approvals (cFMus)

The SMD mixers have been approved by FM, and the explosion-proof versions hold FM-type examination certificates, numbers FM17US0078X and FM17CA0043X.

9.3.1 Approval standards

The SMD mixers have been approved by FM according to:

Canadian standards

CSA-C22.2: No. 1, No. 0.4, No. 100, and No. 145, CAN/CSA-C22.2: No. 60079-0, No. 60079-1, and No. 60529.

United States standards

FM 3600, FM 3615, FM 3650, ANSI/ISA 60079-0, ANSI/UL 60079-1, and ANSI/IEC 60529.

Explanation of FM approval classification

The SMD mixers have the following explosion-protection classification: Class I, Division 1, Groups C and D, T4, IP68.

Code	Description
Class I	Explosive atmosphere caused by gas or vapors
Division 1	Area classification
Groups C and D	Classification of gases
T4	Maximum surface temperature is 275 °F (135 °C)
IP68	Enclosure class according to IEC 60529

10. Servicing the product

Before starting work on the mixer or flowmaker,



- make sure that the fuses have been removed or the main switch has been switched off
- make sure that the power supply cannot accidentally be switched on
- make sure all rotating parts have stopped moving.



All regulations applying to mixers installed in potentially explosive environments must be observed.

Make sure that no work is carried out in potentially explosive environments.

Before starting any work on mixers or flowmakers used in liquids which could constitute a hazard to health, carry out thorough cleaning and venting of mixer or flowmaker, tank, etc. according to local regulations.

10.1 Explosion-proof mixers

Explosion-proof mixers must be serviced and repaired by Grundfos or by a service partner appointed by Grundfos.

Service work must be carried out according to ANSI/IEC 60079-19.

Spare parts

Damaged mixer parts must always be replaced by new, approved parts. Motor parts must not be reconditioned by machining, retapping, welding, etc.

10.2 Contaminated mixer or flowmaker

CAUTION



Biological hazard

- Minor or moderate personal injury
- Flush the mixer or flowmaker thoroughly with clean water and rinse the mixer or flowmaker parts in water after dismantling.

The product will be classified as contaminated if it has been used for a liquid which is injurious to health or toxic.

If you request Grundfos to service the product, contact Grundfos with details about the liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product for service.

Any application for service must include details about the liquid. Clean the product in the best possible way before you return it. Costs of returning the product are to be paid by the customer.

10.3 Service chart

	Type	Service instructions	Lubrication	Inspection
Electric motor	All	Keep the motor housing clean. Otherwise cooling is affected. The motor housing must only be dismantled by Grundfos.	The roller bearings are maintenance-free. They must be replaced if they get noisy.	
Power cable	All			Check the power cable twice a year for surface damage, strain, kinks, etc. If damaged, the cable must be replaced by Grundfos.
Shaft seal housing	SMD	If they are worn, replace the lip seal and wear ring. If the oil contains water, replace the shaft seal.	If the oil contains water or is contaminated, change the oil. Change the oil at least every two years.	If the shaft seal housing is not monitored for the ingress of water, we recommend that you make inspections every 6 months.
Gearbox	SMG, SFG	If they are worn, replace the lip seal and wear ring. If the oil contains water, replace the shaft seal.	If the oil contains water or is contaminated, change the oil. Change the oil at least every two years. If refilling is required, see section 10.4 Oil .	If you do not monitor the shaft seal housing for the ingress of water, we recommend that you make inspections every 6 months.
Propeller	All			Check the propeller blades regularly for wear and tear. Remove any material wound around the blades, such as ropes, threads, etc. which may cause uneven running and oscillation of the installation. In case of strong turbulence, cleaning is absolutely necessary.
Winch	All	Spray the winch with a protective coating of oil at regular intervals to prevent corrosion.	Lubricate the gear teeth and the bearing bushes twice a year with an all-purpose grease.	
Lifting wire	All	Regular oiling or greasing increases the life of the wire.		Check the wire regularly and always before using the winch. Replace the wire, if required.
Bolts	All	Always check that all bolts in the motor bracket are properly tightened. Check the bolts in the bottom fixation bracket or bottom fixation plate every time the tank is empty.	When tightening the bolts, renew the threadlocker if necessary.	

10.4 Oil

10.4.1 Oil quality, gearbox or shaft seal housing

The gear oil designation for mixers, SMD and SMG, is according to ISO VG 68. The gear oil designation for flowmakers, SFG, is according to ISO VG 220.

10.4.2 Oil quantity



SMD, SMG and SFG models do not have oil in the motor compartment.

Type	Gearbox or shaft seal housing [fluid oz. (l)]
SMD.13-23.xx	4.4 (0.13)
SMD.30-47.xx	8.8 (0.26)
SMG.12-55.xx	40.6 (1.2)
SMG.75-160.xx	84.5 (2.5)
SMG.220.xx	135 (4.0)
SFG.xx.51.xx	44.0 (1.3)
SFG.xx.71-91.xx	108.2 (3.2)
SFG.xx.102.xx	155.5 (4.6)

10.5 Oil change

Proceed as follows:

1. Place the mixer or flowmaker in a horizontal position on supports, and place a pan underneath to collect oil.

CAUTION



Pressurised system

Minor or moderate personal injury

- As pressure may have built up in the oil chamber, do not remove the oil level screw until the pressure has been fully relieved.

2. Remove the screw (2, fig. 39).
3. Remove the oil drain screw (1), and allow the oil to drain from the chamber into a glass. Leave the oil in the glass for approx. 10 minutes, and check if it contains water. If the oil contains water, replace the shaft seal.



Dispose of used oil in accordance with local regulations.

4. Clean and refit the oil drain screw (1).
5. Fill oil into the oil chamber through the filling hole (2). The quantity of oil appears from section [10.4.2 Oil quantity](#) and the quality from section [10.4.1 Oil quality, gearbox or shaft seal housing](#).
6. Refit the screw (2).

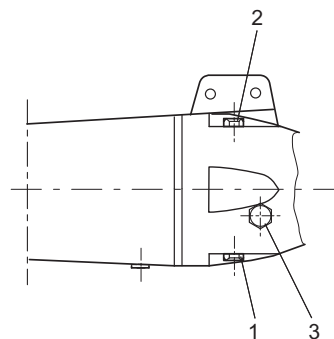


Fig. 39 Position of oil drain and oil filling screws on SMG and SFG

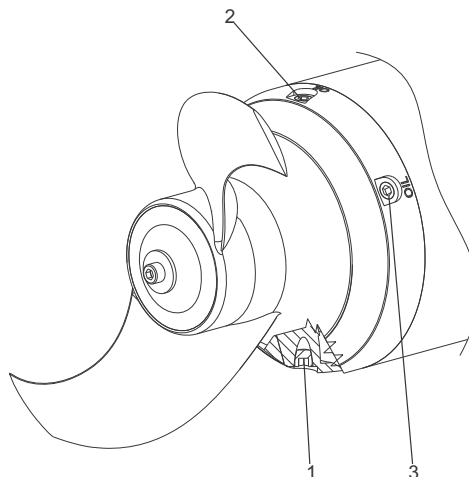


Fig. 40 Position of oil drain and oil filling screws on SMD

TM02 9479 2704

TM06 5327 4315

11. Fault finding the product



- Before starting work on the mixer or flowmaker,
- make sure that the fuses have been removed or the main switch has been switched off
 - make sure that the power supply cannot accidentally be switched on
 - make sure all rotating parts have stopped moving.



All regulations applying to mixers installed in potentially explosive environments must be observed.

Make sure that no work is carried out in potentially explosive environments.

Keep a service log.

Fault	Cause	Remedy
1. The mixer or flowmaker does not start.	a) No power supply, or supply failure.	Call an electrician.
	b) The power cable is faulty.	Call an electrician.
	c) The control system is faulty.	Call an electrician.
	d) The propeller is not free to rotate.	Clean the propeller blades, and check manually that the propeller can rotate freely.
	e) The stator windings are faulty.	Contact Grundfos.
	f) The motor has cut out because of overheating.	Wait until the motor has cooled, and try to restart the mixer or flowmaker.
	g) Different phase voltages.	Call an electrician.
	h) The overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current. See section Overload relays on page 16.
	i) The leakage sensor has cut out the mixer or flowmaker.	Contact Grundfos.
	j) Humidity in the motor.	Contact Grundfos.
2. The mixer or flowmaker starts but stops immediately.	a) The stator windings are faulty.	Contact Grundfos.
	b) Different phase voltages.	Call an electrician.
	c) The overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current. See section Overload relays on page 16.
	d) The leakage sensor has cut out the mixer or flowmaker.	Contact Grundfos.
	e) Humidity in the motor.	Contact Grundfos.
3. No or inadequate circulation produced even if the motor is running.	a) The propeller rotates in the wrong direction.	Interchange two phases of the mains supply.
	b) The the mixer or flowmaker runs on two phases.	<ul style="list-style-type: none"> • Check electrical connections. • Replace faulty fuses. • Call an electrician.
	c) The internal parts are worn.	Contact Grundfos.
	d) The propeller blades are dirty or damaged.	Clean the blades, and inspect for any wear. If the propeller blades are worn or damaged, contact Grundfos.
4. The mixer or flowmaker runs unevenly and is noisy.	a) The internal parts are worn.	Contact Grundfos.
	b) The propeller blades are dirty or damaged.	Clean the blades, and inspect for any wear. If the propeller blades are worn or damaged, contact Grundfos.
	c) The motor or gearbox roller bearings are faulty.	Contact Grundfos.
	d) Oscillations and resonance caused by the installation.	Check the installation design.

Fault	Cause	Remedy
5. The current and power consumption is high.	a) Wrong voltage supply or supply failure.	Call an electrician.
	b) The power cable is faulty.	Call an electrician.
	c) The control system is faulty.	Call an electrician.
	d) The propeller is not free to rotate.	Clean the propeller blades, and check manually that the propeller can rotate freely.
	e) The stator windings are faulty.	Contact Grundfos.
	f) The mixer or flowmaker runs on two phases.	<ul style="list-style-type: none"> • Check the electrical connections. • Replace faulty fuses. • Call an electrician.
	g) The internal parts are worn.	Contact Grundfos.
	h) The motor or gearbox roller bearings are faulty.	Contact Grundfos.

12. Technical data

12.1 General technical data

Voltage tolerance		
SMD, SMG, and SFG	460 V	+ 10 %/- 10 %
Enclosure class		IP68
Insulation class		
	SMG, SFG	H
	SMD.30-47	H
	SMD.13-23	F
Maximum installation depth		65.6 ft (20 m) below liquid surface
Maximum number of starts per hour		
	SMG, SFG	20
	SMD	20
Power cable length		33 or 50 ft (10 or 15 m)*
Wire length on all winches		33 ft (10 m) (standard)

* The standard cable lengths are either 33 or 50 ft (10 or 15 m). Other cable lengths are available on request.

The mixers and flowmakers are designed for continuous operation.

12.2 Motor

Seal	Mechanical shaft seal	
Material, motor housing		
	SMG, SFG	Cast iron, ASTM48 class 35b (EN-GJL-250)
	SMD	Cast stainless steel 316/351/CF8M (1.4408)

12.3 Gearbox, SMG, SFG only

Type	Planetary gearbox
Gears	Hardened and ground steel
Seal monitoring	Leakage sensor incorporated in gearbox
Drive-end bearings	Two tapered roller bearings
Material, gear casing	Cast iron, ASTM48 class 35b (EN-GJL-250)

12.4 Shaft seals

Sealing against ingress of surrounding liquid

Two lip seals and one mechanical shaft seal made of tungsten carbide/tungsten carbide or SiC/SiC

12.5 Propeller

SMD

Number of blades	2
Propeller diameter	7-15 in (180-370 mm)
Material, propeller with hub	Stainless steel (304)

SMG

Number of blades	2
Propeller diameter	16-39 in (400-1000 mm)
Material, propeller with hub	Stainless steel (304)

SFG.xx.51

Number of blades	2
Propeller diameter	51 in (1300 mm)
Material, propeller with hub	Polyurethane (Baydur®) with stainless-steel hub

SFG.xx.59 - 102.xx

Number of blades	2 or 3
Propeller diameter	59, 71, 91, 102 in (1500, 1800, 2300, 2600 mm)
Material, hub	Cast iron (EN-GJS-400-15)
Material, propeller blades	Polyurethane (Baydur®) with cast-iron reinforcement

12.6 Sound pressure level

The sound pressure level of the mixer or flowmaker is lower than 70 dB(A).

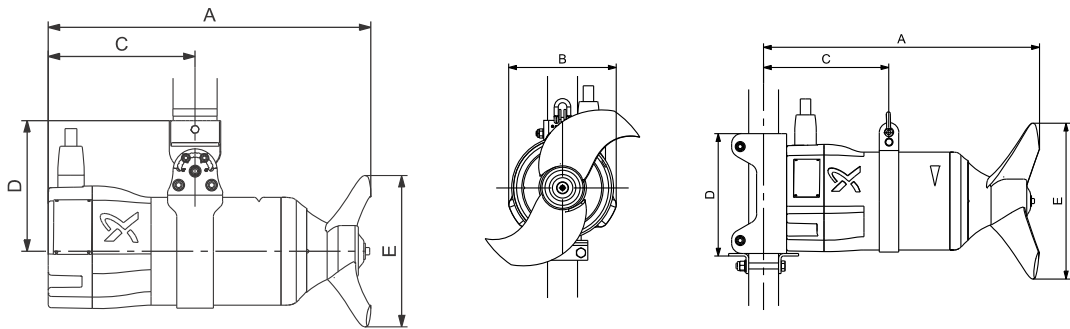
13. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

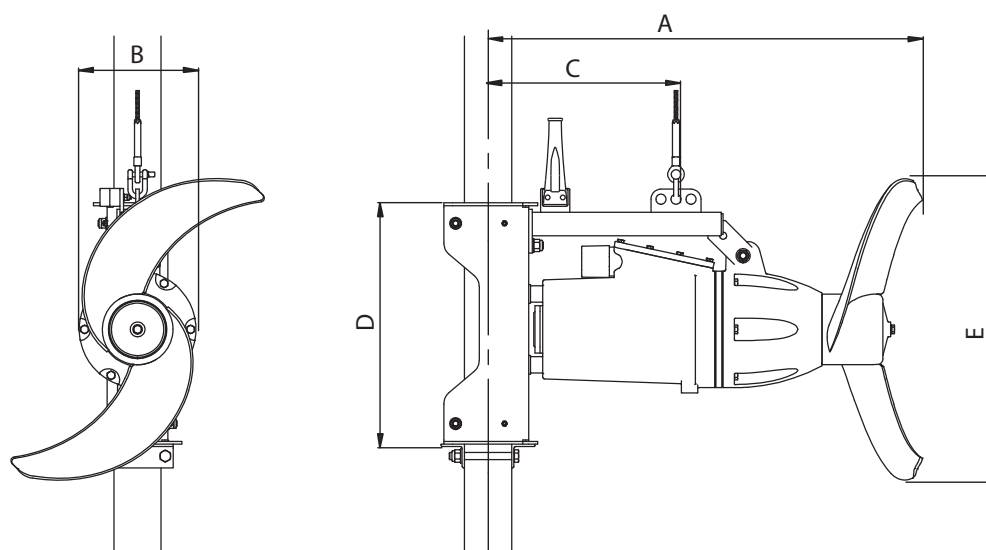
DIMENSIONS AND WEIGHTS
SMD



TM06 5319 4315 - TM06 5320 4315

Type	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight* [lb (kg)]
SMD.13.7.1775.T.	1.3 (1.0)	17.3 (440)	7.09 (180)	7.68 (195)	7.09 (180)	7.09 (180)	79(36)
SMD.17.8.1765.T	1.7 (1.3)					8.27 (210)	
SMD.23.10.1750.T.	2.3 (1.7)					9.84 (250)	
SMD.13.7.1775.	1.3 (1.0)	19.3 (490)	7.09 (180)	8.86 (225)	9.45 (240)	7.09 (180)	84(38)
SMD.17.8.1765.	1.7 (1.3)					8.27 (210)	
SMD.23.10.1750.	2.3 (1.7)					9.84 (250)	
SMD.30.11.1182.	3.0 (2.2)	21.7 (550)	9.06 (230)	9.45 (240)	9.45 (240)	11.4 (290)	148 (67)
SMD.38.13.1178.	3.8 (2.8)					12.6 (320)	
SMD.47.15.1170.	4.7 (3.5)					14.6 (370)	

* With motor bracket and 33 ft (10 m) cable. Weight of cable: 34 lb/ft (0.5 kg/m).



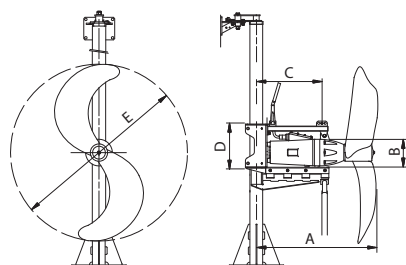
TM02 4944 3210

Type	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight* [lb (kg)]
SMG.12.22.276.	1.2 (0.9)	30.7 (780)	7.87 (200)	12.6 (320)	16.1 (410)	21.7 (550)	174 (79)
SMG.16.25.275.	1.6 (1.2)	31.1 (790)	7.87 (200)	12.6 (320)	16.1 (410)	24.8 (630)	174 (79)
SMG.22.25.273.	2.2 (1.6)						
SMG.27.28.264.	2.7 (2.0)						
SMG.34.28.263.	3.4 (2.5)	31.5 (800)	7.87 (200)	12.6 (320)	16.1 (410)	28.0 (710)	190 (86)
SMG.44.28.315.	4.4 (3.3)						
SMG.55.28.314.	5.5 (4.0)						
SMG.75.34.264.	7.5 (5.6)	41.3 (1050)	10.2 (260)	16.9 (430)	18.1 (460)	33.9 (860)	384 (174)
SMG.95.34.263.	9.5 (7.0)						419 (190)
SMG.130.34.318.	13.0 (9.7)						
SMG.160.34.317.	16.0 (12.0)						
SMG.220.35.345.	22.0 (16.4)	43.3 (1100)	12.4 (315)	18.1 (460)	18.1 (460)	35.4 (900)	617 (280)

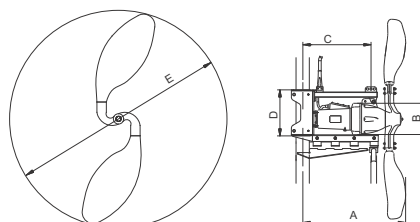
* With motor bracket and 33 ft (10 m) cable. Weight of cable: 34 lb/ft (0.5 kg/m).

SFG.xx.51-91.xx

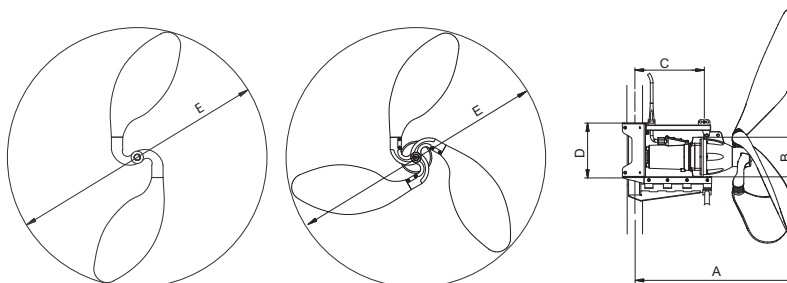
SFG.xx.51.xx



SFG.10-39.71.xx



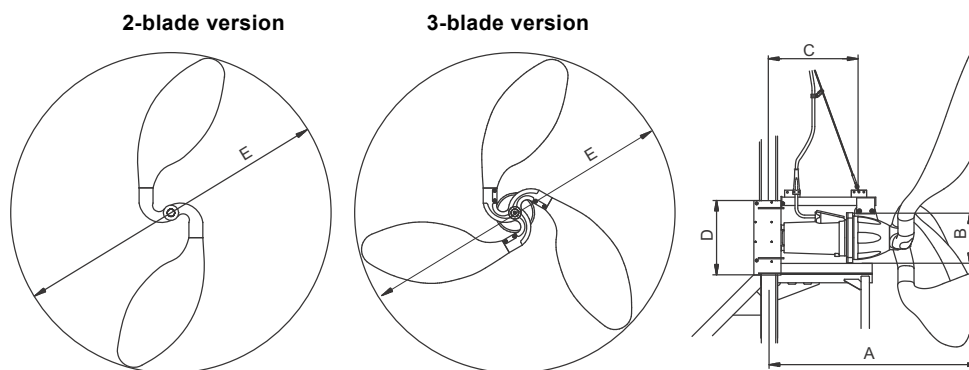
SFG.10-30.91

 SFG.47.71
 SFG.55.71
 SFG.34-55.91


TM02 6346 0305 - TM02 6345 0305 - TM04 3959 0409

Type	Propeller version	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight [lb (kg)]
SFG.10.51.50.	2-blade	1.0 (0.7)	35.4 (900)	7.87 (200)	13.9 (353)	15.7 (400)	51.2 (1300)	249 (113)
SFG.14.51.57.		1.4 (1.0)						
SFG.19.51.64.		1.9 (1.4)						
SFG.23.51.68.		2.3 (1.7)						
SFG.30.51.74.		3.0 (2.2)						260 (118)
SFG.39.51.82.		3.9 (2.9)						
SFG.44.51.85.		4.4 (3.3)						
SFG.48.51.88.		4.8 (3.6)						
SFG.10.71.32.	3-blade	1.0 (0.7)	47.2 (1200)	11.9 (302)	22.4 (570)	15.7 (400)	70.9 (1800)	430 (195)
SFG.14.71.36.		1.4 (1.0)						
SFG.19.71.41.		1.9 (1.4)						
SFG.23.71.43.		2.3 (1.7)						
SFG.30.71.48.		3.0 (2.2)						441 (200)
SFG.39.71.53.		3.9 (2.9)						
SFG.47.71.53.		4.7 (3.5)						
SFG.55.71.54.		5.5 (4.1)						
SFG.10.91.26.	2-blade	1.0 (0.7)	47.2 (1200)	11.9 (302)	22.4 (570)	15.7 (400)	90.6 (2300)	441 (200)
SFG.12.91.28.		1.2 (0.9)						
SFG.16.91.31.		1.6 (1.2)						
SFG.22.91.35.		2.2 (1.6)						
SFG.26.91.37.		2.6 (1.9)						452 (205)
SFG.30.91.39.		3.0 (2.2)						
SFG.34.91.39.		3.4 (2.5)						
SFG.43.91.42.		4.3 (3.2)						
SFG.55.91.46.	3-blade	5.5 (4.1)						507 (230)

SFG.xx.102.xx

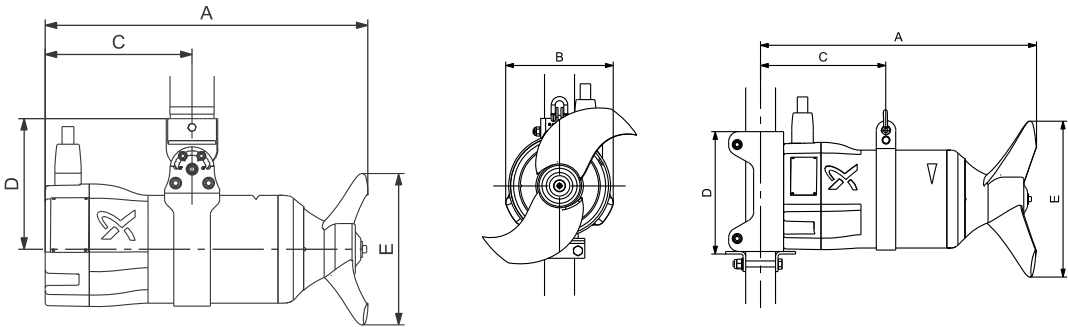


TM04 3957 0409

Type	Propeller version	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Weight incl. motor bracket and 10 m cable [lb (kg)]
SFG.30.102.29.	2-blade	3.0 (2.2)	59.1 (1500)	14.2 (360)	25.6 (650)	23.0 (585)	102.4 (2600)	794 (360)
SFG.43.102.34.		4.3 (3.2)						
SFG.48.102.35.		4.8 (3.6)						
SFG.60.102.38.		6.0 (4.4)						
SFG.67.102.35.	3-blade	6.7 (5.0)			26.8 (680)	23.0 (585)	104.7 (2660)	915 (415)
SFG.82.102.38.		8.2 (6.0)						
SFG.98.102.40.		9.8 (7.2)						
SFG.110.102.42.		11.0 (8.0)						

DIMENSIONS ET POIDS

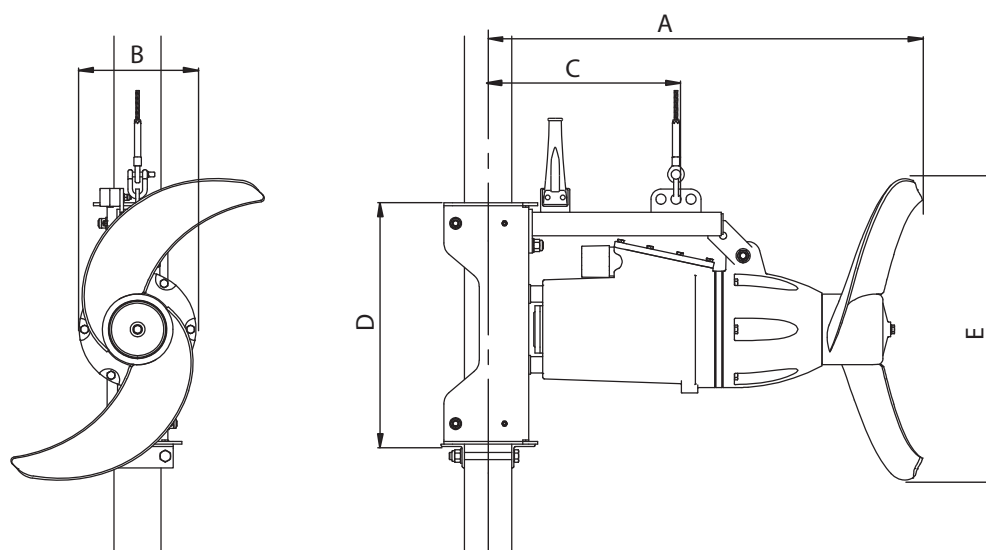
SMD



TM06 5319 4315 - TM06 5320 4315

Type	Puissance nominale [HP (kW)]	A [po (mm)]	B [po (mm)]	C [po (mm)]	D [po (mm)]	E [po (mm)]	Poids net* [lb (kg)]
SMD.13.7.1775.T.	1,3 (1,0)					7,09 (180)	
SMD.17.8.1765.T	1,7 (1,3)	17,3 (440)	7,09 (180)	7,68 (195)	7,09 (180)	8,27 (210)	79(36)
SMD.23.10.1750.T.	2,3 (1,7)					9,84 (250)	
SMD.13.7.1775.	1,3 (1,0)					7,09 (180)	
SMD.17.8.1765.	1,7 (1,3)	19,3 (490)	7,09 (180)	8,86 (225)	9,45 (240)	8,27 (210)	84(38)
SMD.23.10.1750.	2,3 (1,7)					9,84 (250)	
SMD.30.11.1182.	3,0 (2,2)					11,4 (290)	
SMD.38.13.1178.	3,8 (2,8)	21,7 (550)	9,06 (230)	9,45 (240)	9,45 (240)	12,6 (320)	148 (67)
SMD.47.15.1170.	4,7 (3,5)					14,6 (370)	

* Avec support moteur et câble de 33 pi (10 m). Poids du câble : 34 lb/pi (0,5 kg/m).



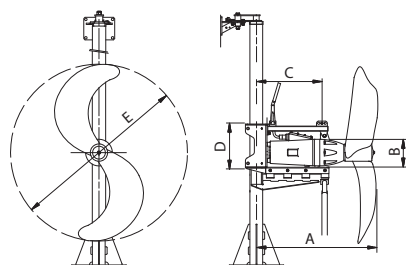
TM02 4944 3210

Type	Puissance nominale [HP (kW)]	A [po (mm)]	B [po (mm)]	C [po (mm)]	D [po (mm)]	E [po (mm)]	Poids net* [lb (kg)]
SMG.12.22.276.	1,2 (0,9)	30,7 (780)	7,87 (200)	12,6 (320)	16,1 (410)	21,7 (550)	174 (79)
SMG.16.25.275.	1,6 (1,2)	31,1 (790)	7,87 (200)	12,6 (320)	16,1 (410)	24,8 (630)	174 (79)
SMG.22.25.273.	2,2 (1,6)						
SMG.27.28.264.	2,7 (2,0)						
SMG.34.28.263.	3,4 (2,5)	31,5 (800)	7,87 (200)	12,6 (320)	16,1 (410)	28,0 (710)	190 (86)
SMG.44.28.315.	4,4 (3,3)						
SMG.55.28.314.	5,5 (4,0)						
SMG.75.34.264.	7,5 (5,6)						384 (174)
SMG.95.34.263.	9,5 (7,0)	41,3 (1050)	10,2 (260)	16,9 (430)	18,1 (460)	33,9 (860)	
SMG.130.34.318.	13,0 (9,7)						419 (190)
SMG.160.34.317.	16,0 (12,0)						
SMG.220.35.345.	22,0 (16,4)	43,3 (1100)	12,4 (315)	18,1 (460)	18,1 (460)	35,4 (900)	617 (280)

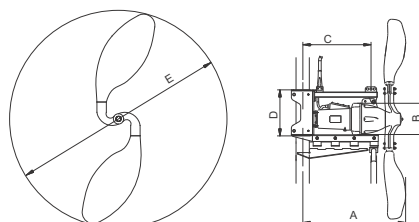
* Avec support moteur et câble de 33 pi (10 m). Poids du câble : 34 lb/pi (0.5 kg/m).

SFG.xx.51-91.xx

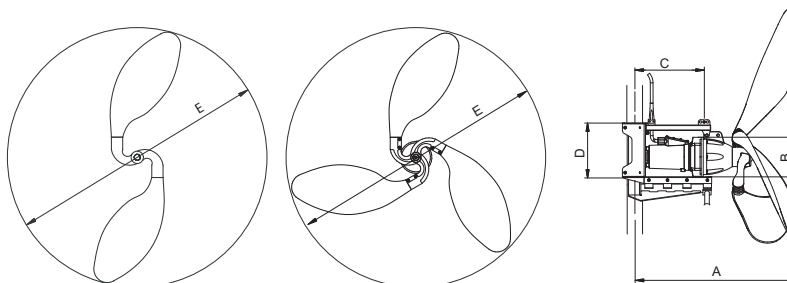
SFG.xx.51.xx



SFG.10-39.71.xx

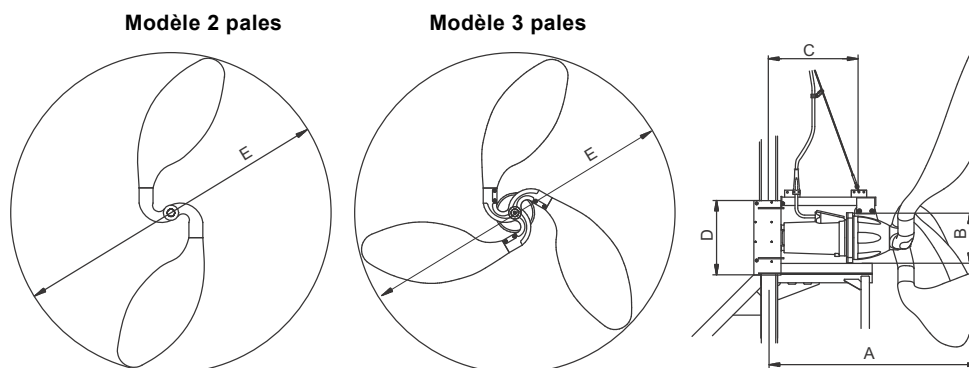


SFG.10-30.91

 SFG.47.71
 SFG.55.71
 SFG.34-55.91


TM02 6346 0305 - TM02 6345 0305 - TM04 3959 0409

Type	Modèle d'hélice	Puissance nominale [HP (kW)]	A [po (mm)]	B [po (mm)]	C [po (mm)]	D [po (mm)]	E [po (mm)]	Poids net [lb (kg)]
SFG.10.51.50.	2 pales	1,0 (0,7)	35,4 (900)	7,87 (200)	13,9 (353)	15,7 (400)	51,2 (1300)	249 (113)
SFG.14.51.57.		1,4 (1,0)						
SFG.19.51.64.		1,9 (1,4)						
SFG.23.51.68.		2,3 (1,7)						
SFG.30.51.74.		3,0 (2,2)						260 (118)
SFG.39.51.82.		3,9 (2,9)						
SFG.44.51.85.		4,4 (3,3)						
SFG.48.51.88.		4,8 (3,6)						
SFG.10.71.32.	3 pales	1,0 (0,7)	47,2 (1200)	11,9 (302)	22,4 (570)	15,7 (400)	70,9 (1800)	430 (195)
SFG.14.71.36.		1,4 (1,0)						
SFG.19.71.41.		1,9 (1,4)						
SFG.23.71.43.		2,3 (1,7)						
SFG.30.71.48.		3,0 (2,2)						441 (200)
SFG.39.71.53.		3,9 (2,9)						
SFG.47.71.53.		4,7 (3,5)						
SFG.55.71.54.		5,5 (4,1)						
SFG.10.91.26.	2 pales	1,0 (0,7)	47,2 (1200)	11,9 (302)	22,4 (570)	15,7 (400)	90,6 (2300)	441 (200)
SFG.12.91.28.		1,2 (0,9)						
SFG.16.91.31.		1,6 (1,2)						
SFG.22.91.35.		2,2 (1,6)						
SFG.26.91.37.		2,6 (1,9)						452 (205)
SFG.30.91.39.		3,0 (2,2)						
SFG.34.91.39.		3,4 (2,5)						
SFG.43.91.42.		4,3 (3,2)						
SFG.55.91.46.	3 pales	5,5 (4,1)						507 (230)

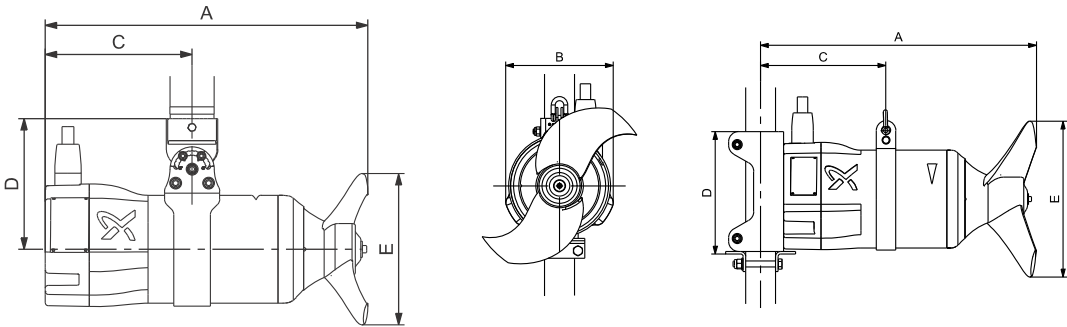


TM04 3957 0409

Type	Modèle d'hélice	Puissance nominale [HP (kW)]	A [po (mm)]	B [po (mm)]	C [po (mm)]	D [po (mm)]	E [po (mm)]	Poids avec support moteur et câble de 10 m [lb (kg)]
SFG.30.102.29.	2 pales	3,0 (2,2)	59,1 (1500)	14,2 (360)	25,6 (650)	23,0 (585)	102,4 (2600)	794 (360)
SFG.43.102.34.		4,3 (3,2)						
SFG.48.102.35.		4,8 (3,6)						
SFG.60.102.38.		6,0 (4,4)						
SFG.67.102.35.	3 pales	6,7 (5,0)			26,8 (680)		104,7 (2660)	915 (415)
SFG.82.102.38.		8,2 (6,0)						
SFG.98.102.40.		9,8 (7,2)						
SFG.110.102.42.		11,0 (8,0)						

DIMENSIONES Y PESOS

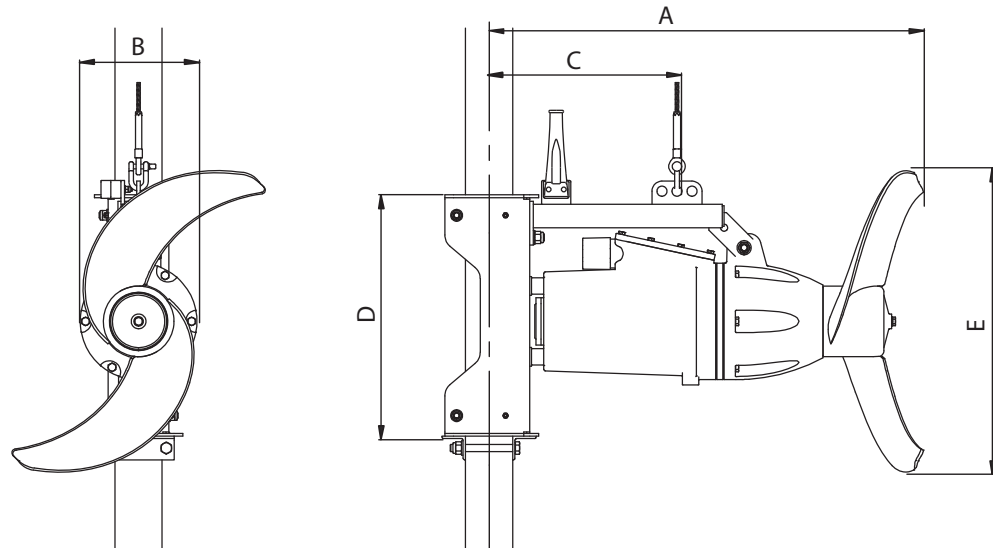
SMD



TM06 5319 4315 - TM06 5320 4315

Tipo	Potencia nominal [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Peso neto* [lb (kg)]
SMD.13.7.1775.T.	1.3 (1.0)					7.09 (180)	
SMD.17.8.1765.T	1.7 (1.3)	17.3 (440)	7.09 (180)	7.68 (195)	7.09 (180)	8.27 (210)	79(36)
SMD.23.10.1750.T.	2.3 (1.7)					9.84 (250)	
SMD.13.7.1775.	1.3 (1.0)					7.09 (180)	
SMD.17.8.1765.	1.7 (1.3)	19.3 (490)	7.09 (180)	8.86 (225)	9.45 (240)	8.27 (210)	84(38)
SMD.23.10.1750.	2.3 (1.7)					9.84 (250)	
SMD.30.11.1182.	3.0 (2.2)					11.4 (290)	
SMD.38.13.1178.	3.8 (2.8)	21.7 (550)	9.06 (230)	9.45 (240)	9.45 (240)	12.6 (320)	148 (67)
SMD.47.15.1170.	4.7 (3.5)					14.6 (370)	

* Con bancada del motor y cable de 33 ft (10 m). Peso del cable: 34 lb/ft (0.5 kg/m).



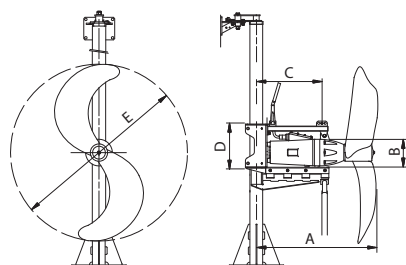
TM02 4944 3210

Tipo	Potencia nominal [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Peso neto* [lb (kg)]
SMG.12.22.276.	1.2 (0.9)	30.7 (780)	7.87 (200)	12.6 (320)	16.1 (410)	21.7 (550)	174 (79)
SMG.16.25.275.	1.6 (1.2)	31.1 (790)	7.87 (200)	12.6 (320)	16.1 (410)	24.8 (630)	174 (79)
SMG.22.25.273.	2.2 (1.6)						
SMG.27.28.264.	2.7 (2.0)						
SMG.34.28.263.	3.4 (2.5)	31.5 (800)	7.87 (200)	12.6 (320)	16.1 (410)	28.0 (710)	190 (86)
SMG.44.28.315.	4.4 (3.3)						
SMG.55.28.314.	5.5 (4.0)						
SMG.75.34.264.	7.5 (5.6)	41.3 (1050)	10.2 (260)	16.9 (430)	18.1 (460)	33.9 (860)	384 (174)
SMG.95.34.263.	9.5 (7.0)						419 (190)
SMG.130.34.318.	13.0 (9.7)						
SMG.160.34.317.	16.0 (12.0)						
SMG.220.35.345.	22.0 (16.4)	43.3 (1100)	12.4 (315)	18.1 (460)	18.1 (460)	35.4 (900)	617 (280)

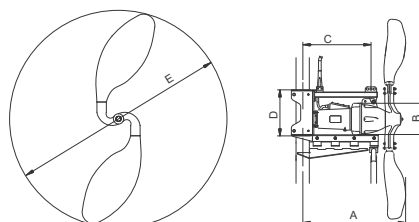
* Con bancada del motor y cable de 33 ft (10 m). Peso del cable: 34 lb/ft (0.5 kg/m).

SFG.xx.51-91.xx

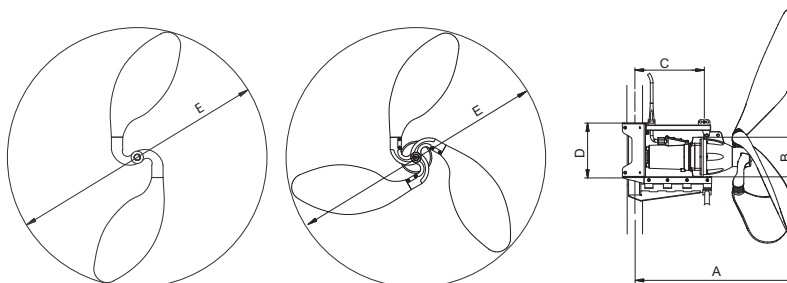
SFG.xx.51.xx



SFG.10-39.71.xx



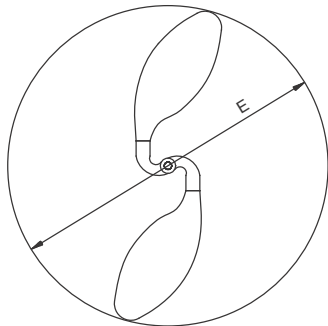
SFG.10-30.91

 SFG.47.71
 SFG.55.71
 SFG.34-55.91


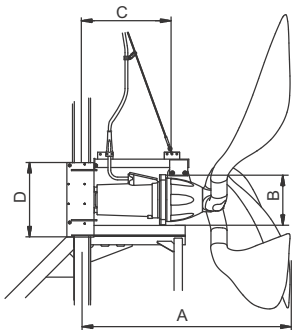
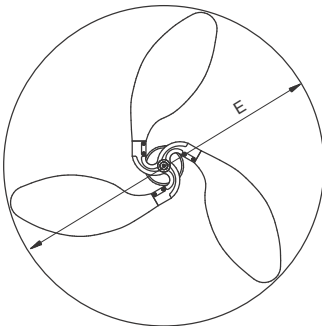
TM02 6346 0305 - TM02 6345 0305 - TM04 3959 0409

Tipo	Versión de la hélice	Potencia nominal [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Peso neto [lb (kg)]
SFG.10.51.50.	2 álabes	1.0 (0.7)	35.4 (900)	7.87 (200)	13.9 (353)	15.7 (400)	51.2 (1300)	249 (113)
SFG.14.51.57.		1.4 (1.0)						
SFG.19.51.64.		1.9 (1.4)						
SFG.23.51.68.		2.3 (1.7)						
SFG.30.51.74.		3.0 (2.2)						260 (118)
SFG.39.51.82.		3.9 (2.9)						
SFG.44.51.85.		4.4 (3.3)						
SFG.48.51.88.		4.8 (3.6)						
SFG.10.71.32.	3 álabes	1.0 (0.7)	47.2 (1200)	11.9 (302)	22.4 (570)	15.7 (400)	70.9 (1800)	430 (195)
SFG.14.71.36.		1.4 (1.0)						
SFG.19.71.41.		1.9 (1.4)						
SFG.23.71.43.		2.3 (1.7)						
SFG.30.71.48.		3.0 (2.2)						441 (200)
SFG.39.71.53.		3.9 (2.9)						
SFG.47.71.53.		4.7 (3.5)						
SFG.55.71.54.		5.5 (4.1)						
SFG.10.91.26.	2 álabes	1.0 (0.7)	47.2 (1200)	11.9 (302)	22.4 (570)	15.7 (400)	90.6 (2300)	441 (200)
SFG.12.91.28.		1.2 (0.9)						
SFG.16.91.31.		1.6 (1.2)						
SFG.22.91.35.		2.2 (1.6)						
SFG.26.91.37.		2.6 (1.9)						452 (205)
SFG.30.91.39.		3.0 (2.2)						
SFG.34.91.39.		3.4 (2.5)						
SFG.43.91.42.		4.3 (3.2)						
SFG.55.91.46.	3 álabes	5.5 (4.1)						507 (230)

Versión de 2 álabes



Versión de 3 álabes



TM04 3957 0409

Tipo	Versión de la hélice	Potencia nominal [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Peso con bancada del motor y cable de 10 m [lb (kg)]
SFG.30.102.29.	2 álabes	3.0 (2.2)	59.1 (1500)	14.2 (360)	25.6 (650)	23.0 (585)	102.4 (2600)	794 (360)
SFG.43.102.34.		4.3 (3.2)						
SFG.48.102.35.		4.8 (3.6)						
SFG.60.102.38.		6.0 (4.4)						
SFG.67.102.35.		6.7 (5.0)						
SFG.82.102.38.	3 álabes	8.2 (6.0)			26.8 (680)		104.7 (2660)	915 (415)
SFG.98.102.40.		9.8 (7.2)						
SFG.110.102.42.		11.0 (8.0)						

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