

SMD, SMG, SFG mixers and flowmakers

60 Hz, North America

Installation and operating instructions



**SMD, SMG, SFG mixers and
flowmakers 60 Hz, North America**
Installation and operating instructions
Other languages
<http://net.grundfos.com/qr/i/99135312>

SMD, SMG, SFG mixers and flowmakers

English (US)

Installation and operating instructions 4

Français (CA)

Notice d'installation et de fonctionnement 32

Español (MX)

Instrucciones de instalación y operación 62

Appendix A **92**

Original installation and operating instructions

Table of contents

1. Limited warranty	4
2. General information	5
2.1 Hazard statements	5
2.2 Notes	5
3. Product introduction	6
3.1 Product description	6
3.2 Intended use	6
3.3 Applications	6
3.4 Mixed liquids	6
3.5 Identification	8
4. Safety instructions	10
4.1 General safety instructions	10
4.2 Potentially explosive environments	10
4.3 Explosion-proof versions	10
4.4 Transporting the product	10
4.5 Electrical connection	10
4.6 Priming the product	10
4.7 Maintenance	11
4.8 Fault finding	11
5. Receiving the product	11
5.1 Transporting the product	11
5.2 Inspecting the product	11
6. Mechanical installation	12
6.1 Foundation	12
6.2 Mounting the product	12
6.3 Positioning of mixers and flowmakers	12
7. Electrical connection	20
7.1 Wiring diagrams for SMG and SFG	21
7.2 Wiring diagrams for SMD	23
7.3 Motor protection	24
7.4 Gearbox or shaft seal housing protection	24
7.5 Starting method	24
7.6 Checking the direction of rotation	25
7.7 Protection against electro-chemical corrosion	25
7.8 Frequency converter operation	25
8. Startup	26
8.1 Priming the product	26
9. Service	27
9.1 Maintenance	27
9.2 Repairing the product	27
9.3 Service chart	28
9.4 Oil	28
10. Storing the product	29
11. Fault finding	30
12. Technical data	31
12.1 Motor	31
12.2 Gearbox, SMG, SFG only	31
12.3 Shaft seals	31
12.4 Propeller	31
12.5 Sound pressure level	31
13. Disposing of the product	31

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



Read this document before you install 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.

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.



Tips and advice that make the work easier.

2.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



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 hazard statements are structured in the following way:

SIGNAL WORD



Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

2.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



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



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

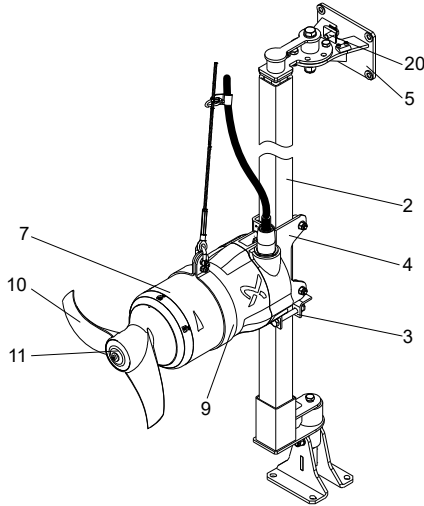


If these instructions are not observed, it may result in malfunction or damage to the equipment.

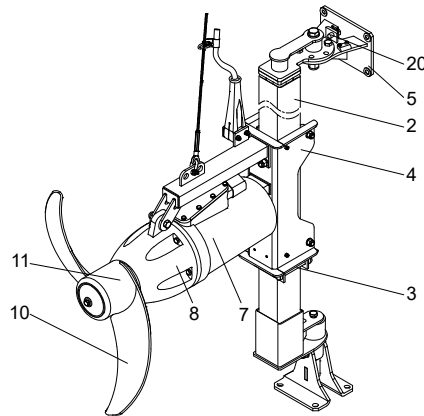
3. Product introduction

3.1 Product description

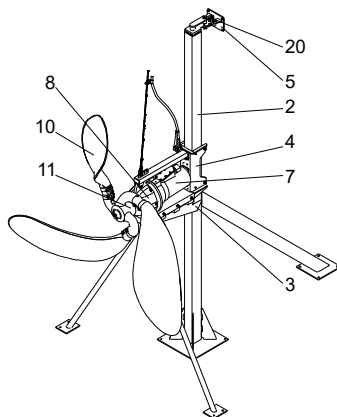
The mixers are fitted with motors of 1.2 to 22 hp (0.9 to 16 kW).
The flowmakers are fitted with motors of 1 to 11 hp (0.7 to 8.0 kW).



SMD Mixer



SMG mixer



SFG flowmaker

Pos.	Description
2	Column profile
3	Depth blocker
4	Motor bracket
5	Top fixation bracket including safety wire
7	Motor housing
8	Gearbox
9	Clamping ring
10	Propeller
11	Hub
20	Wire clamp

3.2 Intended use

These mixers and flowmakers are designed for mixing in industrial applications.

These products are designed for applications involving the mixing, that is the homogenisation and suspension of liquids.

3.3 Applications

These mixers and flowmakers are intended to be used in the following areas:

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

3.4 Mixed liquids

Observe the following liquid limitations to avoid overloading and exposing the mixers and flowmakers to corrosion.

Liquid temperature	41-104 °F (5-40 °C) (140 °F (60 °C)) ¹	
pH value	4-10	
Maximum dynamic viscosity	SMD SMG, SFG	250 cP (mPas) 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)	

¹ The liquid temperature range is stated on the nameplate.

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

3.4.1 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.

TM065347

TM042710

TM042755

	% dry solid	
	SMD	SMG, SFG
Activated sludge		0.5 %
Sludge in selector zones		0.5 %
Sludge in anoxic zones		0.5 %
Sludge in bivalent zones		0.5 %
Sludge in anaerobic zones		0.5 %
Primary sludge		≤ 3 %
Secondary sludge	≤ 4 %	≤ 6 %
Digested sludge	≤ 4 %	≤ 8 %
Sludge in wastewater tank with-out screen		≤ 2 %
Sludge in wastewater tank with sand		≤ 2 %

3.4.2 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 %.

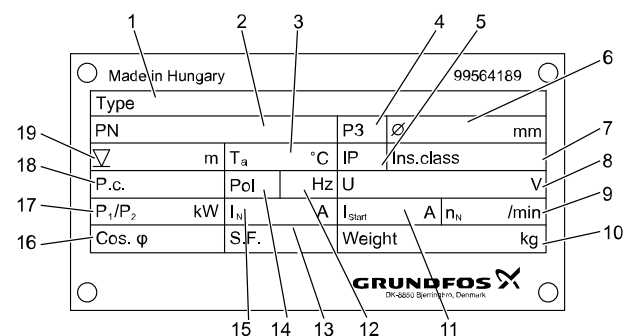
3.5 Identification

3.5.1 Type key

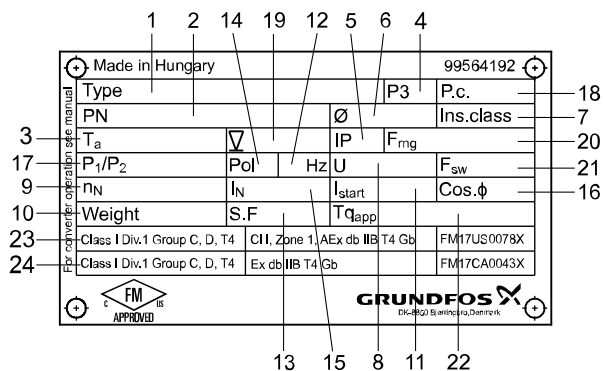
Example: SMG.75.34.264.6.1H.

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

3.5.2 Nameplate



Nameplate of SMD, SMG and SFG



FM nameplate of SMD mixers


Pos.	Description
1	Type designation
2	Product number and serial number
3	Liquid temperature range
4	Production site
5	Enclosure class according to IEC
6	Propeller diameter
7	Insulation class
8	Rated voltage
9	Rated speed (propeller)
10	Weight
11	Starting current
12	Frequency
13	Service factor
14	Number of poles
15	Rated current
16	Power factor
17	Motor power P1/P2
18	Production code
19	Maximum installation depth
20	Frequency range ¹
21	Switching frequency ¹
22	Torque application ¹
23	Ex markings and Ex certification number FM US
24	Ex markings and Ex certification number FM CA

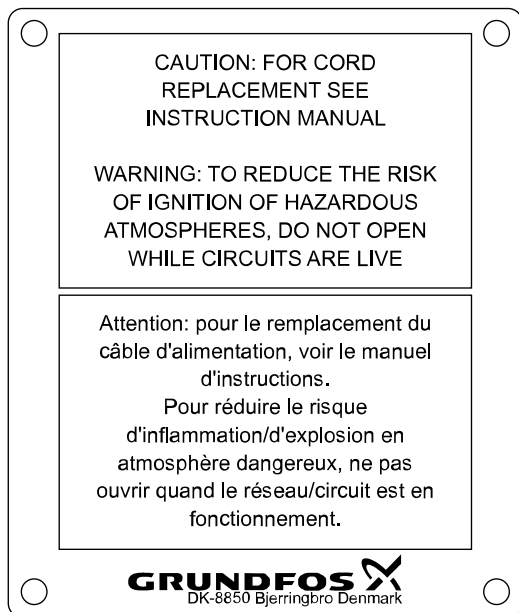
¹ If a frequency converter is used.

At the installation site, fix the extra nameplate that is supplied with the product. Make sure that the nameplate is visible.

3.5.3 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.



TM069369

FM warning plate

3.5.4 Approvals (cFMus)

The SMD mixers have been approved by FM, and the explosion-proof versions hold FM Certificate of Conformity, numbers FM17US0078X and FM17CA0043X.

3.5.5 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/CSAC22.2: 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 for the US market:

- Class I, Division 1, Groups C and D, T4, Ta = +5°C to +40°C, IP68
- Class I, Zone 1, AEx db IIB T4 Gb Ta = +5°C to +40°C, IP68

The SMD mixers have the following explosion-protection classification for the Canadian market:

- Class I, Division 1, Groups C and D, T4, Ta = +5°C to +40°C, IP68
- Ex db IIB T4 Gb Ta = +5°C to +40°C, IP68

Code	Description
Class I	Explosive atmosphere caused by gas or vapors.
Division 1	Area classification: flammable material present intermittently.
Zone 1	Area classification: flammable material present intermittently.
Groups C and D	Gas groups, ethylene and propane.
AEx	Explosion protected based on American National Standard.
Ex	Explosion protected.
db	Type of protection: flameproof.
IIB	Gas groups: ethylene and propane.
T4	Maximum surface temperature is 275 °F (135 °C).
Gb	Equipment protection level: gas atmosphere, high level of protection.
Ta	Ambient temperature.
IP68	Enclosure class according to IEC 60529.

4. Safety instructions

4.1 General safety instructions

WARNING

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.

DANGER

Fall hazard



Minor or moderate personal injury

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

4.2 Potentially explosive environments

Use explosion-proof Grundfos mixers in potentially explosive environments.



The explosion protection classification of the installation must be approved by the local authorities in each individual case. See section [3.5.5 Approval standards](#).

Special conditions for safe use of explosion-proof pumps:

- Make sure the moisture switch and thermal switches are connected in two separate circuits, but have separate alarm outputs (motor stop) in case of high humidity or high temperature in the motor.
- Contact the manufacturer for information on the dimensions of the flameproof joints.



Additional conditions for safe use of explosion-proof pumps

- Thermal protection in the stator windings guarantees the disconnection of supply. Resetting of the supply should be manual.
- The motor and connecting plug are provided with property class A4-70 fasteners.
- The leakage system is electrically connected in accordance with the installation instructions.
- The mixer can be operated by an inverter.



4.3 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 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.

4.4 Transporting the product



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



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



Before lifting the components, make sure to comply with any local regulations that set limits for the weights to be lifted manually by individuals.

4.5 Electrical connection

DANGER

Electric shock

Death or serious personal injury



Mixers and flowmakers must be installed with an external "supply disconnecting device" that permits the mixer or flowmaker to be locked in the OFF (isolated) position. It must be manufactured and installed in a position according to local requirements.

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

4.6 Priming the product

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 is relieved.



Make sure that no persons can fall into the tank.



The mixer or flowmaker must always be submerged during operation.

4.7 Maintenance



CAUTION

Sharp element

Minor or moderate personal injury

- Wear safety gloves when handling the product.



Observe all regulations applying to mixers installed in potentially explosive environments.

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

Before starting work on the mixer or flowmaker make sure that:



- the fuses are removed or the main switch is switched off
- the power supply cannot be switched on unintentionally
- 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.

4.8 Fault finding

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.

5. Receiving the product

5.1 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, flowmaker and accessories cannot roll or fall over.



Before lifting the components, make sure to comply with any local regulations that set limits for the weights to be lifted manually by individuals.



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

5.2 Inspecting the product



Do not install a damaged mixer or flowmaker.

Check the product and the accessories for any visible damage upon delivery.

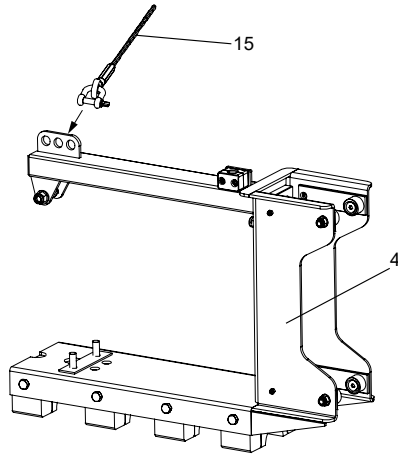
If the product or the accessories are damaged, contact Grundfos immediately. Do not remove a damaged component, unless instructed otherwise by Grundfos.

Make sure to comply with local regulations when disposing of the package.

6. Mechanical installation

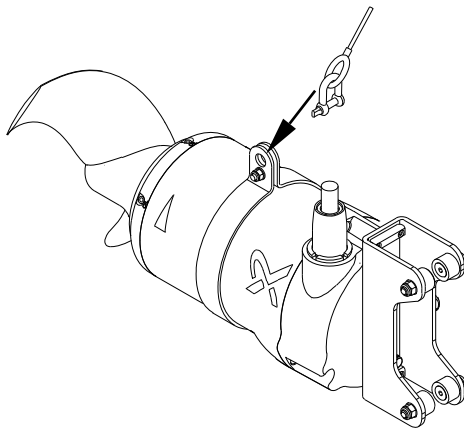
6.1 Foundation

Lift the mixer or flowmaker by the suspension point. See figs Mounting the lifting wire on the motor bracket and Mounting the lifting wire on SMD.



Mounting the lifting wire on the motor bracket

Pos.	Description
4	Motor bracket
15	Lifting wire



Mounting the lifting wire on SMD



Do not use the lifting equipment supplied with the unit nor 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 hanging from the lifting equipment.



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

For dimensions and weights, see [A.1. Dimensions and weights](#).

6.2 Mounting the product

Make sure to use stainless steel nuts and bolts for installation. Use grease or alu-paste with a locking nut for lubrication and locking or, alternatively, use Loctite or a similar product.

Tighten all nuts and bolts to the following torques:

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)

6.2.1 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)

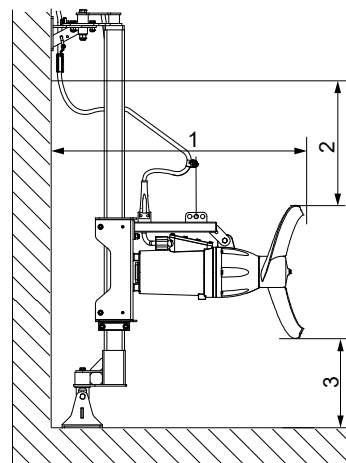
6.3 Positioning of mixers and flowmakers

Correct positioning of mixers and flowmakers is essential to ensure proper operation and long life.

6.3.1 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. Positioning sketch for mixers, must be half of the propeller diameter.
- SMG:** The distance from the propeller tip to the liquid surface must be at least equal to the propeller diameter. See H_{ABOVE} in fig. Positioning sketch for mixers.
- SMD:** The distance from the propeller tip to the liquid surface must be at least 1.5 times the propeller diameter. See H_{ABOVE} in fig. Positioning sketch for mixers.
- The distance between the propeller tip and the wall behind the mixer must be at least 1.5 times the propeller diameter. See L_{MIN} in fig. Positioning sketch for mixers



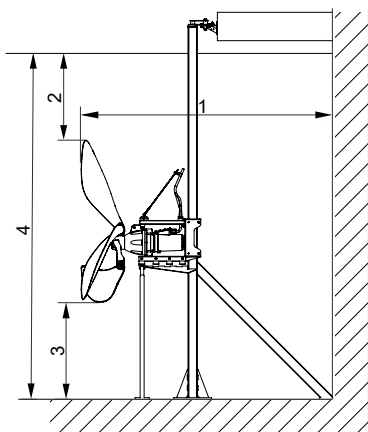
Positioning sketch for mixers

Pos.	Description
1	L_{MIN}
2	H_{ABOVE}
3	H_{MIN}

6.3.2 Flowmakers

Submerge the flowmaker as deeply as possible.

- The distance between the propeller tip and the bottom of the tank must be 20 in (50 cm). See H_{MIN} in fig. Positioning sketch for flowmakers.
- The distance from the propeller tip to the liquid surface must be at least 0.75 times the propeller diameter. See H_{ABOVE} in fig. Positioning sketch for flowmakers.
- The distance between the propeller tip and the wall behind the flowmaker must be at least twice the propeller diameter. See L_{MIN} in fig. Positioning sketch for flowmakers.
- 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 channel bend to the propeller and from the propeller to aeration areas must be at least the largest value of the channel width and the liquid level.



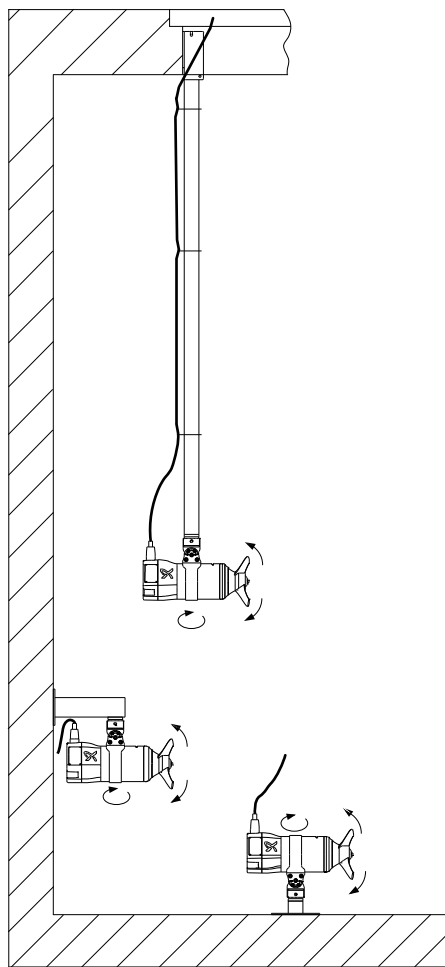
Positioning sketch for flowmakers

Pos.	Description
1	L_{MIN}
2	H_{ABOVE}
3	H_{MIN}
4	H_{LIQUID}

6.3.3 Installing a mixer

The mixer can be mounted in different ways depending on the accessories:

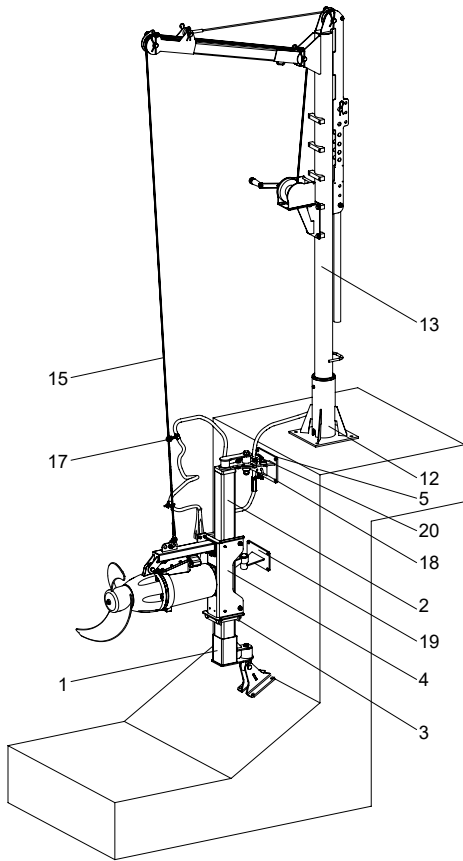
- fixation bracket and tube for suspended mounting. See fig. SMD.09 - 18.xx.xxxx.T.
- fixation bracket for wall mounting. See fig. SMD.09 - 18.xx.xxxx.T.
- fixation base for floor mounting. See fig. SMD.09 - 18.xx.xxxx.T.
- motor bracket for mounting on column profile. See fig. SMD and SMG mixers.



SMD.09 - 18.xx.xxxx.T

TM025417

TM065286



TM042711

SMD and SMG mixers

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

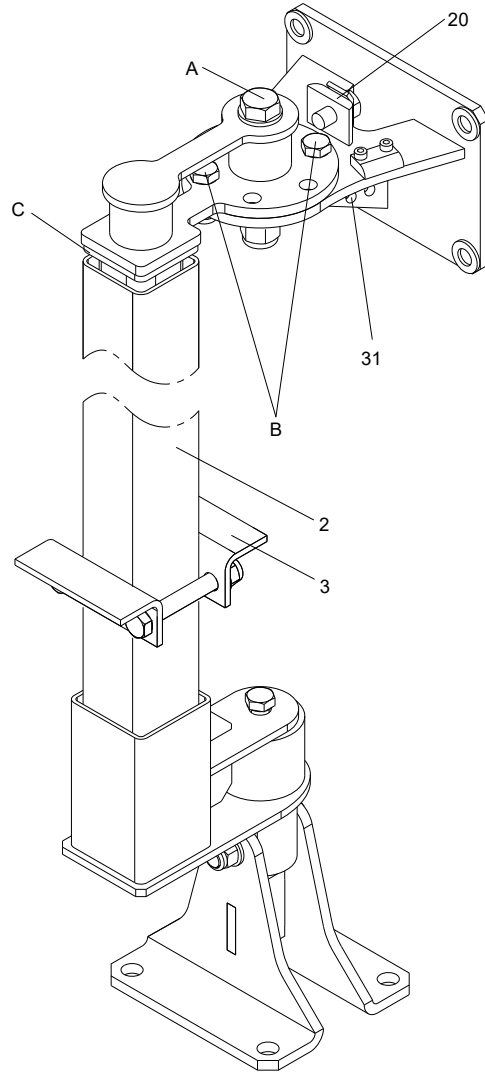
See fig. SMD and SMG mixers.

Torques appear from section [Mounting the product](#).

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. SMD and SMG mixers) 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. Fixation.



TM042712

Fixation

Pos.	Description
A, B	Bolts
C	Insulator
2	Column profile
3	Depth blocker
31	Hole for fastening a safety wire

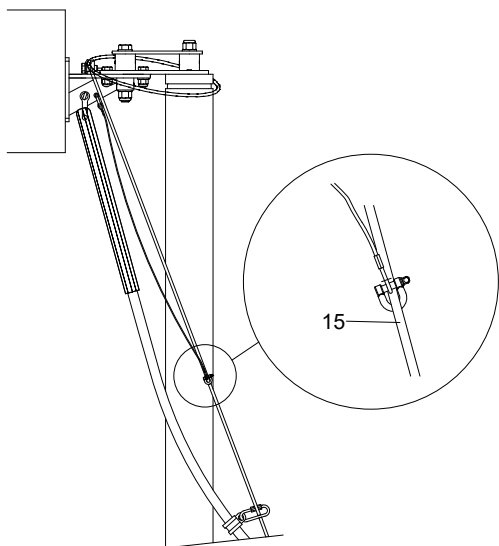
8. Remove the insulator and the turnable metal part by removing the center bolt (A) and the two fixation bolts (B).
9. Adapt the outside of the square insulator to the inside of the column profile.
The insulator must fit tightly inside the column profile.

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.

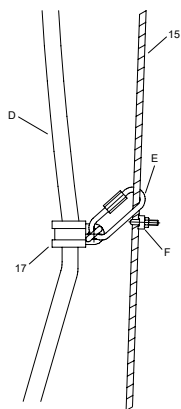
12. Fasten the depth blocker (3) in the right position.
13. Drill the holes for the anchor bolts for the crane foot (12, fig. SMD and SMG mixers).
14. Mount the crane foot, and fit and tighten the bolts.
15. Mount the lifting wire (15) on the motor bracket using the shackle. See fig. Attaching the power cable to the lifting wire.
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.



TM043932

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. Attaching the power cable to the lifting wire.
Attach the power cable to the lifting wire by means of cable clamps placed at 3.3 ft (1 m) intervals.



Attaching the power cable to the lifting wire

Pos.	Description
D	Power cable
E	Snap hook
F	Wire clamp
15	Lifting wire
17	Cable clamp

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



At least three turns of wire must always remain on the drum. Otherwise, the wire may break loose from the drum fixation.



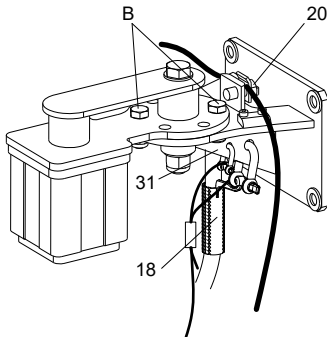
Follow the separate installation and operating instructions for cranes.

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.

TM024938

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. Top fixation bracket with lifting and safety wires and cable sock. The power cable must be slightly tightened.



Top fixation bracket with lifting and safety wires and cable sock

Pos.	Description
B	Bolts
18	Cable sock
20	Fixation bracket
31	Hole for fastening a safety wire



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. Top fixation bracket with lifting and safety wires and cable sock) 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 [Positioning of mixers and flowmakers](#).

DANGER

Electric shock

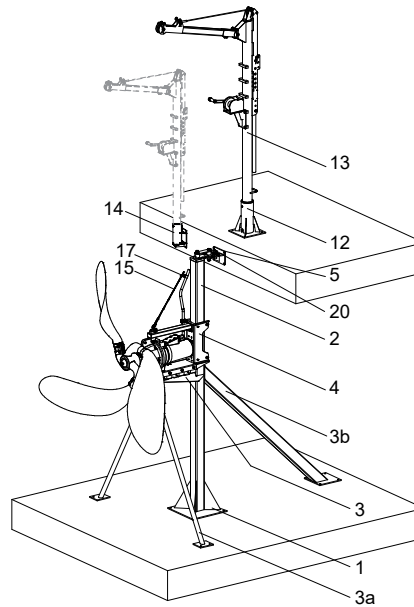
Death or serious personal injury



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

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

6.3.4 Installing a flowmaker



SFG flowmaker

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 including safety wire
12	Crane foot
13	Crane with winch
14	Crane foot for vertical installation
15	Lifting wire including shackle and wire clamp
17	Cable clamp
20	Wire clamp
31	Hole for fastening a safety wire

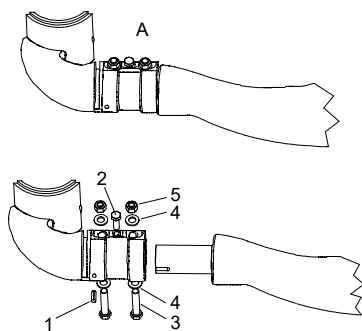
Procedure

For torques, see section [Mounting the product](#).



The propeller blades can be mounted before installing SFG.xx.71/91/102 or after the crane is installed.

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



TM042715

SFG.xx.71 - 91

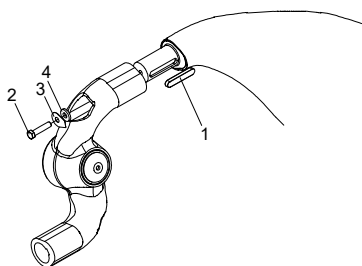
Pos.	Description
A	Blade position
1	Pin
2	Screw
3	Bolt
4	Washer
5	Nut



The fixation of the propeller blades is ensured by the pressure of the clamping jaws which are tightened by the bolts (3) and the 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. SFG.xx.71 - 91.
9. Apply silicone to the joint between the blade and the hub.

6.3.4.2 Mounting the propeller blades of SFG.xx.102



TM042716

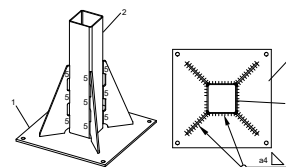
SFG.xx.102

Pos.	Description
1	Key
2	Screw
3	Cover plate
4	Washer

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 on the thread of the screw (2).
5. Turn the hub, and insert the blade from above.
6. Turn the blade to the 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.

6.3.4.3 All flowmakers

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



TM049089

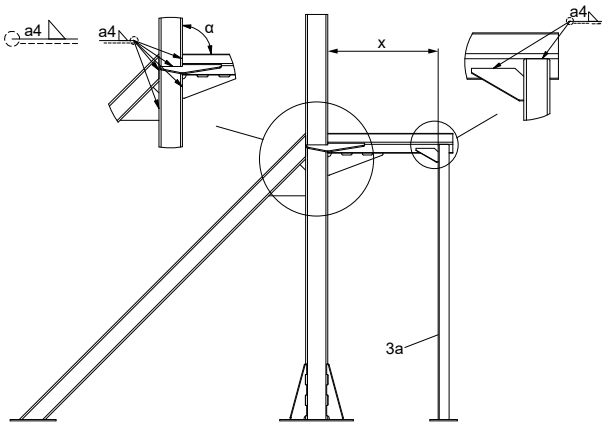
Welding the column profile on to the bottom fixation plate

Pos.	Description
1	Fixation plate
2	Column profile
5	Ribs
2a	End of the column profile



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

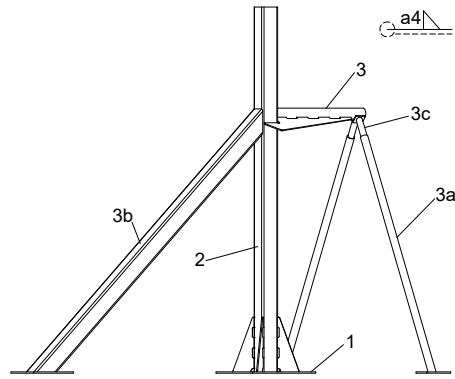
2. **SFG.xx.102:** Place the depth blocker (3), the back support leg (3b) and the front support legs (3a) in the right position, and weld them on the column profile (2).
See position numbers in fig. SFG.xx.102, profile and support legs, back view.



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

Pos.	Description
α	min. 89.7° - max. 90°
x	23.6"
3a	front support legs

TM063308



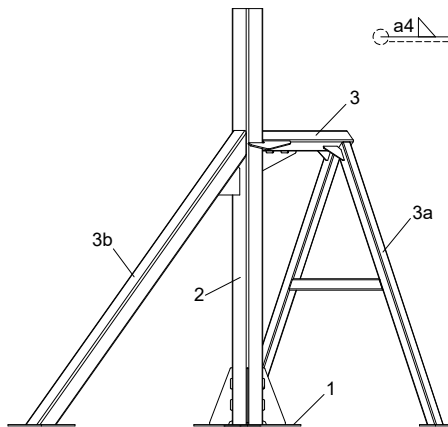
SFG.xx.71 - 91 profile and support legs

Pos.	Description
1	Fixation plate
2	Column profile
3	Depth blocker
3a, 3c	Front support leg
3b	Back support leg



There must be a minimum overlap of 6 in (150 mm) between the front support legs (3a and 3c). See fig. SFG.xx.51 - 91 profile and support legs.

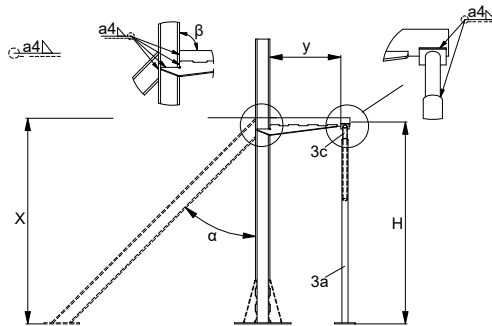
TM063309



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

Pos.	Description
1	Fixation plate
2	Column profile
3	Depth blocker
3a, 3c	Front support leg
3b	Back support leg

TM063310



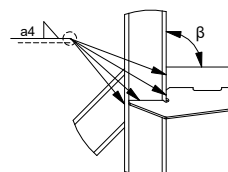
SFG.xx.51	$37.8 \text{ in (960 mm)} \leq H \leq 66.9 \text{ in (1700 mm)}$
SFG.xx.71	$46.1 \text{ in (1170 mm)} \leq H \leq 66.9 \text{ in (1700 mm)}$
SFG.xx.91	$55.9 \text{ in (1420 mm)} \leq H \leq 66.9 \text{ in (1700 mm)}$

Pos.	Description
x	57.1"
α	45°
β	min. 89.7° - max. 90°
3a, 3c	front support leg
y	19.7"
H	height

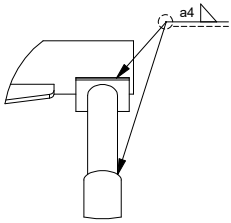
TM063307

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. SFG.xx.71 - 91 profile and support legs. Calculate the required height of the SFG depth blocker according to the positioning rules for flowmakers. See section [Flowmakers](#).



TM063311



SFG.xx.51 - 91 profile and support legs

- 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. SFG.xx.71 - 91 profile and support legs. Calculate the required height of the SFG depth blocker according to the positioning rules for flowmakers. See section [Flowmakers](#).

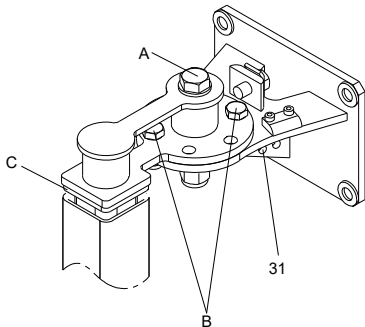


The back support leg (3b) is not supplied for SFG.xx.51.



There must be a minimum overlap of 6 in (150 mm) between the front support legs (3a and 3c). See fig. SFG.xx.51 - 91 profile and support legs.

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



Top fixation

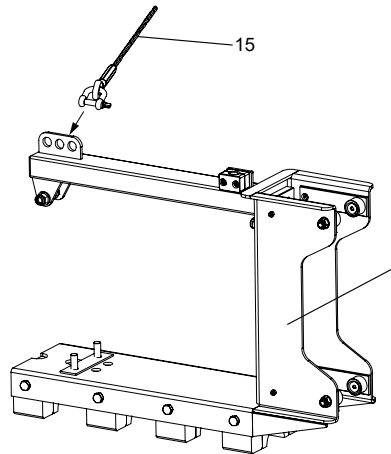
Pos.	Description
A, B	Bolts
C	Insulator
31	Hole for fastening a safety wire

- Shorten the column profile (2 in fig. SFG.xx.102, profile and support legs, back view and fig.SFG.xx.71 - 91 profile and support legs) to the correct length to match the position of insulator (C, fig. Top fixation) 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. Top fixation.
- 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. Top fixation.
- Adapt the outside of the square insulator to the inside of the column profile. The insulator must fit tightly inside the column profile.
- 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. Top fixation) in the desired position. You can adjust the angle in steps of 7.5 °.

TM063312

TM042719

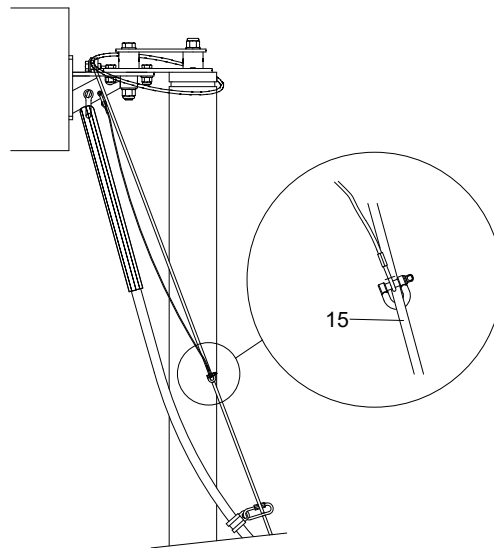
- Drill the holes for the anchor bolts for the bottom fixation plates in the bottom of the tank, and insert the bolts.
See fig. SFG.xx.102, profile and support legs, back view.
- Tighten the anchor bolts in the bottom fixation plate.
- Drill holes, mount and tighten the anchor bolts of the front and back support legs as well.
- Drill the holes for the anchor bolts for the crane foot in the concrete.
- Mount the crane foot, and fit and tighten the anchor bolts.
- Mount the lifting wire (15) on the motor bracket (4) using the shackle.
See fig. Mounting of the lifting wire on the motor bracket.



Mounting of the lifting wire on the motor bracket

Pos.	Description
4	Motor bracket
15	Lifting wire

- Mount the top end of the safety wire to the hole (31 in fig. Top fixation) 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.



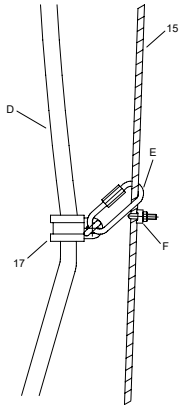
Safety wire

TM042720

TM043932

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. Attaching the power cable to the lifting wire. Attach the power cable to the lifting wire by means of cable clamps placed at 3.3 ft (1 m) intervals.



Attaching the power cable to the lifting wire

Pos.	Description
D	Power cable
E	Snap hook
F	Wire clamp
15	Lifting wire
17	Cable clamp

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

! At least three turns of wire must always remain on the drum. Otherwise, the wire may break loose from the drum fixation.

Follow the separate installation and operating instructions for cranes.



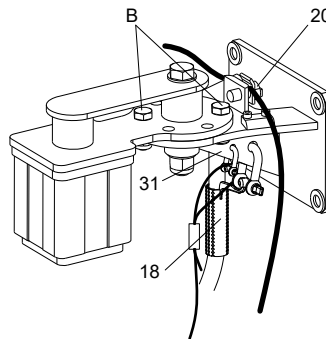
<http://net.grundfos.com/qr/i/96882862>

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.

22. Mount the cable sock (18, fig. Top fixation bracket with lifting and safety wires and cable sock) to the top fixation bracket using the shackle, and pull the power cable through it, to the desired position.

See fig. Top fixation bracket with lifting and safety wires and cable sock. The power cable must be slightly tightened.



Top fixation bracket with lifting and safety wires and cable sock

Pos.	Description
B	Bolts
18	Cable sock
20	Fixation bracket
31	Hole for fastening a safety wire



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. Attaching the power cable to the lifting wire.

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 be switched on unintentionally.

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

7. Electrical connection



Electrical connections 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



- Mixers and flowmakers must be installed with an external "supply disconnecting device" that permits the mixer or flowmaker to be locked in the OFF (isolated) position. It must be manufactured and installed in a position according to local requirements.

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



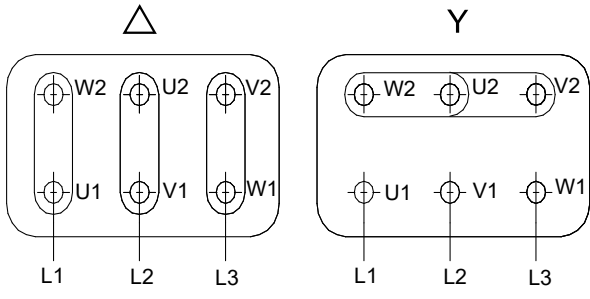
The classification of the installation must be approved by the local authorities in each individual case. For the electrical installation, the standard ANSI/IEC 60079-14 must be met. See section 3.5.5 *Approval standards*.
The instructions in section 4.3 *Explosion-proof versions* must be observed.

The supply voltage and frequency are marked on the 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 49 ft (15 m). Longer cables are available on request. See section 12. *Technical data*.

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

Figure Schematic drawing of delta and star connection shows a schematic drawing of these star and delta connections. See also section 7.1 *Wiring diagrams for SMG and SFG*.



TM024953

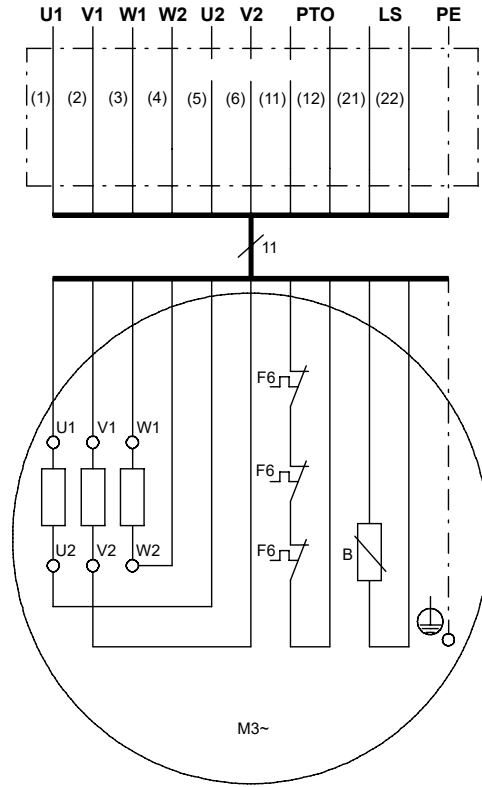
Schematic drawing of delta and star connection

Pos.	Description
Δ	Delta
Y	Star

7.1 Wiring diagrams for SMG and SFG

Three-phase motors

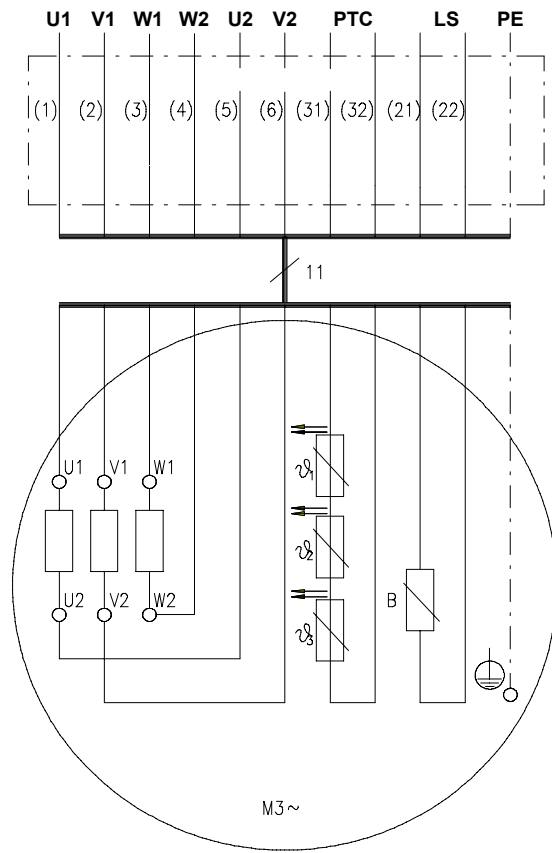
For starting method 1H, wire the motor using the delta connection and for starting method 0H, wire the motor using the star connection. Connection methods are shown in fig. Schematic drawing of delta and star connection. See also section 3.5.2 *Nameplate*, position 1, and section 3.5.1 *Type key* to determine the voltage and starting method of your mixer or flowmaker.



TM024940

Three thermal switches

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



TM024932

Three PTC sensors

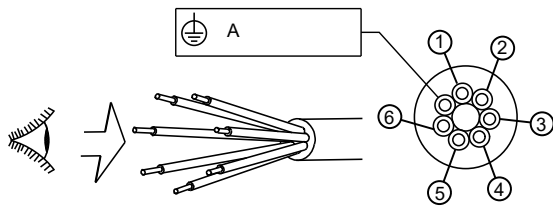
Terminals	Description
1, 2, 3, 4, 5, 6	Ends of the three stator windings, (U1, V1, W1, W2, U2, V2)
31, 32	PTC sensors according to DIN 44081 (ϑ1, ϑ2, ϑ3)
21, 22	Leakage sensor in gearbox (B)

7.2 Wiring diagrams for SMD

Marking		Switch and sensor			Maximum load	Connection
Wire 4 (7*)	Wire 6 (9*)	Thermal switch	Moisture switch (M)	Leakage sensor (LS)		Relay
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.

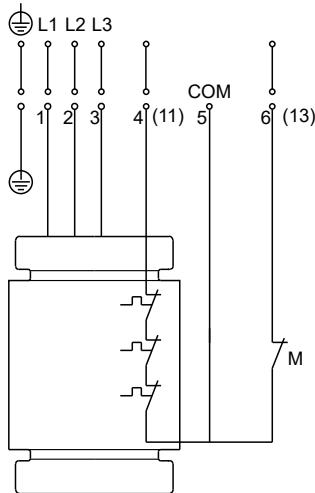
7-wire connections



TM065367

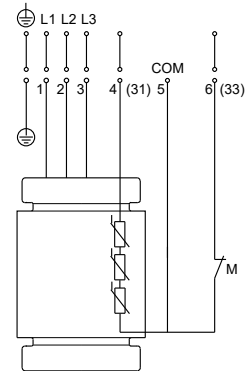
SMD, 7-wire cable

Pos.	Description
A	Yellow and green



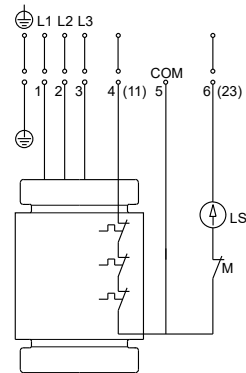
SMD, 7-wire cable, PTO, moisture switch version

TM065364



TM065365

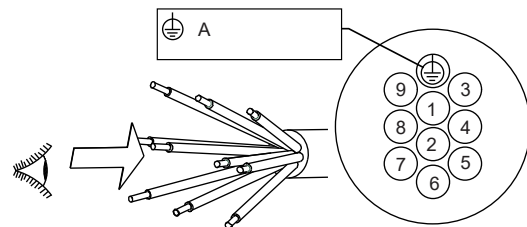
SMD, 7-wire cable, PTC, moisture switch version



TM065366

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

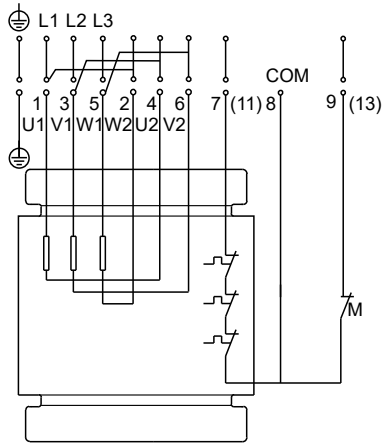
10-wire connections



TM065371

SMD, 10-wire cable

Pos.	Description
A	Yellow and green



TM065368

SMD, 10-wire cable, PTO, moisture switch, standard version

7.3 Motor protection

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

- Standard mixers incorporate three bimetallic PTO thermal switches. See fig. Three thermal switches.
- Standard flowmakers incorporate three PTC sensors according to DIN 44081/44082. See fig. Three PTC sensors.

Function of PTO 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 opens the circuit and stops the motor.

When the windings are cooled to normal temperature, the switch closes the circuit and the motor can be restarted manually.

See fig. Three thermal switches.

Thermal switches (F6):

- two conductors, terminals 11 and 12
- maximum operating voltage: 250 V
- maximum switching current: 2.5 A at $\cos \varphi = 1$
- cut-out temperature: 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. This requires a thermistor trigger unit with a reconnection suppressor in the control circuit of the motor contactor.

See wiring diagram in fig. Three PTC sensors.

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 cut-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). Considered this when conducting tests with an ohmmeter.



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

7.4 Gearbox or shaft seal housing protection

The gearbox or shaft seal housing is monitored for leakage by an incorporated leakage sensor.

The leakage sensor must be connected to a Grundfos ALR-20/A-Ex relay

The ALR-20/A-Ex relay must be ordered separately. Part number: 99794613 or 96489569.

If the gearbox or shaft seal housing is not monitored for leakage, inspect it every 6 months. If the oil contains water, replace the shaft seal.



<http://net.grundfos.com/qr/i/99421246>

For details on SMD cable Ex, see the *SE cable Ex Installation and operating instructions*



<http://net.grundfos.com/qr/i/99952997>



If you need to extend the power cable to the sensor, comply with the standards for the intrinsically safe circuit.

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

The operator must make sure that all installation work conforms with the relevant standards.

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 is triggered and it cuts the power to the SMD.

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).

7.5 Starting method

7.5.1 SMD

Continuous operation

Direct start is possible throughout the entire power range.

Intermittent operation

For 3 hp (2.2 kW) and larger motors use a soft starter or a frequency converter.

7.5.2 SMG

Continuous operation

Motors up to 2.2 hp (1.6 kW) can be started by direct starting.

Use star-delta starting, soft starter or frequency converter for 2.7 hp (2.0 kW) and larger motors.

Intermittent operation

Use star-delta starting, soft starter or frequency converter throughout the entire power range.

7.5.3 SFG

Continuous operation

Start the flowmakers by star-delta starting, soft starter or frequency converter.

Intermittent operation

It is mandatory to start the flowmakers by soft starter or frequency converter.

7.6 Checking the direction of rotation

Once the electrical connections are set, 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.

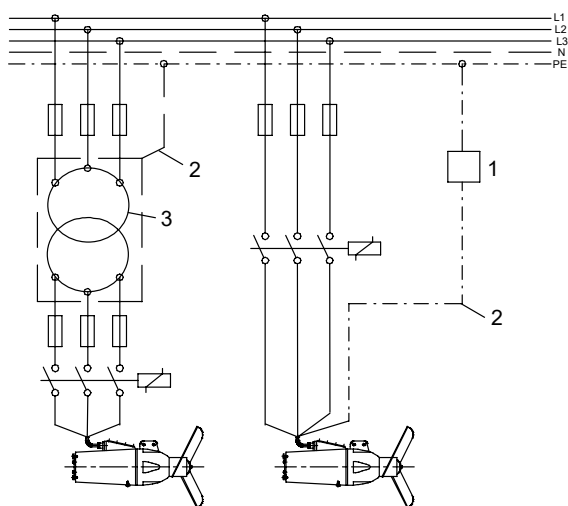
If the propeller rotates in the wrong direction, interchange two phases of the mains supply.

7.7 Protection against electro-chemical corrosion

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

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

Separate the earth conductor, so direct current cannot flow through it. It must still function as a protective conductor. This can be achieved with a limiting unit, polarisation cell, anti-parallel diode or an isolation transformer.



Protection against electro-chemical corrosion

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



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

7.8 Frequency converter operation

All mixers and flowmakers are designed for frequency converter operation for energy saving and for soft start. However, frequency converter operation often exposes the motor insulation system to a heavier load and causes the motor to be more noisy.

In this product range, only negligible amounts of bearing currents occur during frequency converter operation.

For frequency converter operation, observe the following:

- The thermal protection of the motor must be connected.
- 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 is not taken into account. See the frequency converter data sheet regarding the actual values and the cable influence on the peak voltage and dU/dt.
- Set the frequency converter U/f ratio according to the motor data.

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.
- Local regulations or standards must be complied with.
- 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 an 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 the rated current, power, voltage and frequency.
- Do not exceed the frequency indicated on the nameplate as this may cause motor overload.
- Keep the power cable as short as possible. The peak voltage increases with the length of the power cable.
- Use input and output filters on the frequency converter.
- Use a screened power cable if there is a risk that electrical noise may disturb other electrical equipment.
- Ramp-up and ramp-down time must be at least 5-10 seconds.

When operating the pump by a frequency converter, consider the following:

- The locked-rotor torque can be lower depending on the frequency converter.
- The noise level may increase. See the installation and operating instructions for the selected frequency converter type.



Frequency converter use may reduce the lifespan of the bearings and the shaft seal, depending on operating mode and other circumstances.



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



For more information about frequency converter operated mixer or flowmaker speed and torque curves, visit the Grundfos Product Center at <https://product-selection.grundfos.com>.

TM024943

For more information about the frequency converter operation, see the data sheet and the installation and operating instructions for the selected frequency converter.

8. Startup

8.1 Priming 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 or shaft seal housing.

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 is relieved.

If required, fill oil into the gearbox or shaft seal housing through the oil-filling hole (2). See figs Position of oil drain and oil filling screws on SMD and Position of oil drain and oil filling screws on SMG and SFG.

For oil quality and quantity, see section [9.4.1 Oil quality, gearbox or shaft seal housing](#).

If the mixer or flowmaker is stored and not used for a long period before startup, see section [9.3 Service chart](#).

Checks before startup:

1. Check that the propeller is rotating in the correct direction. See section [7.6 Checking the 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 [Installing a mixer](#) and [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.

Related information

[6.3.3 Installing a mixer](#)

[6.3.4 Installing a flowmaker](#)

9. Service

9.1 Maintenance

Before starting work on the mixer or flowmaker make sure that:



- the fuses are removed or the main switch is switched off
- the power supply cannot be switched on unintentionally
- all rotating parts have stopped moving.



Observe all regulations applying to mixers installed in potentially explosive environments.

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

CAUTION



Sharp element

Minor or moderate personal injury

- Wear safety gloves when handling the product.



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



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

9.2 Repairing the product

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.

9.2.1 Explosion-proof mixers



Explosion-proof mixers must be serviced and repaired by Grundfos or by an approved service partner.

Service work must be carried out according to FM directives and standards or according to IEC 60079-17 and IEC 60079-19 standards.

Spare parts

Damaged mixer parts must always be replaced by new, approved parts. Motor parts must not be reconditioned.

9.2.2 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.

Before returning the product for service, contact Grundfos with details about the liquid. Otherwise, Grundfos can deny to service the product.

Any application for service must include details about the liquid.

Clean the product the best possible way before returning it.

Possible costs of returning the mixer or flowmaker are paid by the customer.

9.3 Service chart



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

Type	Service instructions	Lubrication	Inspection
Electric motor All	Keep the motor housing clean. Otherwise, cooling may be 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. If damaged, the cable must be replaced by Grundfos.
Shaft seal housing SMD	Replace the lip seal and wear ring if they are worn. 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 leakage, inspect it every 6 months.
Gearbox SMG, SFG	Replace the lip seal and wear ring if they are worn. 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 Oil.	If the shaft seal housing is not monitored for leakage, inspect it every 6 months.
Propeller All			Check the propeller blades regularly for wear and tear. Remove any material wound around the blades, such as ropes and threads, which may cause uneven running and oscillation of the installation. In case of strong turbulence, a cleaning is 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 lifespan of the wire.		Check the wire regularly before using the winch. Replace the wire, if required.
Screws and bolts All	Always check that all bolts in the motor bracket are properly tightened. Check the anchor bolts in the bottom fixation bracket or bottom fixation plate every time the tank is empty.	When tightening the screws and bolts, renew the threadlocker, if necessary.	

9.4 Oil

9.4.1 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.

9.4.2 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)

Type	Gearbox or shaft seal housing [fluid oz. (l)]
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)

9.4.3 Oil change

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

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 is fully relieved.

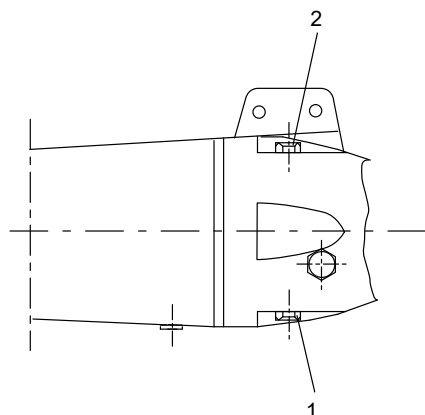
- Remove the screw (2).

- 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.



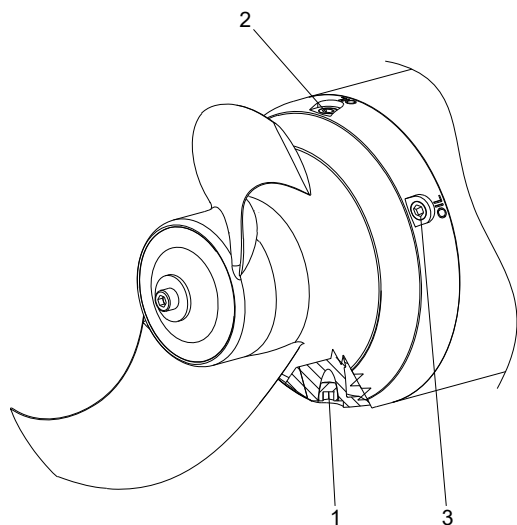
Dispose of used oil in accordance with local regulations.

- Clean and refit the oil drain screw (1).
- Fill oil into the oil chamber through the filling hole (2). For quantity of oil see [Oil quantity](#) and for the quality of oil see [Oil quality, gearbox or shaft seal housing](#).
- Refit the screw (2).



TM029479

Position of oil drain and oil filling screws on SMG and SFG



TM065327

Position of oil drain and oil filling screws on SMD

Pos.	Description
1	Oil drain screw
2, 3	Filling hole

Related information

[9.4.1 Oil quality, gearbox or shaft seal housing](#)

[9.4.2 Oil quantity](#)

10. Storing the product

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

During long periods of storage, protect the mixer or flowmaker against moisture, heat and temperatures below -13 °F (-25 °C).

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

If the mixer or flowmaker is 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 due to natural aging of mineral oil lubricants.

After a long period of storage, inspect the mixer or flowmaker before putting it into operation. Make sure that the blades can rotate freely. Pay attention to the condition of the shaft seals, cable entry and sensors.

11. Fault finding



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
Mixer or flowmaker does not start.	No power supply, or supply failure.	<ul style="list-style-type: none"> • Re-establish the power supply. Start the mixer or flowmaker manually. • Contact an authorized service workshop.
	Power supply cable is damaged.	Contact an authorized service workshop.
	Control system is faulty.	Contact an authorized service workshop.
	Propeller cannot rotate freely.	Clean the propeller blades and make sure that the propeller can rotate freely.
	Stator windings are faulty.	Contact Grundfos.
	Motor has cut out due to overheating.	Wait until the motor is cooled, and try to restart the mixer or flowmaker.
	Different phase voltages.	Contact an authorized service workshop.
	Overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current.
Mixer or flowmaker starts, but stops immediately.	Leakage sensor cut out mixer or flowmaker.	Contact Grundfos.
	Humidity in the motor.	Contact Grundfos.
	Stator windings are faulty.	Contact Grundfos.
	Different phase voltages.	Contact an authorized service workshop.
	Overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current.
No or inadequate circulation produced even if the motor is running.	Leakage sensor has cut out mixer or flowmaker.	Contact Grundfos.
	Humidity in the motor.	Contact Grundfos.
	Propeller rotates in the wrong direction.	Interchange two phases of the main supply.
	Mixer or flowmaker runs on two phases.	<ul style="list-style-type: none"> • Check the electrical connections. • Replace damaged fuses. • Contact an authorized service workshop.
Mixer or flowmaker runs unevenly and is noisy.	Internal parts are worn.	Contact Grundfos.
	Propeller blades are dirty or damaged.	Clean the blades and inspect them for any wear. In case the propeller blades are worn or damaged, contact Grundfos.
	Internal parts are worn.	Contact Grundfos.
	Propeller blades are dirty or damaged.	Clean the blades and inspect them for any wear. In case the propeller blades are worn or damaged, contact Grundfos.
High current and power consumption.	Damaged motor or gearbox roller bearings.	Contact Grundfos.
	Oscillations caused by the installation (resonance).	Check the installation design.
	Wrong voltage supply or supply failure.	<ul style="list-style-type: none"> • Re-establish the correct voltage supply. • Contact an authorized service workshop.
	Power supply cable is damaged.	Contact an authorized service workshop.
	Control system is damaged faulty.	Contact an authorized service workshop.
	Propeller cannot rotate freely.	Clean the propeller blades and make sure that the propeller can rotate freely.

Fault	Cause	Remedy
	Stator windings are faulty.	Contact Grundfos.
	Mixer or flowmaker runs on two phases.	<ul style="list-style-type: none"> • Check the electrical connections. • Replace damaged fuses. • Call an electrician.
	Internal parts are worn.	Contact Grundfos.
	Damaged motor or gearbox roller bearings.	Contact Grundfos.

12. 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	49 ft (15 m) ¹	
Wire length on all winches	33 ft (10 m) (standard)	

¹ The standard cable length is 49 ft (15 m). Other cable lengths are available on request.

The mixers and flowmakers are designed for continuous operation.

12.1 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)

12.2 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)

12.3 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

12.4 Propeller

	SMD	SMG	SFG.xx.51	SFG.xx.59 - 102.xx
Number of blades	2	2	2	2 or 3
Propeller diameter	7-15 in (180-370 mm)	16-39 in (400-1000 mm)	51 in (1300 mm)	59, 71, 91, 102 in (1500, 1800, 2300, 2600 mm)
Material, hub	Polyurethane with stainless-steel hub			Cast iron (EN-GJS-400-15)
Material, propeller	Stainless steel (304)	Stainless steel (304)	Polyurethane with stainless-steel hub	Polyurethane with cast-iron reinforcement

12.5 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.

See also end-of-life information at www.grundfos.com/product-recycling.



The crossed-out wheeled bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.



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



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

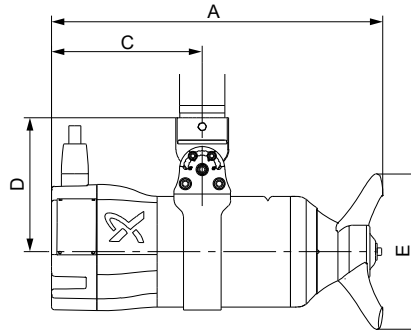


Dispose of used oil in accordance with local regulations.

Appendix A

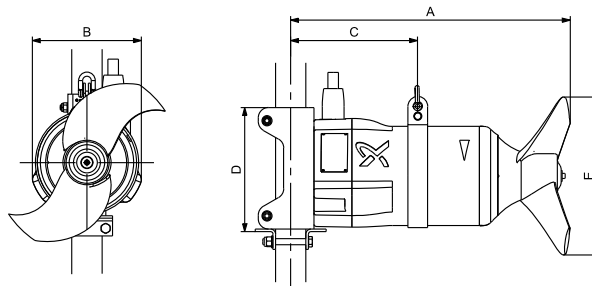
A.1. Dimensions and weights

A.1.1. SMD



TM065319

SMD - Version T



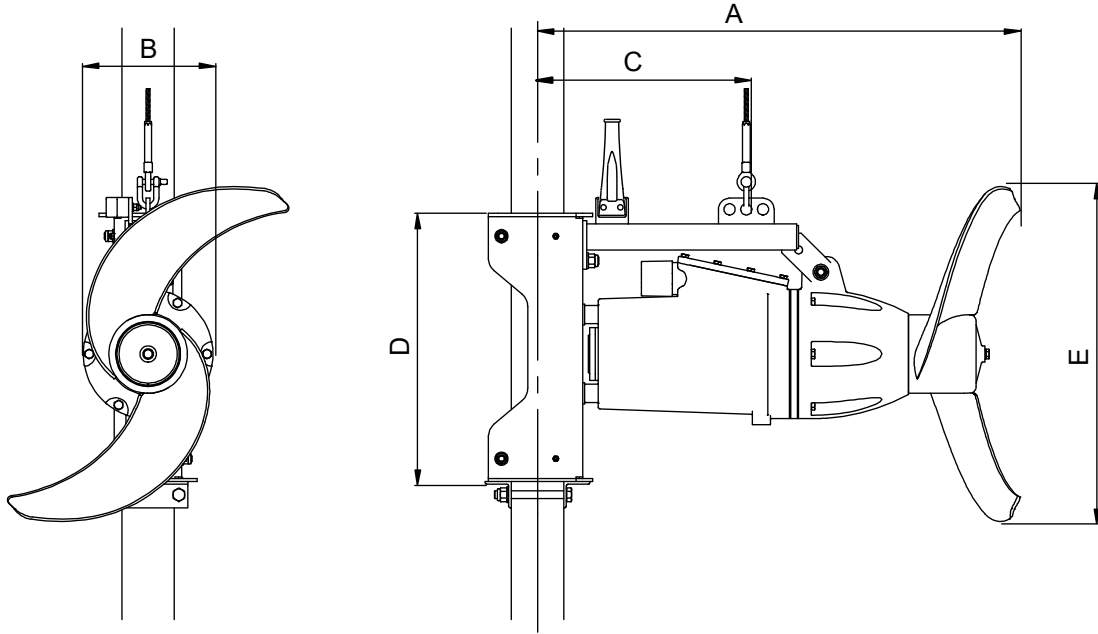
TM065320

SMD mounted on slide

Type	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight ¹ [lb (kg)]
SMD.13.7.1775.T.(Ex)	1.3 (1.0)					7.09 (180)	
SMD.17.8.1765.T.(Ex)	1.7 (1.3)	17.3 (440)	7.09 (180)	7.68 (195)	7.09 (180)	8.27 (210)	84 (38)
SMD.23.10.1750.T.(Ex)	2.3 (1.7)					9.84 (250)	
SMD.13.7.1775.(Ex)	1.3 (1.0)					7.09 (180)	
SMD.17.8.1765.(Ex)	1.7 (1.3)	19.3 (490)	7.09 (180)	8.86 (225)	9.45 (240)	8.27 (210)	89 (40)
SMD.23.10.1750.(Ex)	2.3 (1.7)					9.84 (250)	
SMD.30.11.1182.(Ex)	3.0 (2.2)					11.4 (290)	
SMD.38.13.1178.(Ex)	3.8 (2.8)	21.7 (550)	9.06 (230)	9.45 (240)	9.45 (240)	12.6 (320)	155 (70)
SMD.47.15.1170.(Ex)	4.7 (3.5)					14.6 (370)	

¹ With motor bracket and 49 ft (15 m) cable. Weight of cable: 34 lb/ft (0.5 kg/m).

A.1.2. SMG

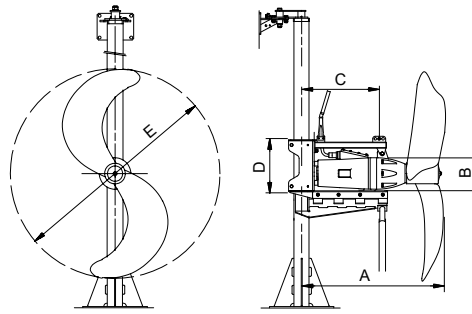


TM024944

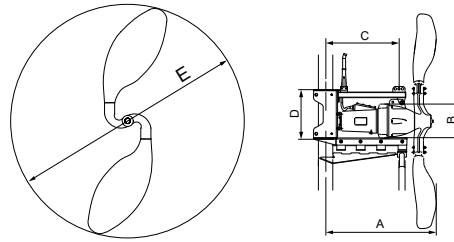
Type	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight ¹ [lb (kg)]
SMG.12.22.276.	1.2 (0.9)	30.7 (780)	7.87 (200)	12.6 (320)	16.1 (410)	21.7 (550)	
SMG.16.25.275.	1.6 (1.2)						179 (81)
SMG.22.25.273.	2.2 (1.6)	31.1 (790)	7.87 (200)	12.6 (320)	16.1 (410)	24.8 (630)	
SMG.27.28.264.	2.7 (2.0)						
SMG.34.28.263.	3.4 (2.5)						
SMG.44.28.315.	4.4 (3.3)	31.5 (800)	7.87 (200)	12.6 (320)	16.1 (410)	28.0 (710)	194 (88)
SMG.55.28.314.	5.5 (4.0)						
SMG.75.34.264.	7.5 (5.6)						
SMG.95.34.263.	9.5 (7.0)						390 (177)
SMG.130.34.318.	13.0 (9.7)	41.3 (1050)	10.2 (260)	16.9 (430)	18.1 (460)	33.9 (860)	
SMG.160.34.317.	16.0 (12.0)						425 (193)
SMG.220.35.345.	22.0 (16.4)	43.3 (1100)	12.4 (315)	18.1 (460)	18.1 (460)	35.4 (900)	624 (283)

¹ With motor bracket and 49 ft (15 m) cable. Weight of cable: 34 lb/ft (0.5 kg/m).

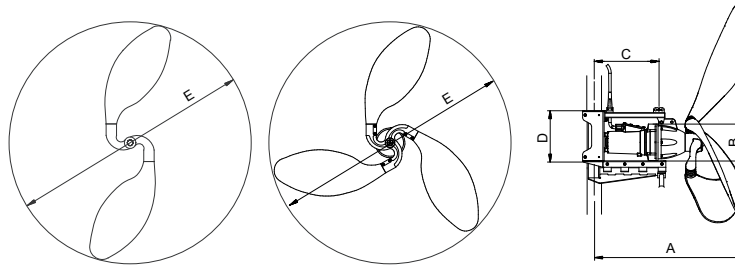
A.1.3. SFG.xx.51-91.xx



SFG.xx.51.xx



SFG.10-39.71.xx - 2 blade



SFG.10-30.91 - 2 blade and SFG.47.71, SFG.55.71, SFG.34-55.91 - 3 blade

TM026346

TM043959

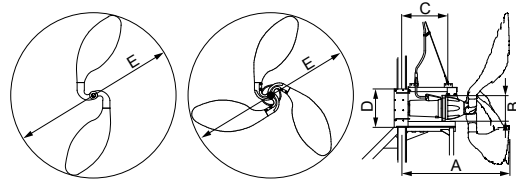
TM026345

Type	Propeller version	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight ¹ [lb (kg)]
SFG.10.51.50.		1.0 (0.7)						
SFG.14.51.57.		1.4 (1.0)						254 (115)
SFG.19.51.64.		1.9 (1.4)						
SFG.23.51.68.		2.3 (1.7)	35.4 (900)	7.87 (200)	13.9 (353)	15.7 (400)	51.2 (1300)	
SFG.30.51.74.		3.0 (2.2)						
SFG.39.51.82.		3.9 (2.9)						265 (120)
SFG.44.51.85.	2-blade	4.4 (3.3)						
SFG.48.51.88.		4.8 (3.6)						
SFG.10.71.32.		1.0 (0.7)						
SFG.14.71.36.		1.4 (1.0)						434 (197)
SFG.19.71.41.		1.9 (1.4)						
SFG.23.71.43.		2.3 (1.7)	47.2 (1200)	11.9 (302)	22.4 (570)	15.7 (400)	70.9 (1800)	
SFG.30.71.48.		3.0 (2.2)						
SFG.39.71.53.		3.9 (2.9)						
SFG.47.71.53.	3-blade	4.7 (3.5)						
SFG.55.71.54.		5.5 (4.1)						496 (225)

Type	Propeller version	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight ¹ [lb (kg)]
SFG.10.91.26.	2-blade	1.0 (0.7)						445 (202)
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.	3-blade	2.6 (1.9)	47.2 (1200)	11.9 (302)	22.4 (570)	15.7 (400)	90.6 (2300)	456 (207)
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.		5.5 (4.1)						

¹ With motor bracket and 49 ft (15 m) cable. Weight of cable: 34 lb/ft (0.5 kg/m).

A.1.4. SFG.xx.102.xx



TM043957

SFG.xx.102.xx - 2 blades and 3 blades

Type	Propeller version	Rated power [hp (kW)]	A [in (mm)]	B [in (mm)]	C [in (mm)]	D [in (mm)]	E [in (mm)]	Net weight ¹ [lb (kg)]
SFG.30.102.29.		3.0 (2.2)						
SFG.43.102.34.	2-blade	4.3 (3.2)						
SFG.48.102.35.		4.8 (3.6)			25.6 (650)		102.4 (2600)	800 (363)
SFG.60.102.38.		6.0 (4.4)	59.1 (1500)	14.2 (360)		23.0 (585)		
SFG.67.102.35.		6.7 (5.0)						
SFG.82.102.38.	3-blade	8.2 (6.0)						
SFG.98.102.40.		9.8 (7.2)			26.8 (680)		104.7 (2660)	922 (418)
SFG.110.102.42.		11.0 (8.0)						

¹ With motor bracket and 49 ft (15 m) cable. Weight of cable: 34 lb/ft (0.5 kg/m).

Uzbekistan

Grundfos Tashkent, Uzbekistan
The Representative Office of Grundfos
Kazakhstan in Uzbekistan
38a, Oybek street, Tashkent
Tel.: (+998) 71 150 3290 / 71 150 3291
Fax: (+998) 71 150 3292

99135312 06.2022
ECM: 1338822