OPERATING INSTRUCTIONS AND SAFETY NOTES

DEF electric diaphragm pump

12 V DC • 24 V DC



FMT nA

80 989 006 A802 US

FMT Swiss AG

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Without our written consent, the content of this documentation (textes, figures, drawings, charts, diagrams etc.), must not be duplicated or distributed, neither in full or in part, utilized for the purpose of competition or passed on/made availabe to third parties.

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Operating instructions translation

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We reserve the right to make design and product modifications, which serve to improve the product.

Table of Contents

1. Introduction 4
1.1. Foreword 4
1.2. Obligations of the personnel 4
1.3. Symbols in this manual 4
1.3.1. Structure of the warning notes 4
1.3.2. Hazard warning symbols 5
1.3.3. General symbols 5
2. Safety notes 5
2.1. Authorized personnel 6
2.2. Notes for maintenance, cleaning and repair 6
2.3. Intended conditions of use 6
2.4. Dangers involved in handling the DEF electric diaphragm pump 7
2.5. Risks in handling DEF solutions 7
3. Transport and temporary storage 8
4. Design and functional description 8
4.1. Area of application 8
5. Technical data 8
6. Installation 9
7. Commissioning and operation 9
8. Preventive maintenance 10
9. Maintenance 10
9.1. Replacing the fuse 11
10. Troubleshooting 11
11. Repair / Service 12
12. Disposal 12
13. Certificate of Compliance 12
14. Mounting dimensions of the electric diaphragm pump (in mm) 13
15. Exploded view of the DEF electric diaphragm pump 14
16. Pump sets for assembly on IBC containers 16
16.1. Design 16
16.2. Assembly on an IBC container 17
17. Pump set for assembly on a barrel 18
17.1. Design 18
17.2. Assembly on a barrel 19

1. Introduction

1.1. Preface

Please carefully read these operating instructions and observe in particular all safety notes!

Our staff will be pleased to provide support if you have any questions about the product.

Yours sincerely, FMT Swiss AG

1.2. Obligations of the personnel

Before they start to work, all persons who are entrusted to work with the DEF electric diaphragm pump, are obliged:

- to follow all applicable regulations on occupational safety and accident prevention.
- to read and to comply with all safety instructions and warning notes contained in these operating instructions.

Please observe the following instructions in the interest of all concerned:

- Refrain from any unsafe working methods!
- Adhere to all hazard and warning notes contained in this manual!!
- In addition to this documentation, keep to all generally accepted safety rules, legal provisions as well as all other binding rules regarding occupational safety, accident prevention and environmental protection!
- Wear appropriate protective clothing in accordance with the work to be done!
- Perform only work for which you have been sufficiently trained and instructed!
- Only genuine spare parts as well as original tools and auxiliaries of the manufacturer are allowed to be used in order to ensure the functional safety and maintain the warranty coverage.

1.3. Symbols in this manual

1.3.1. Structure of the warning notes

The warning notes have the following structure:



SIGNAL WORD

Type and source of the hazard

- Consquences of non-compliance with the notes
- Measures to avoid that risk

Depending on the danger level, different signal words are used:

SIGNAL WORD	Danger level	Consequences of non-compliance
DANGER	Imminent threat of danger	Death or serious bodily injury
WARNING	Possible threat of danger	Death or serious bodily injury
CAUTION	Possibly dangerous situation	Minor bodily injury
ATTENTION	Possibly dangerous situation	Damage to material property



NOTE

Indicates further information or tips which facilitate work

1.3.2. Hazard symbols

Symbol	Meaning
	General hazard symbol. The warning note marked in this way contains supplementary information on the type of hazard.
	This symbol warns of dangerous electrical voltages
	This symbol warns of a hazardous explosive atmosphere

1.3.3. General symbols

Symbol	Meaning
■	A small black square indicates the work you have to perform
–	The dash denotes lists
⇨	The arrow identifies cross-references. If cross-references to other chapters are required within the text, the expression is shortened for reasons of clarity. Example: ⇨chapter 2 Safety instructions This means: please refer to chapter 2 for the safety instructions.

2. Safety instructions

Various dangers may occur if the DEF electric diaphragm pump is improperly handled during installation, commissioning and daily operation.



WARNING

Risk of injury and damage to material property because of improper handling

- Hold the manual at the disposal of the operating staff at the usage site of the unit.
- Country-specific safety measures and accident prevention regulations must be observed.

2.1. Authorized personnel

Only qualified and authorized persons are allowed to operate and to work on the DEF electric diaphragm pump.

Persons are qualified if they are, due to their training, experience, instruction and knowledge of the relevant standards, able to assess assigned tasks and to identify potentially hazardous situations.

These persons must have been authorized by the person responsible for the safety of the unit and must be able to identify and to avoid potential dangers.

All persons charged with installation, operation, maintenance and repair work, must have read and understood this operation manual.

A copy of this operating manual must be stored permanently and ready at hand at the place of usage of the unit.

2.2. Notes on maintenance/cleaning and repair



WARNING

Risk of injury and damage to material property because of improper maintenance and repair

- Keep to the specified inspection and maintenance intervals (⇨**chapter Maintenance)**.
- Should unusual noises occur, immediately stop the electric diaphragm pump. Immediately identify and eliminate the cause in order to avoid consequential damages.
- Observe the safety sheet for DEF.

2.3. Intended conditions of use

The DEF electric diaphragm pump is to be used only for the delivery of DEF (AdBlue®) and water.

The temperature of the conveying liquid must be between -5 °C and +35 °C (23 °F to 95 °F).

The DEF electric diaphragm pump is only allowed to be connected to a suitable power source (see nameplate).

To ensure that usage stipulations are met, read through the Operating Instructions completely before using the pump and observe all stipulations.

Any departure from the usage stipulations (other fluid media, use of force) or user modifications (changes, use of non-original parts) can be dangerous and are considered as non-intended usage.

The user is liable for any damage resulting from non-intended use.

During repairs to any electrical components, the appropriate safety and test requirements are to be observed.

Only genuine replacement parts are to be used for any repairs, because otherwise the warranty will be invalidated.

In order to prevent dirt from entering the pump chamber, it is absolutely necessary to install a strainer with pre-cleaner in the suction line, because otherwise the warranty may be invalidated.

Any application beyond the intended use can lead to hazardous situations and shall be regarded as non-intended use.



DANGER

Risk of injury and material damage from explosive vapors

- **Never use the pump to deliver explosive fluids such as petrol or other fluids with similar flashpoints!**
- Since the motor and the switch are not explosion-protected, the pump must **not** be operated in an explosion risk area!

2.4. Risks when handling the DEF electric diaphragm pump



DANGER

Risk of injury and material damage because of improper installation, electric current or contaminated media

Never work on a pump that is running

- Mount or remove attachments and accessories only when the pump is switched off.
- For your own safety, disconnect the pump in addition from the power supply.

Do not pump contaminated fluids

- Take special care to ensure that there are no contaminants in the fluid to be pumped.
- Install a strainer on the suction pipe.

Damaged attachments and accessories can lead to personal injury and material damage

- Attachments and accessories must be checked for wear, splits or other damage throughout their period of use.
- Damaged accessories and attachments must be replaced immediately.
- With reference to the period of use, please note the details in ZH 1/ A45.4.2 or DIN 20066 Part 5.3.2.

Escaping liquids can cause environmental harm

Comply with the stipulations of the German Water Resources Act (WHG) and of the Plant Regulations of the German federal states.

2.5. Risks in handling DEF solutions

The DEF concentrate is not inflammable, not explosive and not oxidizing.



NOTE

For cleaning, flush equipment with water. Dispose of released contaminated fluid. As a non-hazardous liquid waste, it should be solidified with stabilizing agents. Avoid release to the environment.

DEF is corrosive to non-ferrous metals.

Avoid skin and eye contact. In case of contact with eyes, rinse the eyes with plenty of drinking water and consult a physician.

Observe the safety sheet for DEF.

3. Transport and temporary storage

Do not use the cable to transport the pump**!**

Storage and transport conditions:

- Weather-protected storage with temperature control, protection against frost, moisture and rain. Maximum relative humidity: 80 %
- Storage temperature range from -5 °C to +55 °C (23 °F to 131 °F)

4. Construction and functional description

The self-priming pump is compact and handy. A wide range of FMT accessories are available for quick and easy mounting on each installation.

The materials of the pump are compatible with slightly aggressive liquids like DEF.

The pump is electrically driven by a direct current motor suitable for continuous operation. The pump is directly flange-mounted to the motor.

Pump data ⇨ Chapter Technical Data.

The DEF electric diaphragm pump is available in the following versions:

- **DEF electric diaphragm pump, 12 V, 30 l/min / 7.9 gpm**
- **DEF electric diaphragm pump, 24 V, 30 l/min / 7.9 gpm**

4.1. Area of application

The DEF electric diaphragm pump is only suitable for the delivery of DEF (AdBlue®) and water.

The temperature of the delivery fluids must be between –5 °C and +35 °C (23 °F to 95 °F).
The temperatures must not be above or below these limit values.

Since the motor and the switch are not explosion-protected, the pump must **not** be operated in an explosion risk area!

5. Technical data

Designation	**12 V** **25 281 006**	**24 V** **25 282**
Power cable length (m) / (ft)	3 / 9.84	
Connection suction side	G 1“ male	
Connection discharge side	G 1“ male	
Hydraulic data		
Pump design	Diaphragm pump self-priming	
Delivery rate under free discharge (l/min) / (gpm)	30 / 7.9	
Suction height (m) / (ft)	3 / 9.84	
Discharge pressure up to (bar) / (psi)	1,7 / 24.6	
Pumping media	DEF (AdBlue®), water	
Motor data		
Voltage (V)	12	24
Power consumption (A)	18	9
Power (kW)	0,22	
Fuse (A)	25	
Rotation speed (rpm)	2800	
Type of construction	IMB 5	
Protection class	IP 66	
Material pump housing	PA 6 GF 30	
Dimensions L x W x H (mm) / (inch)	315 x 185 x 130 / 12.4 x 7.28 x 5.11	
Weight (kg) / (lb)	5,8 / 12.7	

Tab. 5.-1: Technical data

6. Installation

The DEF electric diaphragm pump is designed for installations in indoor and outdoor areas.

For outdoor installation, a housing is required as protection against the effects of weather.

4 screws with a diameter of less than 7 mm are required to fasten the DEF electric diaphragm pump (not contained in the scope of delivery).

When installing the pump, ensure that it is mounted on a stable surface. Select a secure location (protected from splash water, damage and theft).

- Remove the plastic plugs from the suction and discharge junctions.
- Fix the hoses to the suction and delivery connectors. Attach the strainer to the end of the suction hose.
- Attach the nozzle valve to the delivery hose.



NOTE

Ensure cleanliness during installation and an exact connection of the accessories with the pump housing.

- Use clamps to connect the pump to a power source according to the specifications on the type plate: 12 V or 24 V.
- Lay the power cable in a way that avoids any risk of stumbling.

Carry out the following steps when connecting the pump to the battery:

- The switch of the pump must be in the OFF position.
- Remove the protection cap from the positive battery terminal (+).
- Connect the red terminal clamp to the positive battery terminal.
- Remove the protection cap from the negative battery terminal (-).
- Connect the black terminal clamp to the negative battery terminal.

Proceed in reverse order when disconnecting the pump from the battery:

At first, disconnect the black clamp from the negative terminal and then the red clamp from the positive terminal. Put the protection caps on the terminals again.



CAUTION

Risk of injury from 12 V / 24 V batteries

- When handling the 12 V / 24 V battery (lead-acid battery), observe the specifications and the material data safety sheet of the battery manufacturer.

7. Commissioning and operation

Check the operativeness of the electric diaphragm pump before use and after a failure-related or scheduled downtime.

Check the DEF electric diaphragm pump and the installed accessories for completeness and damage. Replace any damaged components immediately. Never use a pump if damaged.

Check the suction strainer for damage each time the tank is filled/emptied and replace it if damaged. Never operate the pump without the suction strainer because otherwise the DEF electric diaphragm pump will not be protected against contamination by foreign bodies.

- Hang the suction hose into the container to be emptied.
- Hold the nozzle valve into the container to be filled.
- Operate the rocker switch to switch on the pump.



CAUTION

- Never operate the pump without liquid. The DEF electric diaphragm pump may be damaged by running dry.
- The bypass valve allows operation with closed delivery line only for a short period (for a maximum of 3 minutes).

- Press the nozzle valve lever up according to the delivery rate required, or lock it in position for constant flow.



CAUTION

- The DEF electric diaphragm pump does not switch off automatically, therefore when filling, never let the pump running without supervision.

- For finishing the filling operation, release the nozzle valve control lever. Never operate the pump for longer than 3 min with closed nozzle valve.
- Operate the rocker switch to switch off the pump.
- Position the nozzle valve so that no media can pollute the environment.



CAUTION

Danger of product damage

- The power source must be of the correct voltage for the pump type.

8. Preventive maintenance

In general, the DEF electric diaphragm pump is very easy to maintain and to service.

Due to the operator responsibilities according to § 19i WHG (German Water Resources Act) the following components must be regularly checked and replaced as necessary to minimise the risk of environmental or equipment damage or personal injury:

- Pump housing
- Delivery hose
- Nozzle valve

9. Maintenance

Maintenance must be done by qualified technical personnel. External impact may cause a loss of performance, constitute a risk of damage to persons and/or property and void the guarantee.



DANGER

Direct contact with energized components during various work activities

- For all work, the pump switch must be set to neutral position.
- Maintenance work may only be done by qualified specialists.

Observe the following recommendations for operating the pump:

- Before performing any maintenance work, disconnect the DEF electric diaphragm pump from all electric and hydraulic supply sources.
- Always wear personal protective equipment when carrying out maintenance work.
- If there is danger of freezing, the pump and the circuit must be emptied and stored at a location with a temperature not lower than 0 °C / 32 °F.
- Check to ensure that the labels and decals have not become illegible and have not come loose in the course of time.
- Check at regular intervals that the line connections have not worked loose in order to avoid that liquid escapes.

- Regularly check and clean the suction line filter.
- From time to time, check the pump housing and remove any dirt.
- Check to ensure that the power cables are in perfect working order.
- If the pump is planned to be put out of operation for more than 15 days, completely empty the pump and the system in order to prevent the DEF from crystallizing inside the pump system. Finally, thoroughly clean the pump and the system.

9.1. Replacing the fuse

Open the fuse holder.

Pull the defective fuse out of the fuse holder and replace it by a new one with the same current rating.

Close the fuse holder.

10. Troubleshooting

Malfunction	Cause	Solution
Motor does not run	▸ No power supply	▸ Check the electric connections
Motor is too hot	▸ Incorrect voltage	▸ Verify that the voltage is correct
Motor runs at start slowly	▸ Supply voltage low	▸ Verify voltage
Discharge rate too low	▸ Discharge hose kinked or clogged	▸ Check the discharge hose
	▸ Suction line resistance too high	▸ Suction line too long, kinked, clogged or too many bends ▸ Check the suction filter and the check valve
	▸ Filter resistance too high	▸ Check and clean the suction filter
	▸ Nozzle valve not completely open	▸ Completely open the nozzle valve
Pump runs too loudly	▸ Incorrect voltage	▸ Verify voltage (12 V/12 V; 24 V/24 V)
	▸ Air entry in the suction line	▸ Check the airtightness in the suction line
	▸ Feed quantity too low	▸ Tank almost empty or empty ▸ Dirty suction filter
	▸ Suction tank without pressure compensation	▸ Sufficiently ventilate suction tank, for example by means of FMT vent valve (45 150)
Leak	▸ Defective diaphragm	▸ Replace the diaphragm kit (80 864)
	▸ Defective O-ring	▸ Replace the O-ring (82 869 878)
Pump rotates with difficulty	▸ Deposits or foreign materials in the pump	▸ Clean the pump
	▸ Pump is frozen (temperature too low)	▸ Let thaw the pump and check it for damage. Operating the pump at a too low temperature may lead to damages at the pump or at the motor.

Tab. 10.-1: Troubleshooting

11. Repair/Service

The DEF electric diaphragm pump was developed and produced according to the highest quality standards.

Should a problem develop, despite all quality controls, please contact our customer service:

FMT NA

Phone 1-844-601-9115

12. Disposal

The operating company is responsible for the proper disposal of the pump.

Dispose of in accordance with all local, regional and federal regulations.

Only qualified personnel is authorized to disassemble and dispose of DEF electric diaphragm pump.

13. Certificate of Compliance

Manufacturer:

FMT Swiss AG

Fluid Management Technologies Swiss AG
Gewerbestraße 6
6330 Cham / Switzerland

Declares under his sole responsibility that the machine:

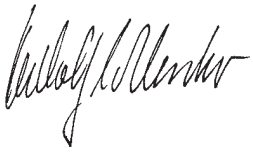
Model type	**DEF electric diaphragm pump 25 281 006 (12 V) / 25 282 (24 V)**
Motor voltage	12 V / 24 V
Power	0,22 kW / 0,22 kW
Function	Conveying of DEF (AdBlue®) and water

Complies with all relevant provisions of the following Directive:	
Applicable standards	CAN/CSA C22.2 No. 108-14–Fifth Edition–Liquid Pumps UL 778–Sixth Edition–Motor Operated Water Pumps

Authorized representative for the compilation of the technical documentation:

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Cham, 30.05.2016



Dipl.-Ing. Rudolf Schlenker

(Managing Director)

14. Mounting dimensions of the DEF electric diaphragm pump (in mm)

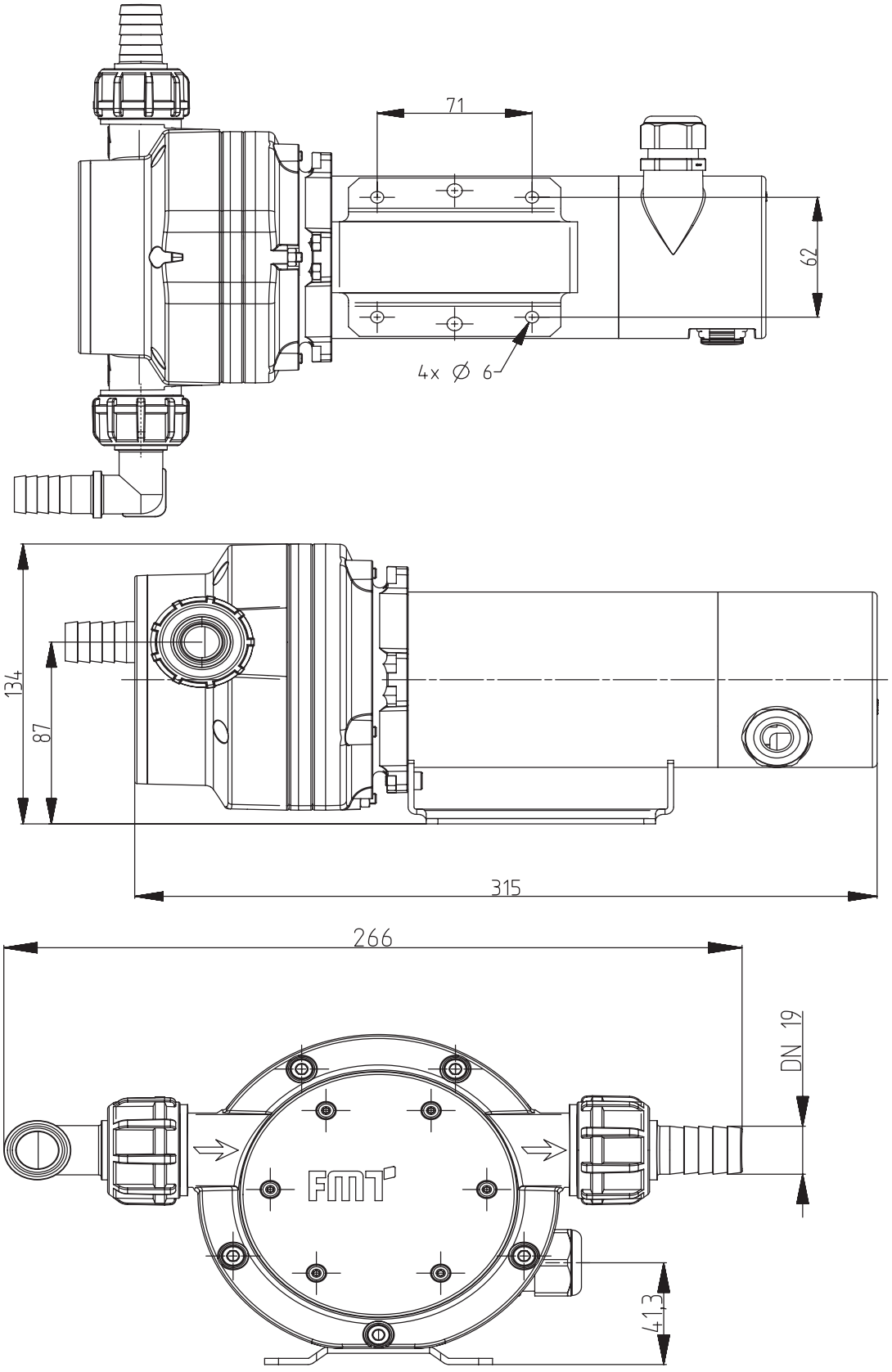


Fig. 14. -1: Mounting dimensions of DEF electric diaphragm pumps (in mm)

15. Exploded view of the DEF electric diaphragm pump

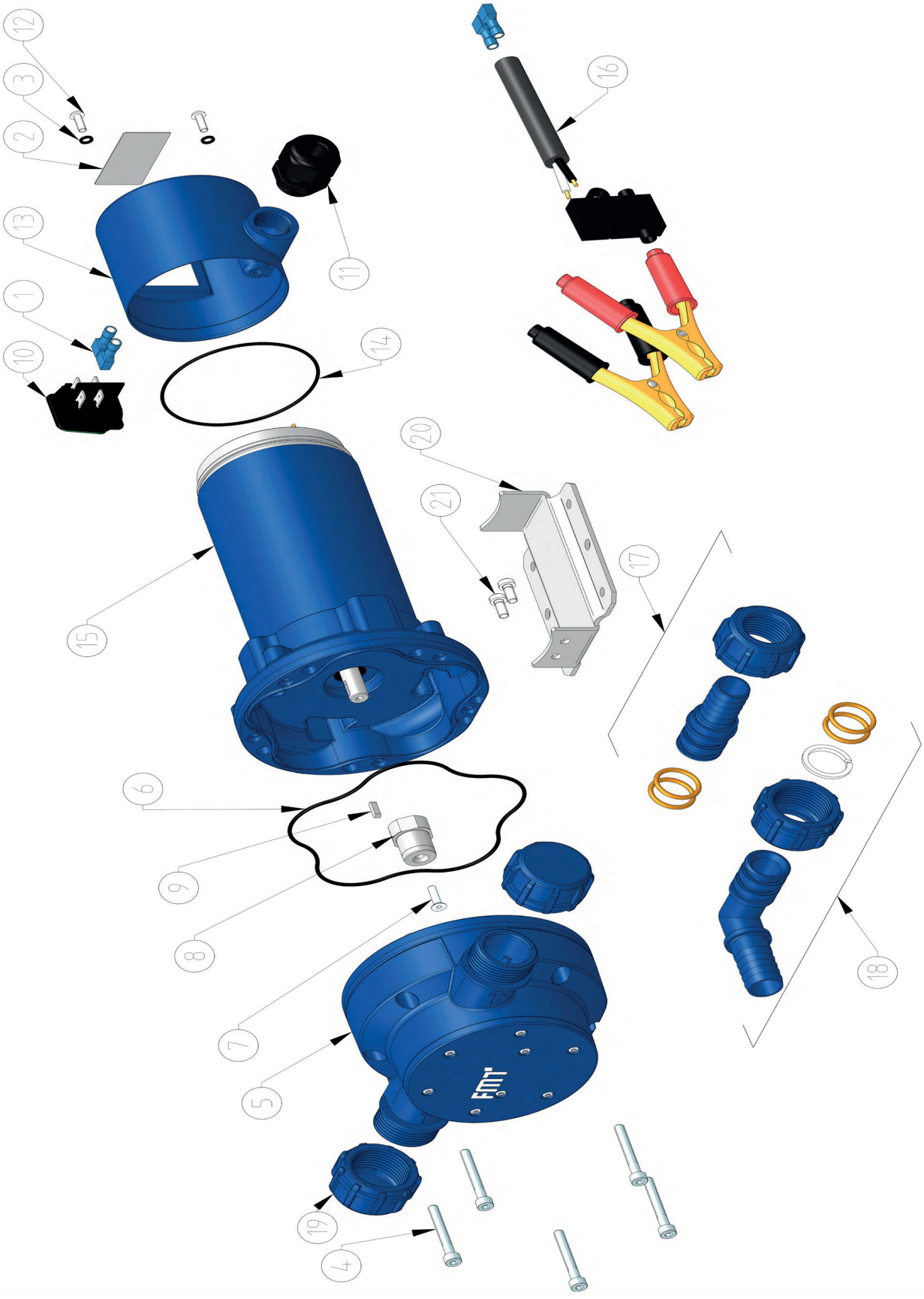


Fig. 15.-1: Exploded view of the DEF electric diaphragm pump

Pos.	Quantity	Description	12 V	24 V
1	2	Cable lug, blue, fully insulated	85 062	
2	1	Plate	89 882	
3	2	Sealing ring	80 638	
4	5	Cylinder screw M 5x55	86 893	
5	1	Spare part for DEF electric diaphragm pump	80 864	
6	1	O-ring FKM 70-Ø120x2	82 869 878	
7	1	Countersunk screw M 4x16	87 087	
8	1	Eccentric flange for 50Hz	82 864	
9	1	Feather key DIN 6885 A	00 602	
10	1	Waterproof switch, black	83 697	
11	1	Cable gland M 20 x 1,5 mm	86 855	
12	2	Fillister head screw M 4x12	00 468	
13	1	Switch housing, cylindrical, radially sealed DEF	80 634	
14	1	O-ring NBR 70-75,92x1,78	80 517	
15	1	ELM-DEF electric diaphragm pump	86 866	80 869
16	1	Cable with clamps and fuse holder	80 725	
17	1	Hose fitting DN 19	25 606	
18	1	Bend 90° with spout	25 601	
19	2	Screw cap G 1“	82 857 001	
20	1	Bracket for pump 12-24V DEF	80 628 878	
21	2	Cylinder screw M 5x10	89 443 878	

Tab. 15.-1: Overview of components for fig. 15.-1

16. Pump sets for assembly on IBC containers

16.1. Design

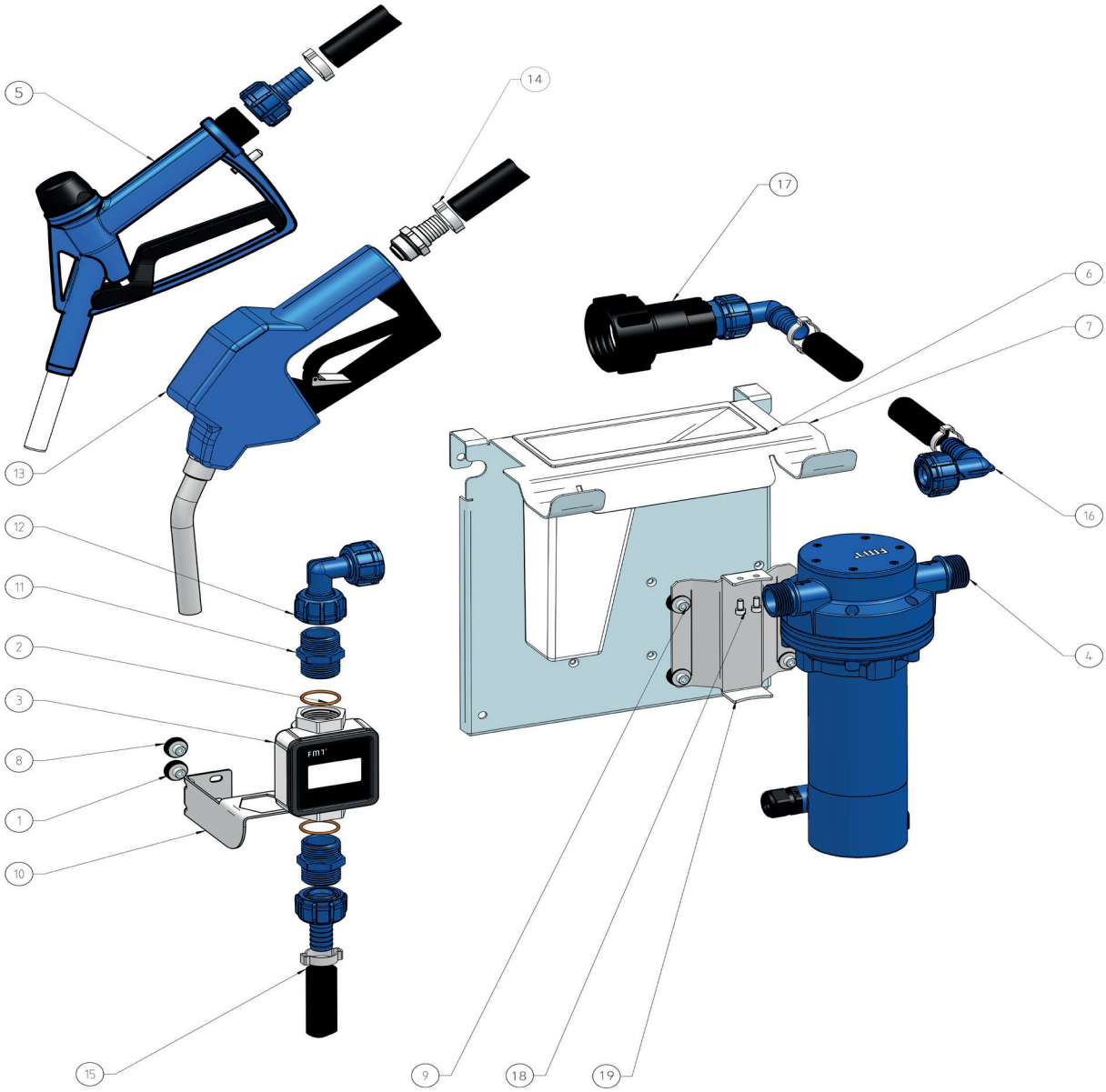


Fig. 16.-1: Design

Pos.	Description	Pos.	Description
1	Washer 6,4x18x1,6	11	Double nipple G 1“ male
2	O-ring FKM 80-29x2,5	12	Bend 90 ° with 2 x union nut
3	In-line meter, digital-NEF	13	Automatic nozzle valve-DEF
4	DEF-electric diaphragm pump	14	2 ear hose clamp
5	Mechanical nozzle valve-DEF	15	DEF discharge hose 6 m / 19.7 ft-DN19
6	Pistol holder	16	DEF connecting hose 2 m / 6.6 ft-DN19-2 x bend 90° G 1“ fem
7	Mounting bracket for IBC	17	IBC adaptor for DEF tanks M64x4
8	NBR vibration absorber	18	Cylinder screw M5x10
9	Hexagon head screws M6x14	19	Bracket for DEF electric diaphragm pump
10	Meter holder for IBC set		

Tab. 16.-1: Overview of the individual parts of fig. 16.-1

16.2. Assembly on a IBC container

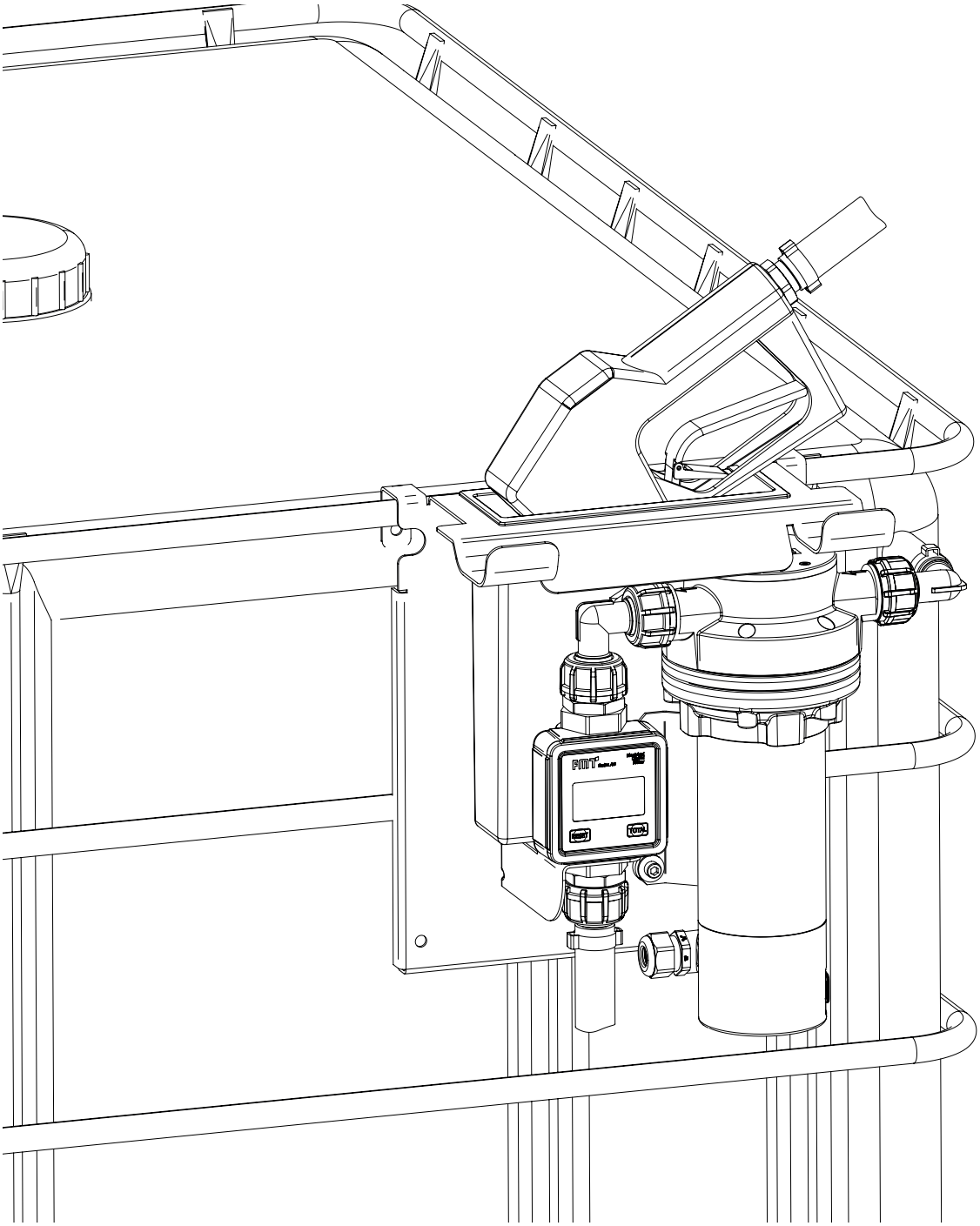


Fig. 16.-2: Assembly on a IBC container

CAUTION

- Ensure a stable and safe fastening of the discharge system during each installation.

17. Pump sets for assembly on a barrel

17.1. Design

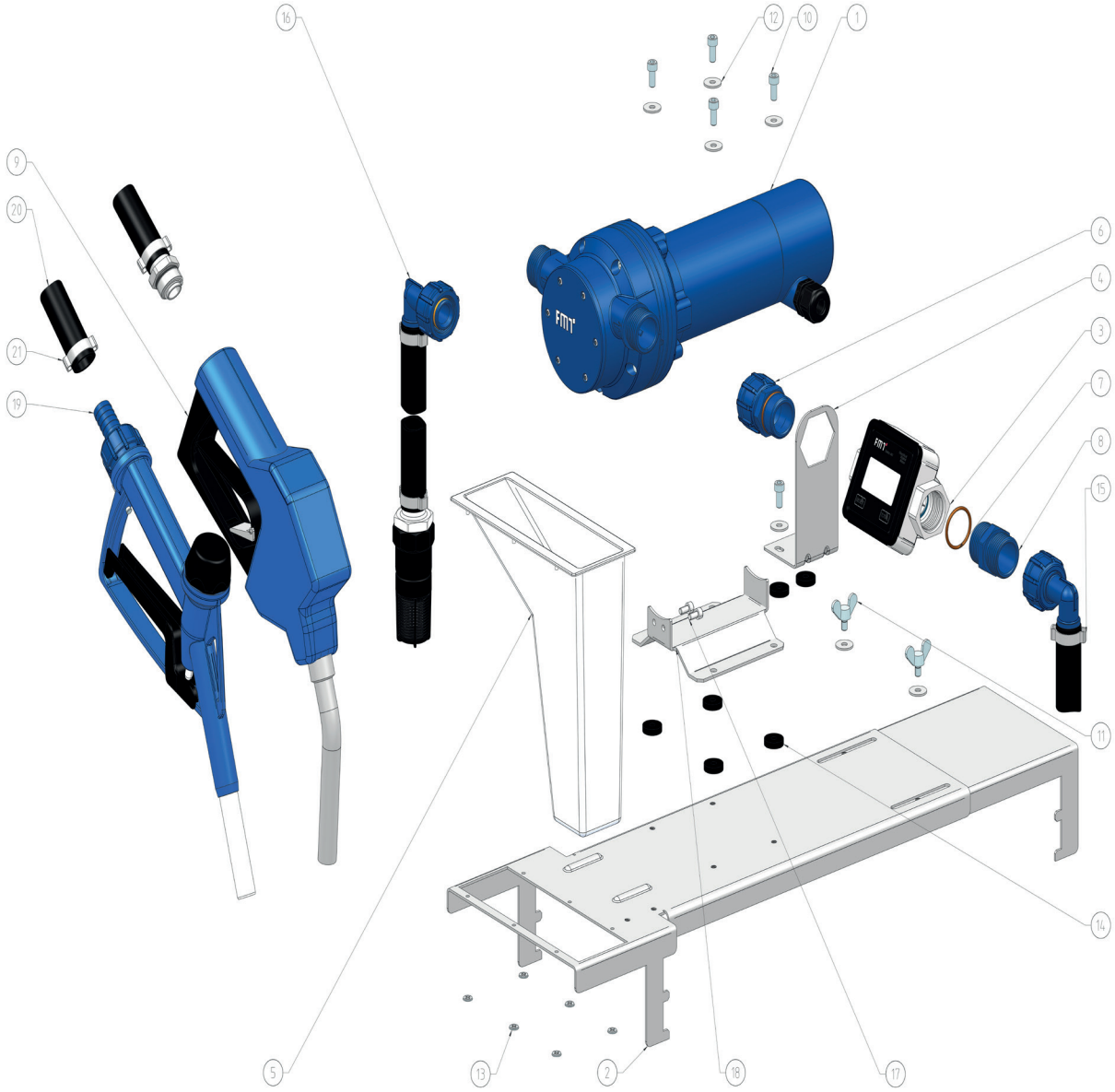


Fig. 17.-1: Design

Pos.	Description	Pos.	Description
1	DEF-electric diaphragm pump	12	Washer 6,4x18x1,6
2	Teleskopkonsole	13	Locking washer
3	In-line meter, digital-NEF	14	NBR vibration absorber
4	Meter holder	15	DEF discharge hose 6 m / 19.7 ft-DN19
5	Pistol holder	16	DEF suction hose 2 m / 6.6 ft- DN 19-bend 90° G 1“ fem with footventil
6	Manifold connection G 1“ fem-G 1“ male	17	Cylinder screw M5x10
7	O-ring FKM 80-29x2,5	18	Mounting bracket for DEF electric diaphragm pump
8	Double nipple G 1“ male	19	Mechanical nozzle valve-DEF
9	Automatic nozzle valve-DEF	20	Discharge hose DN19
10	Screw M6x14	21	2 ear hose clamp
11	Butterfly screw M6x10		

Tab. 17.-1: Overview of the individual parts of fig. 17.-1

17.2. Assembly on a barrel

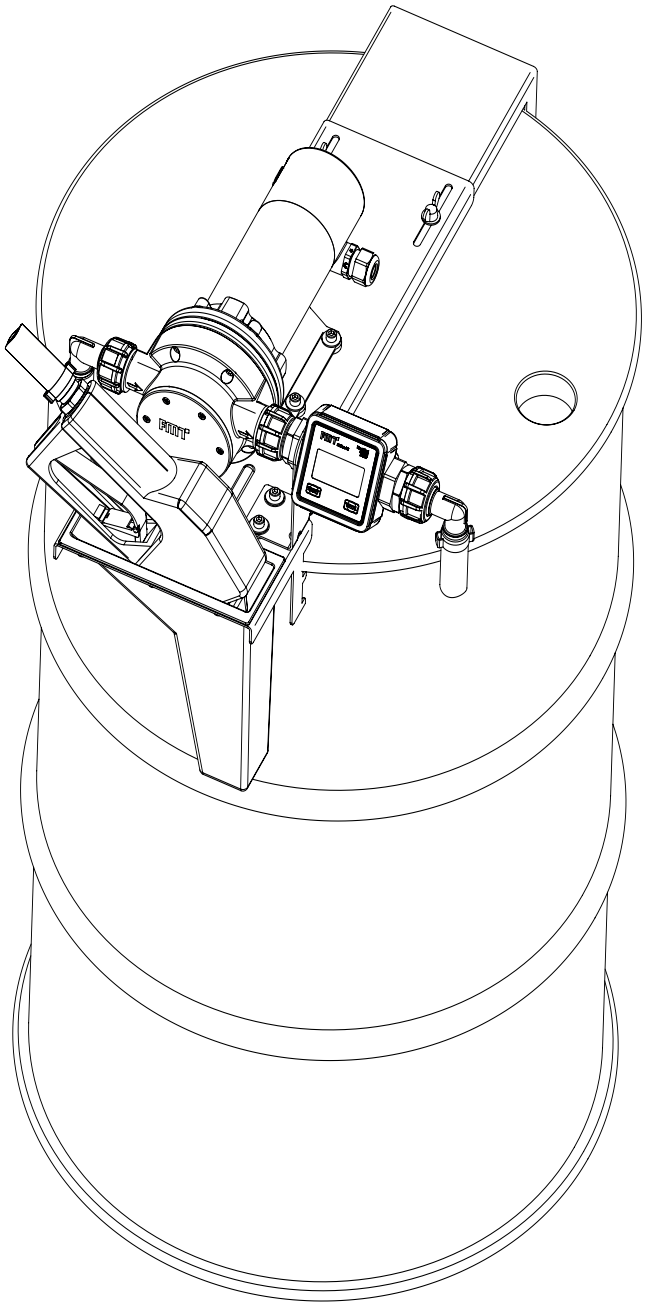


Fig. 17.-2: Assembly on a barrel

CAUTION

- Ensure a stable and safe fastening of the discharge system during each installation.

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