OPERATING AND ASSEMBLY INSTRUCTIONS INSTALLATION, OPERATION, AND MAINTENANCE

DEPA IonTec™
Electrically operated diaphragm pumps

CRANE

www.depapumps.com
www.cranecpe.com

CE EC Declaration of Conformity

within the meaning of the Machinery Directive 2006/42/EC

We hereby declare that the pump units manufactured in series production

Designation:	DEPA IonTec™ Electrically operated diaphragm pumps
Series:	EH
Manufacturer:	Crane Process Flow Technologies GmbH Heerdter Lohweg 63-71 40549 Düsseldorf, Germany, www.depapumps.com
Serial number:	See rating plate details

comply with the following relevant regulations in the version supplied by us:

EC Directive:	Machinery Directive 2006/42/EC
Harmonised standards:	DIN EN 809:2012-10 DIN EN ISO 12100:2011-03

Mr Ralf Rennwanz is authorised to compile the technical documentation.

Crane Process Flow Technologies
GmbH Heerdter Lohweg 63-71
40549 Düsseldorf, Germany

Place, date: Düsseldorf, 05/03/2025

Manufacturer's signature:

Signatory's details: Armin van der Sanden, Site Leader

EC Declaration of Conformity

In accordance with Regulation EC No. 1935/2004 on materials and objects intended to come into contact with food and Regulation EU No. 10/2011 on plastic materials and articles intended to come into contact with food.

The manufacturer	Crane Process Flow Technologies GmbH, Heerdter Lohweg 63-71, D-40549 Düsseldorf, www.depapumps.com

declares that the pump units produced as standard

Designation:	DEPA IonTec™ Electrically operated diaphragm pumps
Types:	EH-SS; -S1S
Sizes:	25
Housing material:	Stainless steel: 316L/1.4404
Diaphragm materials:	DEPA IonTec™ Closed Surface Diaphragms (closed design) nopped E4® PTFE composite diaphragm
Valve ball:	PTFE
Valve seats:	PTFE
O-rings:	FKM/FEP coated

comply with the following relevant regulations in the version supplied by us:

EU regulations:	Regulation 1935/2004, Regulation 2023/2006. and Regulation 10/2011 and above are free from bisphenol-A and phthalate, FCM substance no. 151 and 283 as well
Harmonised standards:	DIN EN 1672-2:2021-05
and international guidelines:	FDA21 CFR 177.2600 (Rubber Articles) FDA21 CFR 177.1550 (Perfluorocarbon Resins) BfR Recommendation XXI (Category 3)

The listed plastic and elastomer items are suitable for reusable contact with all food categories.

The maximum permissible operating temperatures of the respective materials must be observed in accordance with the operating manual.

Place, date:	Düsseldorf, 05/03/2025
Manufacturer's signature:	
Signatory's details:	Armin van der Sanden, Site Leader

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1. General matters

The following instructions only apply to DEPA IonTec™ electrically operated diaphragm pumps. Since the pumps are combined with other assemblies such as sensors or pulsation dampers in use, the operating manuals of those components and any associated safety instructions must be observed as well.

DEPA IonTec™ electrically operated diaphragm pumps are dimensioned as pumps in accordance with Chapter 1, Article 1, Section (2), paragraph (g), point (ii) of the Pressure Equipment Directive. They are, therefore, not counted as pressure equipment within the meaning of the Pressure Equipment Directive 2014/68/EU.
The following instructions only refer to the pump.

⚠ ATTENTION

Since the pumps are combined with other assemblies in the application, such as clutches, gearboxes and motors, the operating and maintenance instructions applicable to these components as well as the associated notices regarding safe operation must be observed.

This manual contains information on the safety, installation, operation, maintenance, repair, and environmentally friendly disposal of DEPA IonTec™ electrically operated diaphragm pumps. Read these instructions with care before use and always observe the information in them.

Persons authorized to install, operate, maintain, or repair the pump must have read and understood these instructions, and in particular the chapter on "Safety", before starting work. This applies in particular to any personnel who only work on the pump occasionally, such as maintenance or cleaning personnel.

Each pump is subjected to a thorough inspection and functional test before delivery.

Remember that the proper function, a long service life, and best operational reliability of the pump essentially depend on

- correct assembly
- correct commissioning
- and properly performed maintenance and repair.

Queries regarding customer service, for spare parts or repairs, please contact the manufacturer or an authorized dealer.

Please always provide the following details:

- Series
- Pump size
- Serial number of the pump

The information can be found on the name plate at the top.

⚠ ATTENTION

Pumps and their parts that are sent to your supplier for repair or overhaul must include certificates that state that the pump and its parts are free from pumped liquids and other aggressive or hazardous substances.

1.1 Warranty

Every DEPA IonTec™ electrically operated diaphragm pump has been tested at the factory to ensure that it is working properly. The manufacturer or authorised dealer assumes the warranty for its product within the scope of the applicable terms of sales and delivery. Any caused by non-compliance with the above guidelines and notices will only be repaired at the expense of the purchaser.

1.2 Transport, unpacking, storage

In order to avoid problems, check the delivered goods for completeness and accuracy based on the delivery note upon receipt of the delivery

- For pumps with drive units, check whether the corresponding instructions for the drive have been enclosed.
- Proceed carefully and according to the following steps when unpacking the pump:
- Check the packaging for transport damage.
- Carefully remove the pump from its packaging.
- Inspect the pump for visible damage.
- Remove the caps from the pump connection pieces.

⚠ ATTENTION

Always observe the weight specifications before lifting the pump. Only use hoists with sufficient load capacity. Never step underneath any suspended loads.

Pumps with drives:
The lifting cable must be placed around the pump body and the motor.

⚠ ATTENTION

To prevent slipping of a sling, cross the rope on the hook.

If the pump is not installed immediately, it must be packed again and stored in a suitable location. For this, observe the following items:

- All connection sockets must be sealed with corresponding plugs.
- The pump must be stored in a clean, dry, and vibration-free location. If an increased amount of dust and humidity is to be expected, the pump must be covered additionally with a material that offers sufficient protection against moisture until it is finally installed.

1.2.1 Packaging and electrical appliances

We are happy to take back packaging and electrical appliances within Germany. Please contact us about this.

1.3 Pump operating principle

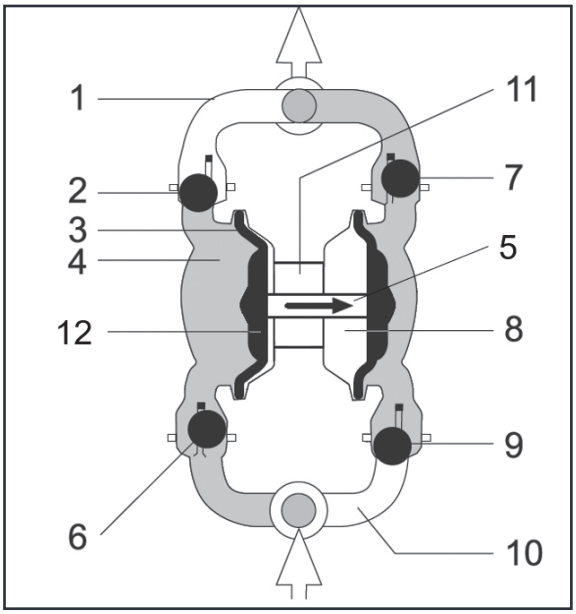
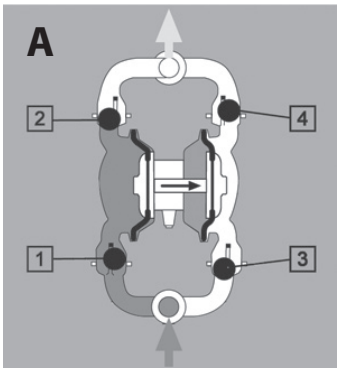


Fig. 1: Pump structure

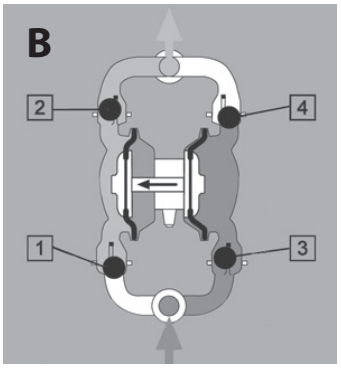
1. Discharge manifold
2. Upper valve ball / (closed during suction)
3. Diaphragm
4. Pump chamber
5. Diaphragm piston
6. Lower valve ball (open – medium flows into the chamber)
7. Upper valve ball (open. Product is pressed out)
8. Chamber
9. Lower valve ball (closed at each transport process)
10. Suction manifold
11. Center block
12. Diaphragm

1.3.1 Function
DEPA IonTec™ electrically operated double diaphragm pumps are oscillating positive displacement pumps with two facing pump chambers. They are separated by a diaphragm into a drive and a medium area each.



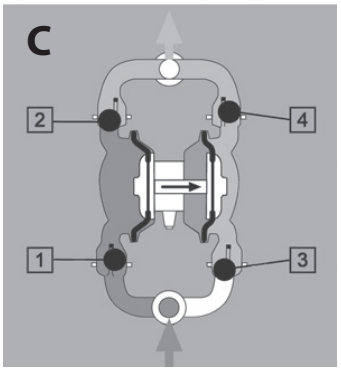
The movement of the diaphragm piston (arrow) presses the right-hand diaphragm outwards. The diaphragm piston pulls the left-hand diaphragm back into its starting position accordingly. The valve ball (1) is sucked out of its position, the medium (grey) can flow into the left pump chamber. At the same time, the negative pressure holds the valve ball (2) in its end position. The left-hand pump chamber thus fills completely with medium (grey).

The two diaphragms are connected by a diaphragm piston so that a stroke will press medium in one pump chamber outwards, while taking in medium in the other pump chamber.



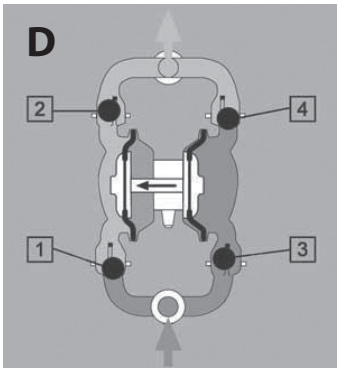
After switching direction of the diaphragm piston (arrow), the medium (dark grey) is now sucked (see B) into the right pump chamber. The medium (light grey) in the left pump chamber is pressed out. The valve ball (1) presses downwards, closes, and the valve ball (2) opens the path for the medium to the discharge.

The four adjacent drawings describe the sequence of a full cycle, comprising a suction and a pressure stroke, an empty and a filled pump chamber.



Process "A" of suction is repeated, except that medium (light grey) is now already in the right-hand pump chamber. By switching the direction of movement of the diaphragm piston medium (dark grey) will be sucked into the left-hand pump chamber and displaced from the right hand pump chamber (light grey).

To illustrate the function, the medium to be transported is marked in colour.



This process is repeated in reverse sequence to the one shown in C. The medium (dark grey) is sucked into the right-hand pump chamber by the negative pressure, while medium (light grey) in the left-hand pump chamber is displaced into the discharge line.

1.4 Technical data

1.4.1 Dimensions, weights, and temperatures

Connection Dimensions and weights of the pump can be found in chapter 8.3, connection sizes and pump weights can be found in chapter 8.4

⚠ ATTENTION

For selection of the correct hoist, multiply the specified weight by a factor of 1.5.

For briefly exceeding the max. continuous operating temperature, please coordinate with your supplier. When operating the pump at higher temperatures, expect the diaphragm service life to reduce.

⚠ ATTENTION

Operation of the pump with simultaneous parameters such as suction heads, pressurization, or operation with chemical media may alter properties in the conveying capacity or mechanical stability of the pump.

Limitations:

- Delivery pressure <> Temperature Reduction of mechanical strength at max. permissible temperature and max. conveying pressure.
- Delivery rate <> Suction head Reduction of the delivery rate as the suction head increases
- Chemical attack Reduction of mechanical strength, impermeability to aggressive media (chemical resistance must be checked).

1.4.2 Temperature ranges and max. operating pressure for housing materials

- See table 2: Temperature ranges for interior fittings and table 3: Temperature range.

1.4.3 Particle sizes and suction heads

The maximum particle sizes listed in the following table must not be exceeded in the pumped liquid to ensure that the pump functions properly.

Sizes	
Grain size (mm)	25
EH25-SS	3.5
Max. suction head [mWs]	
EH25-SS dry	1.5

Table 1: Grain sizes and suction heads

	Metal	
Pump type code	SS/ S1S	FS
Material type	Stainless steel	Aluminium
Min (°C)	The temperature range is limited by interior fittings (see Table 3)	
Max (°C)		
Max. Operating pressure (bar)	6	

Table 2: Temperature ranges for interior fittings

Material	Min (°C)	Max (°C)	Diaphragm	Valve seat	V. balls
PTFE	-20	100	-	•	•
nopped E4® PTFE composite	-10	130	•	-	-

Table 3: Temperature range

The temperature range is determined by the material combination of diaphragms, valve seats, and valve balls made of elastomer or plastic

2.0 Safety

2.1 General

Make sure that the pump is installed in accordance with the applicable national safety regulations. Always observe the relevant accident prevention regulations and implementation instructions. The following precautions must be taken before performing any maintenance work. If the pumped medium is a hazardous or harmful substance, the system must be neutralized and vented.

⚠ ATTENTION

Risk of burns!
Depending on the operating conditions, the pump may reach temperatures that are dangerous to touch. Therefore, switch off the pump and allow it to cool down before touching it.

- Disconnect the main drive unit and pump from the power supply (e.g., pull out the mains plug) and secure the unit before switching it on again.
- Discharge pressure on the pump.

The pump must not be operated while the pump chamber is open. Please ensure that all necessary safety measures have been taken when cleaning the pump manually.

All machines, including pumps, that are incorrectly installed, carelessly operated, or inadequately maintained must be regarded as potential sources of danger.

Failure to observe the relevant safety measures may lead to injury to the operating personnel or damage to the pump. This must be properly fitted before recommissioning for pump systems with a protective cover. The pump must be shut down or not put into operation if any defects are recognized, taking into account operational safety and reliability.

2.2 Danger sources

The pump uses hydraulic energy, which may be subject to high pressure.

When working on the hydraulic system of the pump, first discharge the pressure on it. The pump uses electrical energy.

When working on the electrical system of the pump, disconnect the pump from the power supply first.

Do not change the pressure settings except as specified in these instructions.

Do not remove any safety devices or render them useless by modification.

2.2.1 REACH information on SVHC substances

The following DEPA IonTec™ products do not contain any candidate substances (SVHC = Substance of Very High Concern) in accordance with the European Chemicals Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH, Article 33). This information is based on declarations from our suppliers and, in some cases, material declarations and analyses based on a risk-based approach in accordance with IEC DIN EN 63000.

2.3 Authorized operators

The pump must only be operated, maintained and repaired by authorized and trained persons. Persons under the influence of alcohol, medication, or drugs must not install, operate, maintain, or repair this pump.

2.4 Intended use

The electrically operated diaphragm pump is a working machine that has been specially developed for pumping aggressive, abrasive, and viscous liquids. Any other use is not in accordance with the intended use and will void the warranty.

Observe the manufacturer's operating instructions for the respective drives

2.5 Unauthorized manner of operation

The operational safety of the pump is only guaranteed if it is used as intended. The information in the respective
The limit values specified in the data sheets must never be exceeded.

The pumps are fitted with motors with frequency inverters and forced cooling fans by default.

⚠ ATTENTION

If no forced cooling fan is present or connected, the operating speeds must not be less than 1/2 nominal speed,

2.6 Conversions of and modifications to the pump
No conversions of or modifications to the pump are permitted. The safety devices must never be overridden or changed contrary to their intended purposes.

2.7 Symbols used
The following symbols are used to identify hazardous and special operating situations.

⚠ ATTENTION

**Danger!
Warns of possible
risk of injury and death
if the instructions are not
observed.**

**Attention!
Warns of dangerous
electrical voltage.**

**Warning!
Warns of possible
Damage to the system.**

Touching live parts may cause death. Doors and covers (e.g., bonnets and lids) that are marked with this sign must only be opened by "qualified personnel or/and instructed persons" after the respective operating voltage (supply, operating, or external supply voltage) has been deactivated.

**Notice:
Provides useful advice on how to use the product optimally and economically.**

**Environment:
Provides advice on environmentally friendly handling of the product.**

**Explosion hazard:
Provides special instructions regarding the handling of explosive media
or use in explosive environments.**

**Danger:
Warns of corrosive substances.**

2.8 Maintenance and repair work
Maintenance and repair work must only be performed by qualified and authorized persons. This applies in particular to any work on electrical, hydraulic equipment and the handling of hazardous liquids and substances.

Pumps used to transport media that are hazardous to health must be decontaminated.

Unauthorized persons must be kept away from the pump.

Mechanical and electrical repairs and improvement must only be performed by adequately qualified personnel. Professional execution is to be confirmed by a competent and responsible "inspector".

Shut down the system before performing any repair or maintenance work.

Always check that the pump is depressurized and disconnected from the power supply before starting any maintenance or repair work.

Always protect the pump against unintentional or unauthorized restarting. For this:

- Close the switch or shut-off device and secure it against reactivation.
- Attach a warning sign to the pump.

The owner is responsible for compliance with the accident prevention regulations applicable at the place of use.

Maintenance, adjustment, and repair work must only be performed using admissible and suitable tools and aids to avoid injuries.

Any moving parts must be stopped before working on them. It must be ensured that they cannot start moving during work.

2.9 Safety information for electrical equipment
The pumps may be equipped with additional electrical devices (controls, sensors, etc.), depending on the version.

Severe injury or property damage may occur in the event of:

- unauthorized removal of covers
- improper use of the pump
- inadequate maintenance

Any electrical systems must be disconnected from the power supply before performing any installation work.

Always prevent accidental contact with any open or exposed live cables and plug connections.

Never not put electrical parts that will be stored for long periods of time into operation without first testing the insulation.

Parts that were not live while dry may become live when electrical system parts or components become wet.

Check whether touchable parts are live by measuring before touching a damp electrical component.

Connect the supply cable to earth after disconnecting the voltage and short-circuit components, e.g., capacitors, via a discharge combination when working on high-voltage groups.

Never try to insert objects through the openings on the pump or the additional devices. Short circuits and electric shocks with danger to life and limb are the result.

2.9.1 Safety information for working on pressurized lines
Any pressurized lines must be depressurized before working performed on them.

- Close the shut-off valves
- Vent the lines

⚠ ATTENTION

Take care when searching for leaks on pressurized lines. Fluid or air escaping under pressure may penetrate clothing and skin. Pay attention care when loosening or replacing any discharge lines; swapping lines may cause incorrect function.

Hydraulic systems must be depressurized, and any moving parts must be moved to a secured home or parking position before any work is performed on them.

Take care when handling hazardous (corrosive, harmful) liquids.

- Always wear personal protective clothing (e.g., gloves, safety goggles, waterproof clothing).
- Consult a doctor immediately in the event of skin contact, inhalation of harmful vapours or splash contact with the eye.

2.9.2 Lubrication regulations and instructions
All lubrication work must only be performed by authorized persons. Proper execution must be approved by a competent "inspector". Work on machines or devices or in their vicinity must never be permitted to any unauthorized persons.

Do not bring any lubricants and oils into contact with naked flames or glowing parts.

The specific regulations and lubrication instructions of assemblies and components (e.g., engine, gearbox) must also be observed in accordance with the manufacturer's specifications in the respective operating manual when working on such elements.

The system must always be switched off and shut down before any lubrication work and secured against accidental or unauthorized start-up.

Only authorized and suitable tools and aids must be used for lubrication work to avoid injuries.

Ensure that they are stationary and cannot move during work before working on rotating or moving parts.

Never reach into any rotating parts and maintain a sufficient safety distance so that no items of clothing or hair can be caught.

Avoid skin contact with oils and grease
Wear protective clothing.

The safety regulations specifically applicable to these substances must be observed for particular lubricants, e.g. flame-retardant hydraulic fluids. (See packaging labeling and manufacturer's instructions).

2.10 Personal protective equipment
Suitable protective clothing appropriate to the hazard must be worn at all times, in particular when performing cleaning, maintenance, and repair work. The following protective clothing must be worn depending on the type of work:

- Protective suit
- Safety goggles or face shield
- Hearing protection
- Safety helmet
- Safety shoes
- Gloves

Full face shields must be worn in every situation where there is any risk of chemicals, splinters, or dust entering the field of vision during work.

⚠ ATTENTION

The pump may generate plenty of heat during operation. Switch off the pump and let it cool off before touching it

2.11 Safety information for pressurised lines

Take care when handling hazardous (corrosive, harmful) liquids.

Any pressurized lines must be depressurized before working before working on them. For this:

- Close the shut-off valve
- Vent the lines

⚠ ATTENTION

Caution when searching for leaks in lines under pressure. Liquids or air escaping under pressure may penetrate clothing and skin and cause serious injuries. Pay attention care when loosening or replacing any discharge lines; swapping lines may cause incorrect function.

Moving parts must be moved to a secured home or parking position. Always wear personal protective clothing. Consult a doctor immediately if any hazardous substance comes in contact with your skin or eyes or if you inhale any vapours of such a substance. Do not touch the pump and the pipes in operation. Risk of burns!

Environment: Always collect chemicals and hazardous substances in an environmentally friendly manner and dispose of them accordingly.

Do not expose the pump to strong, sudden temperature fluctuations. This may cause the pump to leak. Tighten the screw fittings or mounting flanges!

2.12 Safety during storage
Chemicals must always be stored and dispensed in accordance with the applicable regulations!

2.13 Noise emission
A room with several pumps may be very loud. The following measures must be taken accordingly, depending on the sound pressure level:

below 70 dB (A): No special measures needed.

above 70 dB (A): People who are constantly in the room must wear hearing protection.

above 80 dB (A): Room with danger from noise!

There must be a warning sign at each entrance informing people that they must always wear hearing protection when entering the room.

The measured average sound pressure level Lp [dB(A)] in accordance with DIN EN ISO 20361 at a distance of 1 m and a delivery head of 60 m for the EH25-SS-ZEE pump (medium: Water, speed: 750 1/min, temperature: 20 °C) 90 dB(A).

The average sound pressure level may deviate if the pump design, pump size, or operating conditions differ.

3.0 Installation

3.1 Observe before installation

1. Installation must only be performed by persons who meet the requirements for this (see chapter 2 "Safety").
2. Align the pump precisely before installation and then mount it without tension. Pipes must be installed in such a way that the dead weight of the lines does not rest on the pump.
3. New systems must not have any assembly residues (welding beads, wire, etc.) in the tank or pipe system in order to prevent damage to the pump.
4. Keep the arrangement of the pump with regard to suction and delivery head in mind.
5. The pump system must be designed to match the application requirements. Valves or gate valves should be installed as close as possible to the pressure connection. This also applies to T-fittings with a valve for bypass control as well as to pressure relief valves, pressure gauges, flow control valves and shut-off valves.
6. Alignment between the pump with the pipes must be checked carefully to avoid tension that would cause premature wear.
7. All pipe connections must be checked for leaks. This applies in particular to the suction line to prevent air ingress.
8. If the liquid to be pumped contains larger solids than permitted in Table 1 in section 1.4.3, a filter must be used. This must be sized to keep changes to the resistance at the pump inlet low. The filter must be constantly checked and cleaned if necessary. Connect the suction strainer upstream.
9. Liquids subject to changes in viscosity must be constantly stirred or the container must be fitted with a temperature monitor. If the viscosity increases, switch on the agitator and/or heating. This is particularly important in intermittent operation!
10. The fastening elements (e.g., screws and nuts) on the pump must be tightened before initial commissioning. The torques specified in chapter 8.5 must be observed.

3.2 Layout and arrangement of the connecting cables

The cross-section of the pipes must be designed so that the flow velocities in the discharge line are between 1 and 3 m/s and in the suction line between 0.5 and 1.5 m/s (see chapter 8.3 Connection dimensions).

⚠ ATTENTION

Conveying flammable liquids. At flow speeds > 7 m/s, experience has shown that no dangerous charges are to be expected (TRGS 727).

The compressed air supply must not have a smaller cross-section than the connection to the pump.

Provide a suction and a shut-off device on the pressure side for easy removal of the pump.

- The weight of the pipes must be supported upstream of the pump.
- Expansion compensators must be fitted to absorb pipe expansion due to increased temperature.

It is recommended that a flexible, dimensionally stable, and pressure-resistant wear part or an expansion joint (see Fig. 2) is fitted to the suction and pressure side of the pump. This prevents pulsation surges from being transmitted to the pump.

3.3 Positioning and installation options for the pump

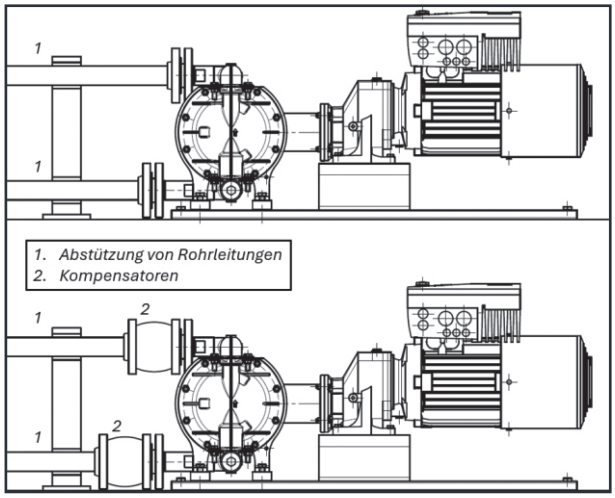


Fig. 2 Setup suggestion for diaphragm pump

3.3.1 Foundations

No special foundations are required. Each pump must be fixed to the floor with dowels. The pump unit must be set up and secured on a horizontal base that can support the weight of the pump.

As this is a positive displacement pump, it must be ensured that there are no closed shut-off devices, pipes tapers or components on the pressure side that may lead to blockages in the line system

3.4 Electrical connection

An on/off switch with a safety device to prevent reactivation (e.g., lockable switch, switch with removable lever) is required near the pump.

All electrical connection work must only be performed by a qualified electrician.

We recommend installing a removable pipe (e.g., a wear part or a line) approx. 1 to 1.5 m long between the pump connections and the pipes to make maintenance work easier (see Fig. 2: Setup suggestion for diaphragm pump). This provides the necessary installation space when replacing the pump's wear parts.

3.5 Connection of suction and discharge lines

Electrically operated diaphragm pumps are positive displacement pumps that have a pulsating flow rate. Expansion joints should be installed on the pressure and suction side (see Fig. 2 Installation suggestion for diaphragm pump) to prevent the pressure surges from being transferred to the pipes. An active pulsation damper may also be used in the discharge line to minimize pulsation. These must be adjusted to the respective work area. The installation instructions of the respective manufacturers of the expansion joints and pulsation dampers must be observed to achieve optimum results.

Connect the suction and discharge lines so that no further forces are transmitted to the pump manifolds. The tightening torque of the fastening screws and the pressure resistance of the manifolds and flanges must be observed when installing the suction and discharge line. Check the system for leaks after installation. For the connection of suction and discharge lines on pumps with a cylindrical internal thread (abbreviation G, standard version ISO 228-G),

- Fittings with cylindrical external thread (not sealing in the thread) or
- Fittings with tapered external thread (abbreviation R, sealing with sealant in the thread) can be used optionally.

A suitable seal must be used between the sealing surfaces outside of the threads (screw-in spigot in accordance with DIN 3852) for fittings with a cylindrical external thread.

The thread can be sealed using a suitable sealant (e.g. PTFE tape) for fittings with a tapered external thread (in accordance with DIN EN 10226, R-tapered). For connection dimensions see chapter 8.3.

3.6 Pump in suction mode

DEPA IonTec™ Electrically operated diaphragm pumps are dry self-priming. A suction head of up to max. 9 m Ws can be achieved, depending on the pump design when the suction line is full (Table 1: Particle sizes and suction heads in chapter 1.4.3).

3.7 Pump in submersible mode

The DEPA IonTec™ electrically operated diaphragm pumps are not submersible.

3.8 Pump with inlet pressure

Avoid excessive inflow on the suction side. This will cause the pump to run irregularly and generate a lot of noise. This will reduce performance and the pump's service life. The maximum inlet pressure on the suction side must not exceed 0.7 bar.

3.9 Equipotential bonding / earthing

Pumps, pulsation dampers, and accessories must always

be earthed or provided with potential equalization in the event of possible electrostatic charging caused by the medium and when used in potentially explosive areas. Pumps and pulsation dampers can be fitted with an earthing screw for this purpose.

3.10 Vibration distance
During installation, a sufficient distance of at least 10 cm must be maintained between the pump and other components, with the exception of connections.

4.0 Operation

4.1 General
Once the suction and discharge lines have been connected correctly and the power supply has been connected, the pump is ready for operation.

Ensure that the diaphragm is not subjected to a differential pressure greater than 6 bar.

Do not expose the pump to sudden temperature fluctuations. This may cause the pump to leak.

⚠ ATTENTION

Do not touch the pump or pipes. Risk of burns!

Always wear personal protective clothing when handling chemicals.

Always observe the applicable regulations when storing and dispensing chemicals.

Dispose of chemicals in accordance with regulations.

4.2 Switching on the pump

The empty pump must never be abruptly charged with a high pressure.

The pump will start transporting medium as soon as the motor is turned on.

4.3 Observe the following before commissioning

Check:

- that the maximum permissible temperature of the pumped liquid is not exceeded. See chapter 1.4.2 Temperature ranges and max. operating pressure for housing materials
- that the maximum permitted delivery pressure of 6 bar is not exceeded. Install a pressure relief valve or sensor if necessary.
- whether the pump is properly installed and connected,
- whether the wear parts in the pump are suitable for the intended medium,
- whether the suction and discharge lines are properly screwed on,
- whether the switches and power connections for the drive are properly connected,
- whether the pump is earthed to prevent electrostatic charges,
- that the ventilation opening on the gearbox is not clogged or closed,
- An overcurrent relay must be installed for the electric motor of the pump and the forced cooling fan. The wiring diagram in the terminal box of the motor and its operating instructions must be considered,
- Cables and connection terminals are located in the terminal box of the motor for motors with thermal circuit breakers. These must be connected in such a way that the motor is stopped when the switch is triggered.
- The forced cooling fan is connected and working.

4.4 Commissioning
Commission the drive unit in accordance with the operating instructions. Check lubrication of drive unit. Geared motors and variable speed gearboxes are equipped and filled with grease lubrication as standard. The oil in the gearbox housing must be checked or filled before commissioning in the case of oil lubrication.

Ensure that all protective devices are installed and operational.

The electrically operated diaphragm pump may be used against closed shut-off valves.

4.4.1 Switching on
The pump will start up when the operating switch for the drive is switched on.

4.4.2 Switching off
Switch off the operating switch for the pump.

4.4.3 Decommissioning

Always observe the safety instructions in chapter 2 of this manual.

The pump must only be decommissioned, for example for maintenance, assembly, or cleaning work, by authorized specialists.

4.5 Delivery rate control
The pump's delivery rate is controlled via the frequency inverter. It is recommended that the pump be operated at the lowest possible stroke frequency to protect wear parts, such as diaphragms, ball valves, and the drive, as well as the environment.

The speed will be reduced to zero when the adjustable maximum pressure is reached. This feature makes it possible to operate the pump even with a closed valve on the pressure side.

⚠ ATTENTION

The maximum pressure is as standard set to 6 bar

The pump must not be operated at pressures above 6 bar.

Ensure that downstream system components are designed for this pressure before operating the pump.

4.6 Switching off the pump
Pump is ramped down via the frequency inverter to turn it off. The pump will not stop immediately.

Warning!
If the pumped medium is an aggressive substance, the pump must be flushed or cleaned after use. Observe the cleaning instructions.

4.7 Behaviour in emergency situations
The pump must be switched off immediately and, if necessary, secured against being switched on again in an emergency situation.

4.8 Diaphragm rupture monitoring
Pumped liquid will enter the pump chamber, to be detected by the integrated sensor, in the event of a diaphragm defect. Depending on equipment variant.

4.8.1 Conductive diaphragm rupture monitoring
A current flow is measured between the two electrodes via the conductivity measurement when conveying a conductive medium. The evaluation unit supplies the sensor with voltage and switches a relay above a certain current (<1 mA), which switches off the pump or gives an alarm signal.

The pumped liquid must have a minimum conductivity of >5 µS.

4.8.2 Capacitive diaphragm rupture monitoring
Diaphragm rupture monitoring for non-conductive media requires the use of a capacitive sensor system.

4.8.3 Diaphragm rupture sensors and deactivation at leaks
Diaphragm rupture sensors turn off the pump via the frequency inverter if a leakage occurs due to a rupture in the diaphragm. The electrical connections can be found in the circuit diagram in the operating instructions for the frequency inverter.

4.9 Pulsation damping
Electrically operated diaphragm pumps are double-acting, oscillating positive displacement pumps and therefore produce a pulsating flow. We recommend use of pulsation dampers to minimise pulsations. Various designs are available, active and passive, made of metal and plastic, with and without diaphragm in several sizes. These must be set manually or automatically on site depending on the prevailing pressure conditions.

4.10 Downtimes
The pump chambers must be flushed before the pump is switched off if the pumped liquid contains any solids, chemicals, or oils. This prevents the settling of solids or chemical attack and thus the destruction of the diaphragms when restarting.

4.11 Decommissioning
The pump will stop when the power supply is switched off. Since the suction and pressure-side valve balls act like non-return valves, the rising part of the discharge line will remain filled with product. Please note that there may be medium in the pump during disassembly of the pump.

4.12 End-of-life disposal

The metallic components used – aluminium, stainless steel, and steel – can be recycled. Polypropylene plastic parts can be recycled and should be collected and disposed of separately. Any other plastic parts cannot be recycled and must be disposed of as residual/ special waste.

5.0 Maintenance

⚠ ATTENTION

Observe the safety instructions in chapter 2.0 Safety for all maintenance work and conversions!

Any work not described in that chapter is not covered by maintenance and must only be performed by the manufacturer as part of a repair or authorized by the manufacturer.

5.1 Basics before maintenance

Regularly check all lines and screw fittings for leaks and visible external damage!

Remove any damage at once!

Ball bearings and sealing rings in the center block are lubricated for life.

Maintenance of the drive and clutch must be performed in accordance with the instructions in the respective manufacturer's operating manual

⚠ ATTENTION

Before starting maintenance work, pumps with electric drive always must be turned off and disconnected from power supply!

Before opening the pump housing, the pump must be flushed where aggressive, corrosive, or toxic media are used.

5.2 Control intervals

- Visual inspection at least once a week, depending on the application.
- Disassembly and replacement of wearing parts every 4 weeks to 6 months, depending on the type and/or duration of use.
- Since PTFE deforms under pressure, the pumps listed below must be checked regularly for leaks and the screw fittings tightened if necessary (for tightening torques, see chapter 8.5):

Type	Control interval	Screw connection
EH-SS/S1S/FS	monthly*	manifold/pump chamber

Table 4: Inspection intervals
* The test interval can be significantly reduced if the media temperatures fluctuate greatly.

5.3 Cleaning

⚠ ATTENTION

Always observe the safety instructions in Chapter 2 "Safety".

Check all lines and screw fittings regularly for leaks and visible external damage! Remove any damage at once!

⚠ ATTENTION

The pump must be flushed with a neutral medium before opening if any aggressive, corrosive, or toxic media are used.

When working with solvents and/or cleaning agents, always wear protective clothing.

The following generally applies:
Mechanical cleaning of the pump is preferable to cleaning with chemical agents. Compatibility with the pumped medium must be ensured when using chemical cleaning agents.

5.4 Disassembly and assembly

⚠ ATTENTION

The pump must be disconnected from the power supply and removed from the system before disassembly.

5.4.1 General

The work described below can be performed independently and the defective assemblies and parts can be replaced easily if the pump is damaged. Please note that the manufacturer or authorised dealer can only accept any warranty claims if the unopened unit is presented.

Only use original DEPA IonTec™ spare parts for repair work; otherwise all warranty claims will be void.

5.4.2 Replacing diaphragms, valve seats, valve balls

Electrically operated diaphragm pumps can be supplied with different elastomer materials depending on the application. The following materials are available for this purpose:

- NRS marked yellow
- NBR marked red
- EPDM marked blue
- FKM (Viton®) marked white
- PTFE (polytetrafluoroethylene) without marking

The specified colour markings only apply to valve balls and valve seats.

The diaphragms are marked with specific material codes to distinguish them. Please check whether the material corresponds to the delivery condition (see pump name plate) and is suitable for the respective application (see resilience list) before installing a new set of diaphragms, valve seats, and valve balls. A different material must be used if the defective parts in the pump were not damaged by normal mechanical wear but show signs of chemical damage. The pump must be sent to the manufacturer in this case.

5.4.2.1 Disassembly of the manifolds and pump chamber

- Loosen and remove the pressure connection screws (upper connection) (Fig. 3).
- Remove the valve balls from the pressure port
- Loosen and remove the suction manifold screws (Fig. 3)

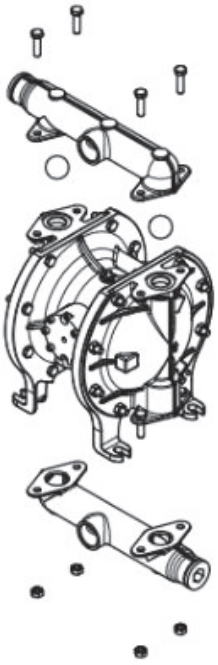


Fig. 3: Disassembly of the manifold and valve balls in the discharge manifold

- Loosen the screws of the pump chambers (Fig. 4)
- Remove the pump chambers.

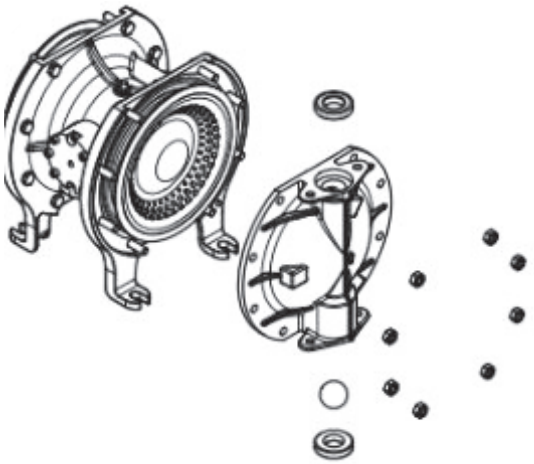


Fig. 4: Pump chamber Disassembly incl. valve seats and balls

5.4.2.2 Disassembly of the diaphragm

- Unscrew the nopped E4® diaphragm by hand. (Fig. 5)
- The grub screw will remain in the diaphragm and must also be replaced as it is glued in.

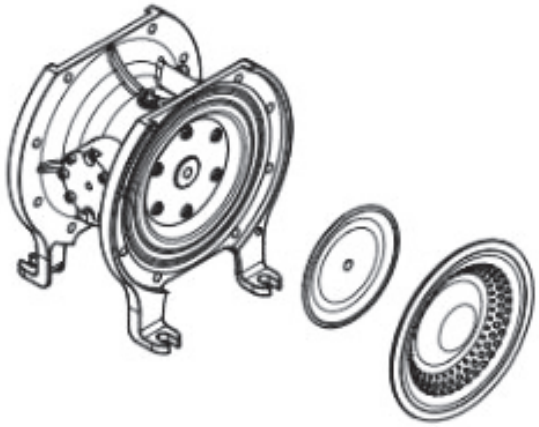


Fig. 5: Disassembly of diaphragm with DSS

5.4.2.3 Installation of the diaphragms

The diaphragm is installed in the reverse order.
The diaphragm grub screw must be glued in in all cases.

⚠ ATTENTION

Always observe the safety and instructions for use of the threadlocker manufacturer

- Screw the diaphragm onto the diaphragm piston and tighten hand-tight

5.4.2.4 Replacing the valve seats and valve balls

- Remove valve balls and valve seats
- PTFE valve seats are always supplied with 2 O-rings. These O-rings must be replaced every time the manifolds are removed to ensure that the pump is leak-proof. Install the new valve balls.
- Valve seats made of elastomer materials (EPDM, NRS, FKM, NPR, NR) are installed in the pump chamber in the holes provided.

5.5 Torques

(Chapter 8.5)

5.5.1.1 Maintenance on the center block
Maintenance of the center block is not required. Repairs must only be performed by the manufacturer.

6.0 Troubleshooting

Fault	Possible cause	Remedy
No delivery rate when pump is running	Pump takes in air	Seal suction line
	Suction valve closed or pumping speed exceeded	Open valve Change arrangement
	Valve ball and seat worn on suction side	Replacing the seats and balls
	Motor connected incorrectly	Check connection diagram
Flow rate too low	Speed too low	Check speed and wiring
	Leak in suction pipe	Find and remove leaks
	Back pressure higher than designed	Lower pressure
	Blocked pipes	Check supply line Clean
	Viscosity too high	Adjust conditions
	Suction pipe blocked	Remove obstacle
	Pump parts worn	Replace parts
	Insufficient suction pressure	Increase suction pressure
Pump slows, stops, starts up	Back pressure higher than designed	Reduce pressure
Lower delivery rate, stronger pulsation	Suction-side valve ball blocked	Unstick the valve ball
Product comes from center block	Diaphragm torn	Replace diaphragm and center block
Pump loses pumping speed	Leak in suction line	Locate and seal
	Suction head too high or air or gas in liquid	Increase suction pressure

Fault	Possible cause	Remedy
	Pump worn Speed too low	Inspect, replace parts as necessary Increase speed
Pump is loud	Pump is worn or defective	Inspect and replace defective parts if necessary
	Air or gas in liquid	Degassing liquid
	Solids in liquid	Install dirt trap in suction line
Insufficient diaphragm service life	Chemical damage. Diaphragm swollen or detached	Check the chemical compatibility of the diaphragm material using the resistance list, contact an authorised dealer or manufacturer if necessary.
	Speed too high	Check diaphragm and reduce speed if necessary
		Reduce speed by using a frequency converter
	Delivery pressure too high	Increase the diaphragm service life by changing the pressure-side conditions (reduction)
		Install a pressure gauge
	Washouts on the diaphragm surface	Abrasive medium containing solids
	Delivery pressure above 6 bar	Reduce pressure
Drive heats up or is overloaded	Some amount of heating is normal with electric motors	Check the current consumption just in case
	Speed too high	Reduce speed
	Liquid more viscous than known for design	Check design
	Motor connected incorrectly	Check electrical connection and change if necessary
	Pump parts seized or stuck	Investigate and change the transport conditions

Fault	Possible cause	Remedy
	Delivery pressure above 6 bar	Reduce pressure
	Forced cooling fan not running	Connect / repair / replace the forced cooling fan
Valve balls deformed	Chemical damage	Use different material
	Mechanical damage	Use different material
Pump leaks between pump chamber and center block	Diaphragm not installed centered	Replace diaphragm
Pump leaks at the pump chamber flange	Screws loosened by vibration	Tighten or replace screws
Diaphragm ruptures quickly	Large solids in the medium Compressed air suddenly opened	Connect filter upstream
Insufficient suction head	Valve ball and seat leaking	Replace the valve ball and seat
	Pump completely dry	Fill the suction line
Pump very loud, rattling noise	Center block bearing worn	Have it replaced
	Excessive influx on the suction side	Throttling the suction line

Please contact our customer service team at infoDUS@cranecpe.com, or
+49 211 5956 0 if you have any further questions

7.0 Spare parts

7.1 Spare parts inventory
Please contact the manufacturer or an authorised dealer since the scope of the recommended spare parts stock depends on the period of use and the different operating conditions of the pumps.

7.2 Ordering spare parts
Always provide the following information when ordering spare parts:

- Pump type
- Year of manufacture and serial number
- Spare part item no.

Always specify if any material changes were subsequently made to any components of a pump. The required spare parts and their item numbers can be found in the spare parts lists. These can be found at www.cranecpe.com.

7.3 Liability for the use of other than genuine spare parts:
The installation and/or use of other than genuine spare parts or accessories may impair the design characteristics of the electrically operated diaphragm pump and thus impair them. Any liability and warranty is excluded for damage to the pump, system or pumped liquid caused by use of other than genuine spare parts and accessories.

7.4 Spare parts kits
Please refer to Fig. 6 for the item number: Exploded view.

Spare part kits			
Pump type			all
Size			all
	Pos.	Quantity	
Diaphragm	30	2	•
Screw (diaphragm)	30	2	•
Valve ball	32	4	•
Valve seat	31	4	•

Table 5: Spare parts kits

8.0 Technical Data Annex

8.1 Pump parts

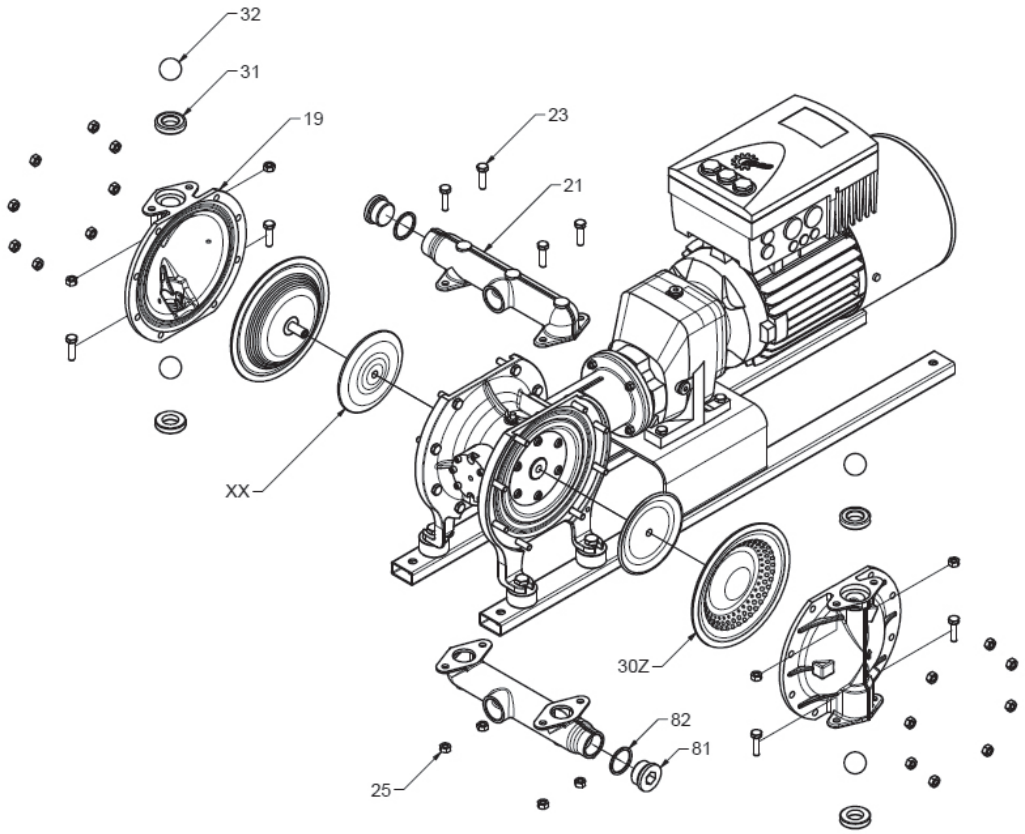


Fig. 6: Exploded view

8.2 Material and pump coding

EH	25	-	SS	-	Z	T	T

Pump type	Size	Housing/ center block	Diaphragm	Valve seats	Valve balls
EH	25	SS Cast stainless steel 316L/ stainless steel S1S Cast stainless steel 316L electropolished/ stainless steel FS Aluminium/ stainless steel	Z CSD nopped E4[a] PTFE composite diaphragm	T PTFE	T PTFE

Fig. 7: Pump coding

8.3 Connection sizes

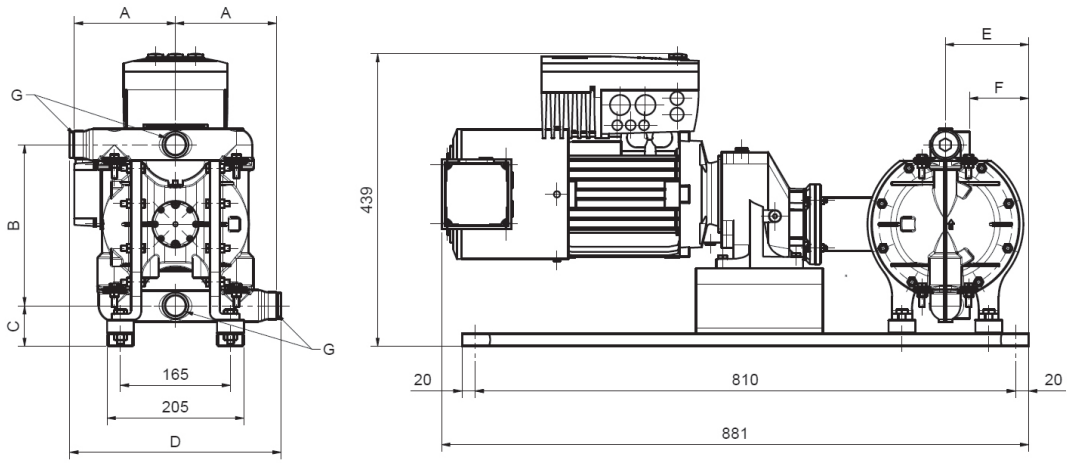


Fig. 8: Gate sizes

Size	Material	A	B	C	D	E	F	G
25	FS	-	241	61	270	-	89	1 "G
25	SS	152	241	61	317	125	89	1 "G
25	S1S	152	241	61	317	125	89	TriClamp ISO

8.4 Pump weights
(pump weights will increase at combinations with stainless steel seats or balls with core)

Size	FS	SS	S1S
25	50	55	55

Table 7: Pump weights (kg)

8.5 Tightening torques
Please refer to Fig. 6 for the item number: Exploded view.

8.5.1 Tightening torques series EH-SS/S1S/FS size 25

Size	Socket Item 21	Pump chamber Item 19
25	25 Nm	25 Nm

Table 8: Tightening torques EH-SS/S1S/FS series

9.0 Directories

9.1 Figure Directory

9.2 Index

9.3 Table directory

10.0 Notices on the declaration of no objection for returned goods

Notice on the declaration of no objection
We want to protect our employees from the dangers of contaminated equipment and enable prompt processing of your return delivery.

Therefore, we ask you to understand that we can only accept your delivery on presentation of our declaration of no objection including a returns number.

You will receive a returns number from us after submitting the completed declaration of no objection.

Attach the label clearly visible on the outside of the shipping packaging.

Declaration on Health Safety

Please send to your CPFT contact person by email or fax before dispatching the goods

Crane Process Flow Technologies GmbH
Heerdter Lohweg 63-71
40549 Düsseldorf, Germany
Fax +49 (0) 211 5956 111

We want to protect our employees from the dangers of contaminated equipment. Therefore, please understand that we can only perform any inspections/repairs if this declaration has been completed in full and signed. Medium samples may not be sent to us.

For return of _____ delivery note no. _____

Pump type / spare parts _____

Drive type _____

I sign this document to declare
that the pump/drive sent in has been carefully cleaned and decontaminated before despatch,
that the pump/drive sent in does not pose any risk of bacteriological, virological, chemical, or radioactive contamination,
that I am authorised to make such declarations on behalf of the represented

company. Please provide the following additional information for the repair service:

Detected defect

The media used

Name _____

Position _____

Date/Signature _____

Company stamp

You may request the safety declaration from us via the contact details below.
(infoDUS@cranecpe.com).

Notes

Notes

CRANE CHEMPHARMA & ENERGY
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