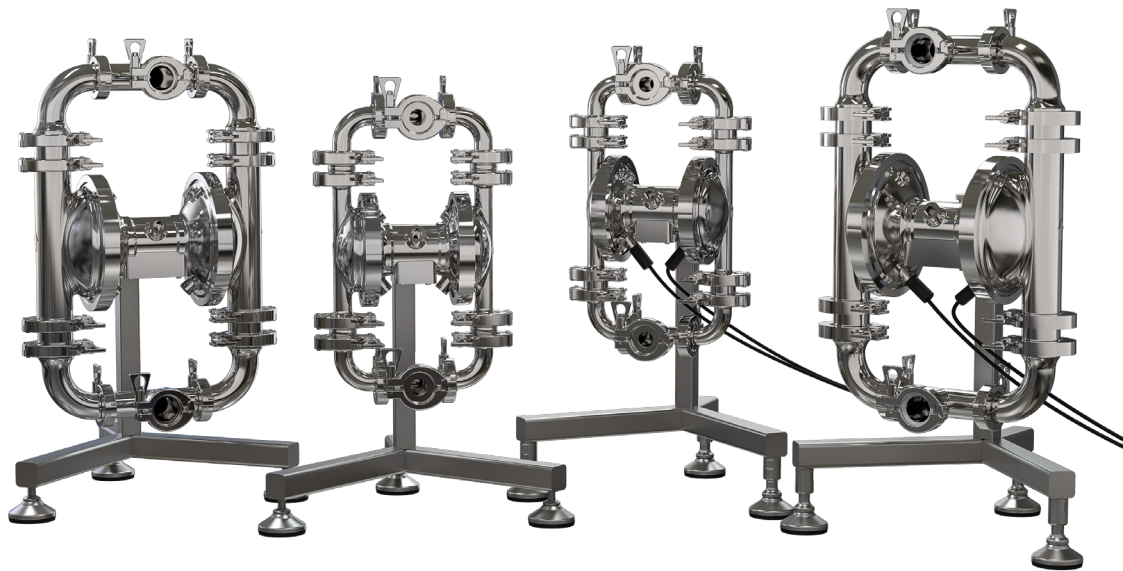


AISIBOXER
SANIBOXER



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SANITARY AND FOOD PUMPS

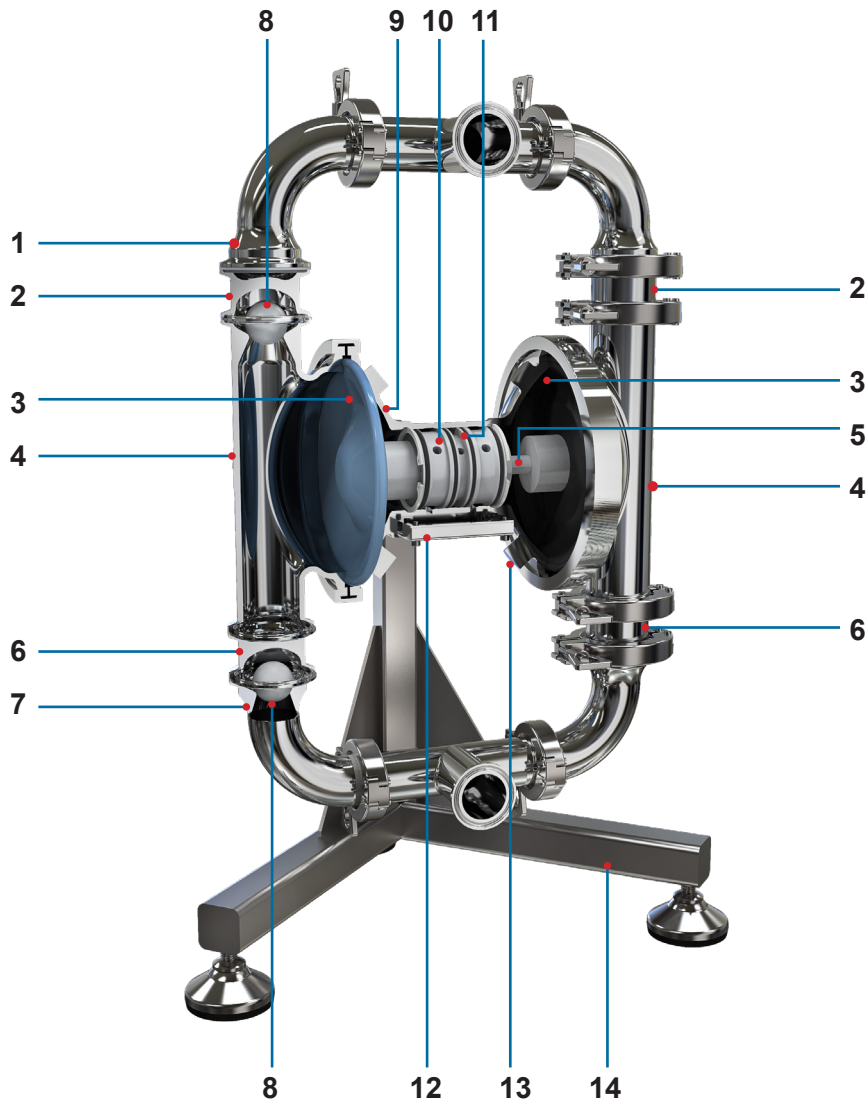
PHARMACEUTICAL / FOOD / COSMETICS / TRICHOLOGICAL / BEVERAGE



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IDENTIFICATION AND NOMENCLATURE OF PARTS



POS.	NOMENCLATURE	POS.	NOMENCLATURE
1	DELIVERY MANIFOLD	8	BALL
2	PRODUCT DELIVERY VALVES	9	CENTRAL BODY
3	DIAPHRAGM	10	PNEUMATIC EXCHANGER
4	PUMP BODY	11	AIR SUPPLY CONNECTION
5	SHAFT	12	AIR EXHAUST FILTER
6	PRODUCT SUCTION VALVES	13	DIAPHRAGM RUPTURE SENSOR SEAT
7	SUCTION MANIFOLD	14	SUPPORT STAND (on request)

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Layout and contents by: Infographic sas

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CHAPTER 1

This chapter includes the EC Declaration of Conformity, the List of Residual Risks and information on the structure of the Original Instructions so that Operators and Technicians can properly consult the manual itself.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
1.1	EC DECLARATION OF CONFORMITY	5
1.2	LIST OF RESIDUAL RISKS	6
1.3	FOOD CONTACT DECLARATION OF CONFORMITY	7
1.4	INTRODUCTION TO THE MANUAL	8 - 11
1.5	DELIVERY NOTE	12
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1.7	WARRANTY	13

Below is a detailed description of each topic mentioned.

1.1 DICHIARAZIONE CE DI CONFORMITÀ - EC DECLARATION OF CONFORMITY



AISIBOXER, SANIBOXER

DICHIARAZIONE (CE - UE) DI CONFORMITÀ DECLARATION (CE - UE) OF CONFORMITY

FABBRICATO DA: MANUFACTURED BY

DEBEM SRL - Via del bosco 41 - 21052 Busto Arsizio (VA) – ITALIA

LA PRESENTE DICHIARAZIONE DI CONFORMITÀ È RILASCIATA SOTTO LA RESPONSABILITÀ ESCLUSIVA DEL FABBRICANTE.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

TIPO: TYPE

POMPA PNEUMATICA A MEMBRANA / AIR OPERATED DIAPHRAGM PUMP

MARCATURA ATEX: MARKING ATEX

 II 2G Ex h IIB T4 Gb

 II 2D Ex h IIIB T135°C Db X


MODELLO: MODEL
MODELLO


N° DEPOSITO: DEPOSIT NUMBER
FT_AISI_SANI_BOXER_FULFLOW

CODICE: CODE
CODICE

MATRICOLA: SERIAL NUMBER
MATRICOLA

L'oggetto della dichiarazione di cui sopra è conforme alle pertinenti normative di armonizzazione dell'Unione Europea.
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation.
2006/42/CE : **Direttiva Macchine / Machinery Directive**
2014/34/UE: **Direttiva ATEX, concernente l'armonizzazione delle legislazioni degli Stati membri relative agli apparecchi e sistemi di protezione destinati ad essere utilizzati in atmosfera potenzialmente esplosiva (rifusione)**
2014/34/UE: **ATEX Directive, on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast)**
UNI EN ISO 12100:2010 – Sicurezza del macchinario - Principi generali di progettazione - Valutazione del rischio e riduzione del rischio.
UNI EN ISO 12100:2010 – Safety of machinery - General principles for design - Risk assessment and risk reduction.
UNI EN 809:2009 – Pompe e gruppi di pompaggio per liquidi - Requisiti generali di sicurezza.
UNI EN 809:2009 – Pumps and pump units for liquids - Common safety requirements.
EN ISO 80079-36:2016 – Atmosfere esplosive - Parte 36: Apparecchi elettrici destinati ad essere utilizzati in atmosfere potenzialmente esplosive. Metodo e requisiti di base.
EN ISO 80079-36:2016 – Explosive atmospheres - Part 36: Non-electrical equipments to be used in potentially explosive environments. Method and basic requirements.
EN ISO 80079-37:2016 – Atmosfere esplosive - Parte 37: Apparecchi non elettrici per atmosfere potenzialmente esplosive. Tipo di protezione non elettrica per sicurezza costruttiva "c", per controllo della sorgente di accensione "b", per immersione in liquido "k".
EN ISO 80079-37:2016 – Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k".
UNI EN 13951:2012 – Pompe per liquidi - Requisiti generali di sicurezza - Applicazioni agro-alimentari - Regole di progettazione per assicurare l'igiene durante l'utilizzo.
UNI EN 13951:2012 – Liquid pumps - Safety requirements - Agrifoodstuffs equipment - Design rules to ensure hygiene in use
I PRODOTTI DENOMINATI AISIBOXER, SANIBOXER FORNITIVI PER IL CONTATTO CON TUTTI GLI ALIMENTI SONO CONFORMI ALLA SEGUENTE LEGISLATURA COMUNITARIA: REGOLAMENTO (CE) N.1935/2004 E REGOLAMENTO (CE) N.2023/2006 (GMP). LA DICHIARAZIONE DI CONFORMITÀ AL CONTATTO COI PRODOTTI ALIMENTARI VIENE TRASMESSA DA P.L.R. VIA TELEMATICA E ALLEGATA AL PRODOTTO IN FORMATO CARTACEO.
THE PRODUCTS NAMED AISIBOXER, SANIBOXER SUPPLIED FOR THE CONTACT WITH ALL TYPE OF FOOD ARE IN COMPLIANCE WITH THE FOLLOWING COMMUNITY LEGISLATURE: REGULATION (EC) N.1935 / 2004 AND REGULATION (EC) N.2023 / 2006 (GMP). THE DECLARATION OF CONFORMITY TO CONTACT WITH FOOD PRODUCTS IS TRANSMITTED BY TELEMATIC AND ATTACHED TO THE PRODUCT IN PAPER FORMAT.
ESTENSIONI: la presente dichiarazione si estende anche ai modelli AISIBOXER 01, AISIBOXER 02, AISIBOXER 03, AISIBOXER 04, SANIBOXER 01, SANIBOXER 02, SANIBOXER 03, SANIBOXER 04 IN METALLO.
EXTENSIONS: this declaration is also valid for the following versions AISIBOXER 01, AISIBOXER 02, AISIBOXER 03, AISIBOXER 04, SANIBOXER 01, SANIBOXER 02, SANIBOXER 03, SANIBOXER 04 MADE OF METAL.

 **ATTENZIONE:** data l'innumerabile varietà di prodotti e composizioni chimiche, l'utilizzatore è ritenuto il maggior conoscitore delle reazioni e compatibilità con i materiali costruttivi della pompa. Pertanto, prima dell'impiego, eseguire con perizia tutte le verifiche e prove necessarie al fine di evitare situazioni pericolose anche se remote che non possono essere conosciute ed imputabili al costruttore. Per ogni controversia il Foro Competente è quello di Busto Arsizio.

 **WARNING:** since there exists an endless variety of products and chemical compositions, the user is presumed to have the best knowledge of their reaction and compatibility with the materials used to build the pump. Therefore, before using the pump, all the necessary checks and tests must be performed with great care to avoid even the slightest risk, an event that the manufacturer cannot foresee and of which he cannot be held responsible. Any controversy lies within competence of the Court of Busto Arsizio.

PERSONA AUTORIZZATA A CUSTODIRE IL FASCICOLO: PERSON AUTHORISED TO KEEP THE FILE



MARCO DE BERNARDI - SOCIO AMMINISTRATORE

LUOGO PRESSO CUI È CUSTODITO IL FASCICOLO: THE FILE IS KEPT IN
VIA DEL BOSCO, 41 - 21052 BUSTO ARSIZIO (VA) – ITALIA

APPROVATO DA: APPROVED BY



MARCO DE BERNARDI - SOCIO AMMINISTRATORE

LUOGO: BUSTO ARSIZIO - DATA: DATASPED



1.2 LIST OF RESIDUAL RISKS



After careful analysis and evaluation of the hazards involved in the operating phases of the AISIBOXER and SANIBOXER series of air-operated pumps, the necessary measures have been taken to eliminate or reduce the related risks. The residual risks were reported and dealt with in the Installation, Use, and Maintenance Manual (Original Instructions) provided with the pump, so that they can be further reduced or eliminated through the design of the machines in which they will be installed and the integration of safety measures:

HANDLING AND POSITIONING - CONSULT PROCEDURES IN THE ORIGINAL INSTRUCTIONS

- Impact and crushing hazard.

INSTALLATION - CONSULT PROCEDURES IN THE ORIGINAL INSTRUCTIONS

- Health and/or food hazards related to the liquids to be pumped;
- Danger of product leakage; (provide flow and collection containment protections);
- Crushing hazard.

OPERATION - CONSULT PROCEDURES IN THE ORIGINAL INSTRUCTIONS

- Danger of chemical incompatibility with the fluids to be pumped;
- Danger of stress corrosion cracking (combined action of corrosion and/or incorrect application of a load) combined with high temperatures.

CLEANING AND MAINTENANCE - CONSULT PROCEDURES IN THE ORIGINAL INSTRUCTIONS

- Danger of projection of pump parts during disassembly due to residual internal pressures (anomalous) in the pneumatic circuit of the pump;
- Danger of rupture of diaphragms due to lack of Scheduled Maintenance.

The persons in charge of designing the machine/system in which the AISIBOXER and/or SANIBOXER series air-operated Pumps will be installed must consider the residual risk indicated in each operational phase and must take the necessary safety integration measures provided by the applicable directives before commissioning.

It is forbidden to commission the pump before the Machine in which it will be incorporated has been declared compliant with Directive 2006/42/EC and any further applicable specific Regulations and/or Directives.

Whoever works in these areas and deals with these operational phases must be trained and aware that there may still be "residual risks" impossible to eliminate.

The persons in charge of these operations must always have at their disposal (consult and understand) all the information contained in the Manufacturer's Manual (Original Instructions or Translation of Original Instructions) and must get the necessary Personal Protective Equipment (PPE) provided before intervening.

The Customer, the Installation and Maintenance Technicians, and the Qualified Operators are responsible for arranging all the necessary measures so that access near the pump is reserved and limited to trained and qualified personnel and for providing adequate information and reports of any residual risk on the machine/system in which it will be installed, in compliance with current safety laws. It is always the purchaser's responsibility to assess the microbiological hazards that could occur in the pump and/or system into which it will be fitted and to carry out all the necessary tests to achieve adequate risk reduction.

Due to the countless variety of products and fluid compositions (process, flushing, and/or sanitising), the user is considered the most knowledgeable regarding chemical and temperature compatibility with the pump materials.

The purchaser is strictly responsible for selecting the construction materials compatible with the fluid(s) and/or the temperatures with which the pump components come into contact.

The user can contact the Manufacturer or the Distributor for suggestions concerning the construction materials that offer the best chemical and temperature compatibility; however, neither the Manufacturer nor the Distributor will be held liable for damage (malfunction, structural ageing, leakage or indirect damage) attributable to chemical incompatibility reactions between the pump materials and the fluids that come into contact with them

1.3 FOOD CONTACT DECLARATION OF CONFORMITY



AISIBOXER, SANIBOXER

DICHIARAZIONE DI CONFORMITÀ AL CONTATTO CON ALIMENTI FOOD CONTACT DECLARATION

Con la presente si dichiara che i prodotti denominati **AISIBOXER, SANIBOXER** forniti per IL CONTATTO con TUTTI GLI ALIMENTI

*We hereby declare that the products **AISIBOXER, SANIBOXER** supplied for the contact with all type of food*

SONO CONFORMI

Are in compliance

alla seguente legislazione comunitaria:

with the following European Union legislation:

- **Regolamento (CE) n. 1935/2004**
Regulation (EC) No 1935/2004
- **Regolamento (CE) n. 2023/2006 (GMP)**
Regulation (EC) No 2023/2006
- **Regolamento (CE) n. 10/2011**
Regulation (EC) No 10/2011

alla seguente legislazione italiana:

with the following italian legislation:

- Decreto Ministeriale 21/03/1973 e s.m.i (acciai inossidabili)
- DPR 777/82 e s.m.i
- D. Lgs 10 febbraio 2017, n.29

e alla seguente legislazione americana (Food and Drug Administration):

and with the following american regulation (F.D.A.):

- **Generalmente riconosciute come sicure (GRAS)**
Generally Recognized as Safe - GRAS
- **FDA Titolo 21, Parte 70-199**
FOOD AND DRUG ADMINISTRATION, TITLE 21, CFR Part 177-199

Questa dichiarazione ha una validità a partire dalla data sotto riportata e sarà sostituita se interverranno cambiamenti nella produzione/formulazione del materiale o se i riferimenti legislativi saranno modificati e aggiornati in modo da richiedere una nuova verifica ai fini della conformità.

The validity of this declaration starts from below listed date and will be replaced when there will be important changes in production of handmade article, or of raw material used, that can change some essential requirements of conformity or when legislative references are modified or updated so to need a new inspection of conformity.

Cod. Pratica/Code of practise: 02962710121-26052022-1148

APPROVATO DA: *Approved by*

Marco De Bernardi - Socio Amministratore

LUOGO: BUSTO ARSIZIO - **DATA:** DATASPED

1.4 INTRODUCTION TO THE MANUAL



The Original Instructions have been drawn up with consideration of all sizes and different supply configurations of the AISIBOXER and SANIBOXER series air-operated pumps and the steps necessary for correct installation and safe use.

This manual is an integral part of the pump and a safety device by which the manufacturer intends to communicate important information so that the purchaser and their personnel install, use and maintain it in a constant state of efficiency and safety.

The processed information is aimed at the highest level of safety for the environment, the exposed persons and the technicians qualified for the operations foreseen by the Manufacturer.

CONSULTATION AND CONSERVATION

The Manufacturer's Original Instructions must always be kept in good condition and be available for consultation by the Technicians qualified to service the machine in which it will be installed.

Otherwise, the Manufacturer declines any liability concerning:

- Incorrect installation;
- Incorrect or lack of assessment of chemical and temperature compatibility with the fluids to be pumped;
- Improper use of the pump and/or for performances other than those declared;
- Use with higher and/or lower temperatures than those declared by the Manufacturer;
- Interventions and/or use of the same by untrained personnel;
- Use contrary to the Manufacturer's safety rules;
- Serious deficiencies in maintenance;
- Changes or operations not authorised by the Manufacturer;
- Use of non-original spare parts and/or unsuitable parts for the pump;
- Failure to clean or sanitise the pump properly;
- Use of unsuitable detergents, sanitising agents, and/or temperatures allowed by the pump;
- Total or partial non-compliance with the Manufacturer's Original Instructions.

RECIPIENTS OF THE ORIGINAL INSTRUCTIONS

This Original Instruction manual is addressed to all Operators and Technicians qualified to transport, handle, install, maintain, and/or repair the pump.

All Operators and qualified Technicians who work on the pump must be aware of the service procedures established by the Manufacturer, of the residual risk present and of the safety measures to be taken to prevent dangerous situations, and any damage that may arise for exposed persons and operators, as well as for the environment and property in general. In particular, Operators must be aware of all personal protective equipment to be used during operations that require working near potentially dangerous areas. The contents of this manual must be strictly followed.

LIMITS OF THE ORIGINAL INSTRUCTIONS

Please note that the instruction manual cannot replace the adequate knowledge and technical preparation of the installer or maintenance technician. This Manual provides information and instructions on installation and maintenance that do not intend to replace or modify any general or specific standard, requirement or law concerning safety and use, which affects the machine on which the pump will be installed.

UPDATES TO THE ORIGINAL INSTRUCTIONS

The manual reflects the state-of-the-art technique at the time of marketing the pump and cannot be considered inadequate only because it is not updated based on any and future technical achievements. The Manufacturer reserves the right to update production and the manual without prior notice and without obligation to update the previously issued documents.

CONTENTS OF THE ORIGINAL INSTRUCTIONS

The topics are covered to allow a classification of the information and the professional address to which they are intended so that the contained information can be immediately and directly consulted.

The manual is divided into chapters and related sections that deal with the operational topics for correct installation, use and maintenance of the pump, with exposure divided into numbered sequences.

The pages are characterised by the following layout and contents:

- A bar has been added at the beginning of each section which, through symbols, indicates the personnel authorised to operate, the prohibitions and obligations to be observed, and the Personal Protective Equipment (PPE) that must be used;
- The residual risk that may occur during the operations is highlighted by appropriate symbols integrated with the text.

Authorised Personnel

Operating Sequences

Title SECTION

CAUTIONS WARNINGS and NOTES

Title CHAPTER

Graphical Contents

PAGE numbers

2.6 DESCRIZIONE DELLA POMPA

2.6.1 PRINCIPIO DI FUNZIONAMENTO

Le pompe pneumatiche della serie AISIBOXER e SANIBOXER sono costituite da uno Scambiatore Pressurizzato con un ridotto numero di componenti, che consente tramite un unico controllo le membrane dei due gruppi pompanti. Le membrane solidali al perno centrale di trascinamento vengono azionate con moto alternato in due fasi (aspirazione-mandata) e costituiscono gli elementi pompanti.

Tra le due camere di pompaggio ed i condotti di aspirazione e mandata della pompa sono alloggiati i corpi valvole con le rispettive sfere.

Il principio di funzionamento a doppio stadio avviene simultaneamente (mentre una camera è in fase di aspirazione, la seconda camera è in mandata) garantendo separazioni negative, prevalenze elevate e il pompaggio di fluidi con alta viscosità e parti solide in sospensione (vedere Sezione 2.6 CARATTERISTICHE TECNICHE).

2.6.2 REQUISITI E CARATTERISTICHE DI INSTALLAZIONE

Le pompe pneumatiche della serie AISIBOXER e SANIBOXER sono adatte ad essere installate in ambienti a secco e consentono la variazione della velocità di funzionamento anche durante il servizio. Possono essere impiegate per il ricambio e il pompaggio di liquidi agro-alimentari con elevata viscosità e parti solide in sospensione (vedere Sezione 2.6 CARATTERISTICHE TECNICHE). Il manuale (opzionale, viene fornito su richiesta) della pompa è essenziale per agevolare le operazioni di svuotamento manuale della stessa in fase di pulizia e sanificazione. Il funzionamento pompe pneumatiche della serie AISIBOXER e SANIBOXER è previsto per installazioni in orizzontale, sopra e sotto battente sull'apposito cavalletto.

Le tubazioni di aspirazione e mandata devono essere opportunamente dimensionate (mai inferiori ai diametri della pompa) per garantire le portate minime ed un rendimento ottimale.

2.7 USO PREVISTO E USI IMPROPRI

2.7.1 USO PREVISTO

Le pompe pneumatiche della serie AISIBOXER e SANIBOXER sono state progettate e costruite nel rispetto della sicurezza alimentare, per il pompaggio di liquidi farmaceutici, agro-alimentari, cosmetici e idroli fluidi per le operazioni di pulizia e sanificazione con temperature compatibili con i materiali di composizione della pompa e sicurtà superiore consentita fino a 20.000 Cps a 20°C (vedere Sezione Tecnica Specifica pompe) per viscosità superiori a 20.000 Cps a 20°C intervengono fattori fluidi che richiedono una corretta valutazione pertanto è sempre necessario contattare preventivamente l'Ufficio Tecnico del Costruttore.

ATTENZIONE

I limiti massimi di temperatura sono dati dai materiali interni (tenute, sfere e membrane) con il superamento della massima temperatura, non è più garantita la conformità della marcatura ATEX apposta sulla pompa. Vista l'immensa varietà di prodotti e composizione dei fluidi (il processo, di lavaggio e/o di sanificazione), l'utilizzatore è ritenuto il maggiore conoscitore di compatibilità chimica e di temperatura con i materiali costitutivi della pompa.

Spetta sempre all'installatore ed all'utilizzatore l'omere e la responsabilità di valutare i pericoli microbiologici che potrebbero presentarsi nell'ambito della pompa e/o dell'impianto ed averne inserita e di eseguire tutte le prove necessarie al fine di adottare un'adeguata riduzione del rischio.

2.7.2 CALCOLO DELLA MASSIMA TEMPERATURA DEL FLUIDO (per Zona 1 - Zona 21)

Qui di seguito viene indicata la formula per determinare la massima temperatura di processo del fluido consentita, per la pompa AISIBOXER e SANIBOXER in esecuzione II 20 Ex h IIB T4 Gb per installazioni in Zona 1 - Zona 21.

Classe di Temperatura ATEX	Fattore di Calcolo (solo per Zona 1 - Zona 21)	Massima Temperatura di Processo del Fluido
ATEX T4	0.8	T ₁ 60°C

4.3.5 ALLIACCIAMENTO DEL CIRCUITO PRODOTTO

Dopo aver eseguito il posizionamento è possibile effettuare l'allacciamento della pompa al circuito del prodotto (Agro-Alimentare, Cosmetico e/o Farmaceutico) operando come segue:

Requisiti tubazioni legante prodotto

- Il circuito prodotto deve essere conforme alla sicurezza (Agro-Alimentare, Cosmetico e/o Farmaceutico) e alla certificazione della pompa (AISIBOXER Reg.UE/2017/755, SANIBOXER certificazione 3-A).
- L'allacciamento alla pompa del circuito prodotto deve prevedere un'elemento flessibile certificato per impiego in ambito alimentare con anello metallico di rinforzo (è vietato l'allacciamento con tubo rigido e/o non rinforzo).
- Le tubazioni devono essere auto sostenute e non gravare in nessun modo sulla pompa.
- Controllo dimensionamento dei condotti di aspirazione e mandata per una corretta velocità di aspirazione.
- Valvole di intercettazione prodotto (aspirazione e mandata, che non causino perdite di carico).
- Con particelle in sospensione, installare sull'apposizione idonea sonda scorrevole costantemente dimensionata (vedere fig. 2.7.1) nella sezione di aspirazione della pompa con passaggio massimamente orientato.
- Condotti prodotto puliti internamente e privi di residui solidi di lavorazione (trucioli, particelle, ecc.).

4.3.5a

La pompa a membrana con aspirazione negativa sono influenzate dai seguenti fattori:

- **Viscosità del fluido** - peso specifico del fluido - diametro - lunghezza e/o curve sull'aspirazione. Posizionare la pompa il più vicino possibile al punto di prelievo (entro 2,5 m e in tutti i casi mai superiore a 5 m verticalmente). Il diametro del tubo di aspirazione non deve mai essere inferiore a quello dell'attacco della pompa. Il diametro deve essere opportunamente dimensionato con l'aumentare della distanza o della viscosità del fluido.

4.3.5b

Attenzione: pericolo di usura prematura e/o rottura membrana. Il tubo da pompa con aspirazione negativa non deve mai superare una viscosità di 5.000 Cps a 20°C ed un peso specifico di 1.4 Kg/l.

Con viscosità superiori intervengono fattori fluidi che richiedono una corretta valutazione pertanto è sempre necessario contattare preventivamente l'Ufficio Tecnico del Costruttore.

4.3.5c

Rimuovere l'attacco Clamp e i tappi dai condotti di aspirazione e mandata.

4.3.5c

Le pompe della serie AISIBOXER e SANIBOXER sono fornite con attacco prodotto clamp. Per le connessioni al collettore della pompa SANIBOXER impiegare unicamente raccordi clamp dello stesso tipo di materiale della pompa e con la medesima certificazione 3-A (Sanitary Standard). Installare sul collettore di mandata e di scarico una valvola manuale di uguale diametro all'attacco della pompa (mai più piccolo) e maggiorata per aspirazione negativa e per fluidi con elevata viscosità.

ATTENZIONE: pericolo di contaminazioni e/o non conformità alla certificazione della pompa. È vietato l'utilizzo di valvole in materiale diverso dalla pompa e/o non certificate per uso alimentare e/o sotto-dimensionate.

Special symbols are used within the manual to highlight and differentiate particular information or suggestions important for the safety and/or correct installation, maintenance or replacement of the pump.

With these measures, the Manufacturer intends to draw the attention of qualified Technicians to the CAUTIONS, WARNINGS, or NOTES concerning them.

For any doubts or clarifications regarding the contents of this manual, do not hesitate to contact the Manufacturer's Technical Service.

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 website: www.debem.com



SYMBOLS AND DEFINITIONS



OPERATOR

Identifies the type of Operator in charge of the mentioned operation. This qualification requires having obtained the necessary training and specific skills in the sector of use of the pump (Pharmaceutical/Food/Cosmetic), in addition to full knowledge and understanding of the information contained in the Manufacturer's user manual.



HANDLING OPERATOR

Identifies the type of Operator in charge of the mentioned operation. This qualification requires specific skills for lifting equipment, safe methods and characteristics for slinging and handling as well as full knowledge and understanding of the information contained in the Manufacturer's user manual.



MECHANICAL INSTALLER/MAINTENANCE TECHNICIAN

Identifies the type of Technician in charge of the mentioned operation. This qualification requires the necessary training and specific skills to carry out installation work (on machines and/or in a Pharmaceutical/Food/Cosmetic environment), maintenance and full knowledge and understanding of the information contained in the manufacturer's user manual.



EXTRAORDINARY PROCEDURES

Identifies the operations that can only be performed by the Manufacturer's After-Sales Service Technicians.

HAZARD SYMBOLS

They indicate, together with the text, the type of residual risk that may occur during the mentioned operation:



General danger.



Temperature hazard.



Fire/explosion hazard.



Danger of toxic and/or corrosive fluids.



Danger of biological contamination.



Danger of crushing and shearing.

PROHIBITION SYMBOLS

They indicate, together with the text, the type of prohibition to be observed during the mentioned operation:



Prohibition to come into contact with parts of the component when it is powered, running, or hot.



Prohibition to remove the guards with the pump powered or running.



Prohibition to lubricate.

SYMBOLS AND DEFINITIONS

OBLIGATION SYMBOLS

They indicate, together with the text, the type of personal protection to be used to carry out a certain operation:



Obligation to disconnect the power supply before servicing.



Gloves required.



Obligation to wear protective and anti-slip shoes.



Aprons required.



Face mask required.



Breathing apparatus required.



CAUTION

It informs the personnel concerned that the operation described poses a residual risk of exposure to hazards with the possibility of personal injuries, harm to health, and/or the environment if not carried out in compliance with the requirements and procedures described and/or in the absence of the required suitable Personal Protective Equipment (PPE).



WARNING

It informs the personnel concerned that the described operation may cause damage to the pump and/or its components and consequent risks for the Operator, Technicians and/or the environment if not carried out in compliance with the prescribed procedures.



NOTE

It provides significant technical details relating to the topic and/or operation in question, the content of which is of technical importance or a technical/legal nature.

1.5 DELIVERY NOTE



AISIBOXER and SANIBOXER pumps are manufactured in compliance with Directive 2006/42/EC and EC Regulation No. 1935/2004 on Materials and Objects intended for Food Contact (MOCA) in compliance with harmonised European standards and the American FDA food safety standards. SANIBOXER pumps also comply with the strict 3-A (Sanitary Standards) food safety standards.

With the drafting of this manual, the Manufacturer hopes that you can make the most of the performance of the AISIBOXER and SANIBOXER pumps in complete safety; the pumps represent any risk to operators if used in compliance with the Manufacturer's Original Instructions.

It is the duty of the Client, the Installation and Maintenance Technicians and the Qualified Operators to take the necessary measures to ensure that access to the pump is restricted to trained and authorised personnel and to provide adequate information and warnings about any residual risk on the machine or system in which it will be installed, in accordance with current safety laws.

All technical values refer to the "standard" AISIBOXER and SANIBOXER pumps (*see 2.8 TECHNICAL SPECIFICATIONS*) and we remind you that due to a constant search for innovation and technological quality, the technical specifications of the products could change without prior notice; **it is necessary to always follow the version of the Original Instructions provided with the pump.**

It is forbidden to put the pump into service before the machine into which it is to be incorporated has been declared compliant with the Machinery Directive 2006/42/EC provisions and any further applicable Regulations and/or Directives.

Please note that the Original Instruction Manual, the Drawings and any other technical documents delivered with the pump are confidential and the property of the Manufacturer, who reserves all rights (intellectual property) and PROHIBITS their reproduction (even partial, by any means) and disclosure to third parties without their prior written approval.

1.6 GENERAL NOTES ON DELIVERY



Upon receipt of the supply, check that:

- the packaging is intact
- the supply matches the order specifications (see accompanying document)
- the pump has not been damaged.

DESCRIPTION OF THE SUPPLY

POS.

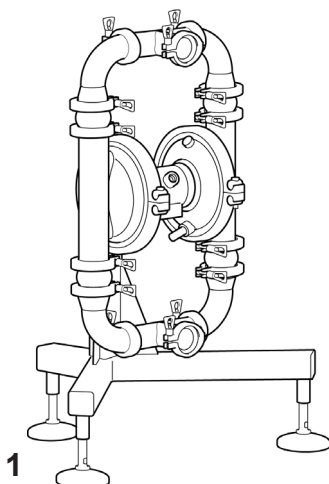
AISIBOXER and/or SANIBOXER pump (with Diaphragm Sensor kit)

1

Official Manual (Original Instructions)

2

In the event of damage or missing parts, immediately inform (within 7 days of receipt) and in detail (possibly with photographs) the Manufacturer and the Carrier.



1.7 WARRANTY



The high quality of AISIBOXER and SANIBOXER pumps is promptly confirmed to us by our Customers' satisfaction. However, should any defect appear, please contact the Manufacturer's After-Sales Service, your Dealer or the nearest Customer Service Centre where you will receive assistance as quickly as possible.

In any case, provide the following:

- A. Identification of the pump through the Serial number on the label affixed to it;
- B. Description of the detected anomaly.

All AISIBOXER and/or SANIBOXER pumps are covered by the following warranty:

1 WARRANTY TERMS

The pump is guaranteed for 12 months (8 hours of operation per day) from the date of delivery (see Accompanying Document) on all mechanical parts found to be defective, excluding parts subject to normal wear and tear due to operation. The warranty provides for free repair of the pump or the supply of replacement parts, provided that the manufacturer acknowledges the defect a construction fault.

The repair or replacement of defective parts constitutes full satisfaction of the warranty obligations.

2 INTERVENTION NOTIFICATION

The Purchaser must report any defect to the Manufacturer in writing within 8 days.

3 METHODS OF INTERVENTION

Warranty work will only be carried out in the manufacturer's workshops after the following conditions have been met shipment or sending of the defective pump at the Buyer's expense.

4 EVALUATION RESERVE

Warranty shall not be extended in case of repair or replacement.

5 EVALUATION RESERVE

The defective parts remain the Manufacturer's property the moment they are replaced by the same under warranty. If the parts are not found to be defective, Manufacturer reserves the right to invoice the full cost of the parts parts previously replaced under warranty.

Purchaser responsibility

The Manufacturer will not bear the costs and risks for the shipping or transport of the defective and/or repaired or replaced parts, including any customs charges. The warranty DOES NOT cover any indirect damage and, in particular, any lack of production. In addition, the warranty does not cover any normal consumable materials (diaphragms, balls and ball seats, etc.). The warranty does not cover parts damaged due to incorrect installation, carelessness, neglect, incorrect cleaning and sanitisation, incorrect maintenance, or damage due to transportation or resulting from any other reason not directly linked to functional or manufacturing defects.

Warranty and liability exclusion for chemical and/or microbiological reactions:

Since an endless variety of products and chemical compositions of the fluids exists, the user is presumed to have the best knowledge of their compatibility and chemical reaction with the pump's construction materials. **The purchaser is strictly responsible for selecting the construction materials compatible with the fluid(s) with which the pump components come into contact.** The user can contact the Manufacturer or the Distributor for suggestions in relation to the construction materials that offer the best chemical compatibility or performance at the temperature. However, neither the Manufacturer nor the Distributor will be held liable for damage (malfunction, structural ageing, leakage or indirect damage) attributable to reactions due to temperature or chemical incompatibility between the pump materials and the fluids (process, washing and or sanitisation) that come into contact with them.

The warranty excludes all cases of tampering, improper use or incorrect applications or non-observance of the information contained in the Manufacturer's Original instruction manual.

Any controversy falls within the jurisdiction of the Court of Busto Arsizio (VA) ITALY.

CHAPTER 2

This chapter of the manual covers topics of a preliminary nature but is especially important for the safe and correct use of the pump; therefore, follow the instructions in the sections below.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
2.1	PUMP IDENTIFICATION	16
2.2	PUMP CONFIGURATION CODE	17
2.3	ATEX MARKING AND DEFINITION	18
2.4	IECE_x MARKING AND DEFINITION	19
2.5	MOCA / FDA[®] DECLARATION AND DEFINITION	20
2.6	3-A[®] CERTIFICATION AND DEFINITION	21
2.7	PUMP DESCRIPTION	22
2.8	INTENDED USE AND IMPROPER USES	22 - 23
2.9	TECHNICAL SPECIFICATIONS	24 - 25

Below is a detailed description of each topic mentioned.

2.1 PUMP IDENTIFICATION



2.1.1 For any communication with the Manufacturer or authorised After-Sales Centres, always specify the data shown on the identification plate of the pump.

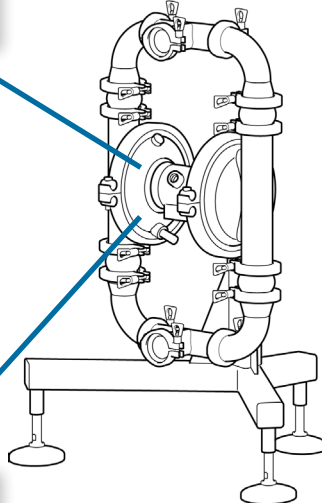
The identification plate contains the following data:

1. Manufacturer's Identification;
2. Manufacturer's address and contact numbers;
3. Pump name;
4. **Type and Composition Code of the pump;**
5. **AISIBOXER ATEX, IECEx, CE, MOCA and FDA marking;**
6. **SANIBOXER ATEX, IECEx, CE, MOCA, FDA and 3-A (Sanitary Standards) marking;**
7. Identification code (serial number);
8. Year of manufacture:

AISIBOXER: CE / ATEX / IECEx / MOCA / FDA marking

Debem S.r.l.
 Via Del Bosco 41
 21052 Busto Arsizio (VA)
 Italy - www.debem.com
 Air-operated diaphragm pump
 name
 ANNO/YEAR 11/2022
 MATR/SERIAL 111111
 TIPO/TYPE AB100A - DTTAT - -
 II 2 G Ex h IIB T4 Gb
 II 2 D Ex h IIIB T135°C Db X

AT: 0°C - +40°C
 PATENT
 MADE IN ITALY



AISIBOXER, SANIBOXER
 DICHIARAZIONE DI CONFORMITÀ AL CONTATTO CON ALIMENTI
 FOOD CONTACT DECLARATION

Con la presente si dichiara che i prodotti denominati AISIBOXER, SANIBOXER forniti per il contatto con tutti gli alimenti.
 We hereby declare that the products AISIBOXER, SANIBOXER supplied for the contact with all type of food

SONO CONFORMI
 Are in compliance

alla seguente legislazione comunitaria:
 with the following European Union legislation:
 - Regolamento (CE) n. 1935/2004
 - Regolamento (CE) n. 2023/2006 (GMP)
 - Regolamento (CE) n. 315/2008
 - Regolamento (CE) n. 1831/2003
 - Regolamento (CE) n. 1831/2003
 - Regolamento (CE) n. 1831/2003
 - Regolamento (CE) n. 1831/2003

alla seguente legislazione italiana:
 with the following Italian legislation:
 - Decreto Ministeriale 21/03/1975 e s.m.i. (acciai inossidabili)
 - DPR 17782 e s.m.
 - D.L. 10/03/2002 n.29

e alla seguente legislazione americana (Food and Drug Administration):
 and with the following american regulation (FDA):
 - Generalmente riconosciute come sicure (GRAS)
 - Generali Integrazioni di Sale - GDS
 - FDA Title 21, Parte 175-159
 - FOOD AND DRUG ADMINISTRATION, TITLE 21, CFR Part 177-159

Questa dichiarazione ha una validità a partire dalla data sotto riportata e sarà annullata in caso di cambiamenti nella progettazione o nella produzione.
 This declaration is valid from the date reported below and will be annulled in case of changes in production or in the design of the product.

Con l'adesione di:
 APPROVATO DAL:
 LUOGO: BUSTO ARSIZIO - DATA: 11/2022

Debem S.r.l.
 Via Del Bosco 41
 21052 Busto Arsizio (VA)
 Italy - www.debem.com
 Air-operated diaphragm pump
 name
 ANNO/YEAR 11/2022
 MATR/SERIAL 111111
 TIPO/TYPE SB100A - DTTAT - -
 II 2 G Ex h IIB T4 Gb
 II 2 D Ex h IIIB T135°C Db X

AT: 0°C - +40°C
 PATENT
 MADE IN ITALY



AISIBOXER, SANIBOXER
 DICHIARAZIONE (CE - UE) DI CONFORMITÀ (CE - UE) OF CONFORMITY

FABBRICATO DA / MANUFACTURED BY
 DEBEM S.R.L. VIA DEL BOSCO 41 - 21052 BUSTO ARSIZIO (VA) - ITALIA
 LA PRESENTE DICHIARAZIONE DI CONFORMITÀ È VALIDATA SOTTO LA RESPONSABILITÀ ESCLUSIVA DEL FABBRICATORE.
 THE PRESENT DECLARATION OF CONFORMITY IS VALIDATED UNDER THE SOLE RESPONSIBILITY OF THE MANUFACTURER.

TIPO / TYPE
 POMPA PNEUMATICA A MEMBRANA - AIR OPERATED DIAPHRAGM PUMP

MARCATURA ATEX / MARKING ATEX
 II 2D Ex h IIB T4 Gb

MODELLO / MODEL
 SB100A - DTTAT - -

CODICE / CODE
 MATRICOLA / SERIAL NUMBER
 111111

PERSONA AUTORIZZATA A CUSTODIRE IL FASCICOLO / PERSON AUTHORIZED TO KEEP THE FILE

 LUOGO PRESSO CUI È CUSTODITO IL FASCICOLO / THE FILE IS KEPT IN
 VALSALDA (VA) - DATA: 11/2022

APPROVATO DA / APPROVED BY

 LUOGO: BUSTO ARSIZIO - DATA: 11/2022

SANIBOXER: CE / ATEX / IECEx / MOCA / FDA / 3-A Sanitary Standards Marking



CAUTION

The nameplate and Declaration of Conformity contain highly important data, allowing the pump's material composition to be recognised (4. Pump Type and Composition Code) essential for a correct assessment of chemical compatibility, temperatures and the area of use in which it can be used. The reported data indicate the ATEX or IECEx execution class (see ATEX Marking or IECEx Marking) for the correct assessment of compatibility with the working environment. IT IS FORBIDDEN to remove and/or alter the identification plate and the data it contains; removal involves forfeiture of the warranty.

2.1.2 The number of this manual is written on the cover. Make a note of the revision code and keep it so that you can request a new copy in case of loss.



2.2 PUMP CONFIGURATION CODE



AISIBOXER and SANIBOXER series Air-operated Pumps have been designed and manufactured in different sizes and configurations (composition materials) with the respective certifications.

The identification plate of the pump contains the product model and specifies the composition materials of the pump, which is reported and explained below to determine the suitability and compatibility of the pump with the temperatures, the fluid (process and or/sanitisation and washing) to be pumped and the surrounding environment.



CAUTION: risk of damage and product leakage.

Please note that the pump must always be installed in compliance with the characteristics of the pump composition materials shown on the Identification plate (see sections 2.2 CONFIGURATION CODE and Section 2.8 TECHNICAL SPECIFICATIONS).

It is always necessary to check the suitability of the chemical compatibility and temperature of the fluid (process and/or washing and sanitisation) if necessary by subjecting it to prolonged tests) before installing and using the pump.

Example of Pump Configuration Code:

SB001	A-	D	T	T	A	T	C	C	PX	R	X
PUMP MODEL	PUMP BODY	AIR SIDE DIA-PHRAGM	FLUID SIDE DIAPHRAGM	BALLS	BALL SEATS	SEALS	FITTINGS	FITTINGS	SETUP	VALVES	SENSORE MEMBRANE
AB001 AISIBoxer 01*	AA AISI 304	D EPDM	W EPDM WHITE	A AISI 316L	A AISI 316L	W EPDM WHITE	C BS4852 I DIN 11851	 C Zone 1 - 21 Z IECEx	Standard PC Cycle counter	R Concentric E Eccentric	On Request
AB002 AISIBoxer 02*			T PTFE	T PTFE		T PTFE					
AB003 AISIBoxer 03*			T PTFE	T PTFE		T PTFE					
SB001 SANIBoxer 01*	AA AISI 316L	D EPDM	W EPDM WHITE	A AISI 316L	A AISI 316L	W EPDM WHITE	C BS4852 I DIN 11851	 C Zone 1 - 21 Z IECEx	Standard PC Cycle counter	R Concentric E Eccentric	S Standard X Version ATEX
SB002 SANIBoxer 02*			T PTFE	T PTFE		T PTFE					
SB003 SANIBoxer 03*			T PTFE	T PTFE		T PTFE					

* **Note:** The support/removal stand is optional and only supplied on request. The dimensions for the stand refer to the STANDARD model proposed by DEBEM. The "diaphragm rupture" sensors are only supplied as standard (disassembled - in Kit with Manufacturer's Certificate and Technical Data Sheet) on SANIBOXER pumps, while on AISIBOXER pumps they are optional and only supplied on request.

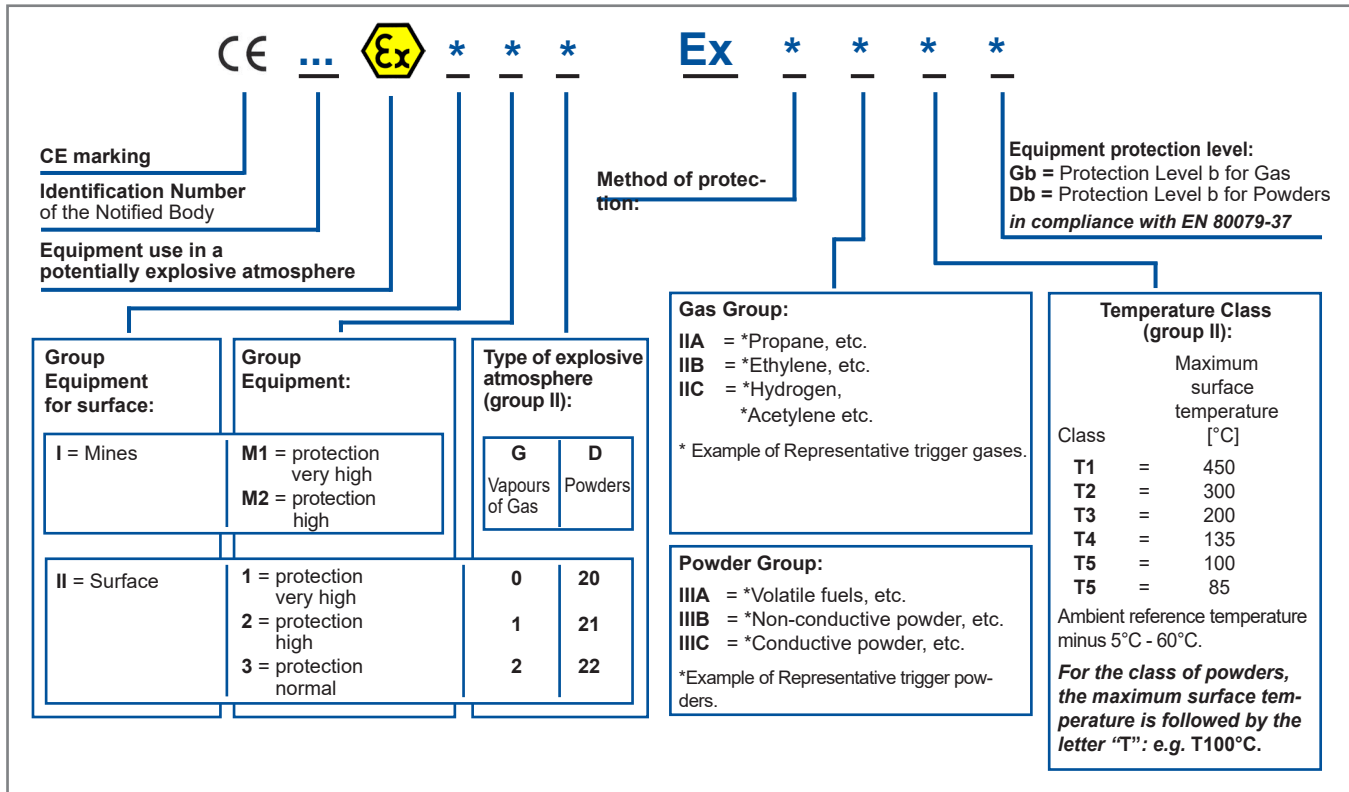


2.3 ATEX MARKING AND DEFINITION



All AISIBOXER and SANIBOXER Air-operated Pumps comply with the Community Directives for the free circulation of goods applicable to them (*see Declaration of Conformity*).

They are produced as standard in ATEX execution II 2G Ex h IIB T4 Gb and II 2D Ex h IIB T135°C Db X for use in "Zone 1 - Zone 21".



CAUTION

The Identification Plate of the pump shows the ATEX marking and the category of the equipment. Check compliance with the classification of the installation "Zone" before carrying out the installation. The equipment user is responsible for classifying their installation zone.

Below is the definition of the ATEX marking for each execution.



: Safety symbol in accordance with DIN 40012 attachment A.

II 2G/II 2D: Surface equipment for use in areas with the presence of gases, vapours, or mists, as well as clouds of combustible dust in the air, which occur occasionally during normal operation both in the outdoor and the indoor zone (Zone 1- Zone 21).

Ex h: Protection equipment «c», or «b», or «k», in accordance with EN 80079-37.

IIB: Excluding the following powders: conductive powder.

T4/T135°C: Temperature class permitted. The processed fluid temperature value must fall within such class range and the user must comply with the instructions contained in the manual and with the current laws. The user must also take into account the ignition temperatures of the gases, vapours or mists and combustible dust clouds in the air in the area of use.

Gb: Protection level b for Gas according to EN 80079-36:16.

Db: Protection level b for Dust according to EN 80079-36:16.

X: The internal area of the pump is not ATEX, that is, it cannot process powders.

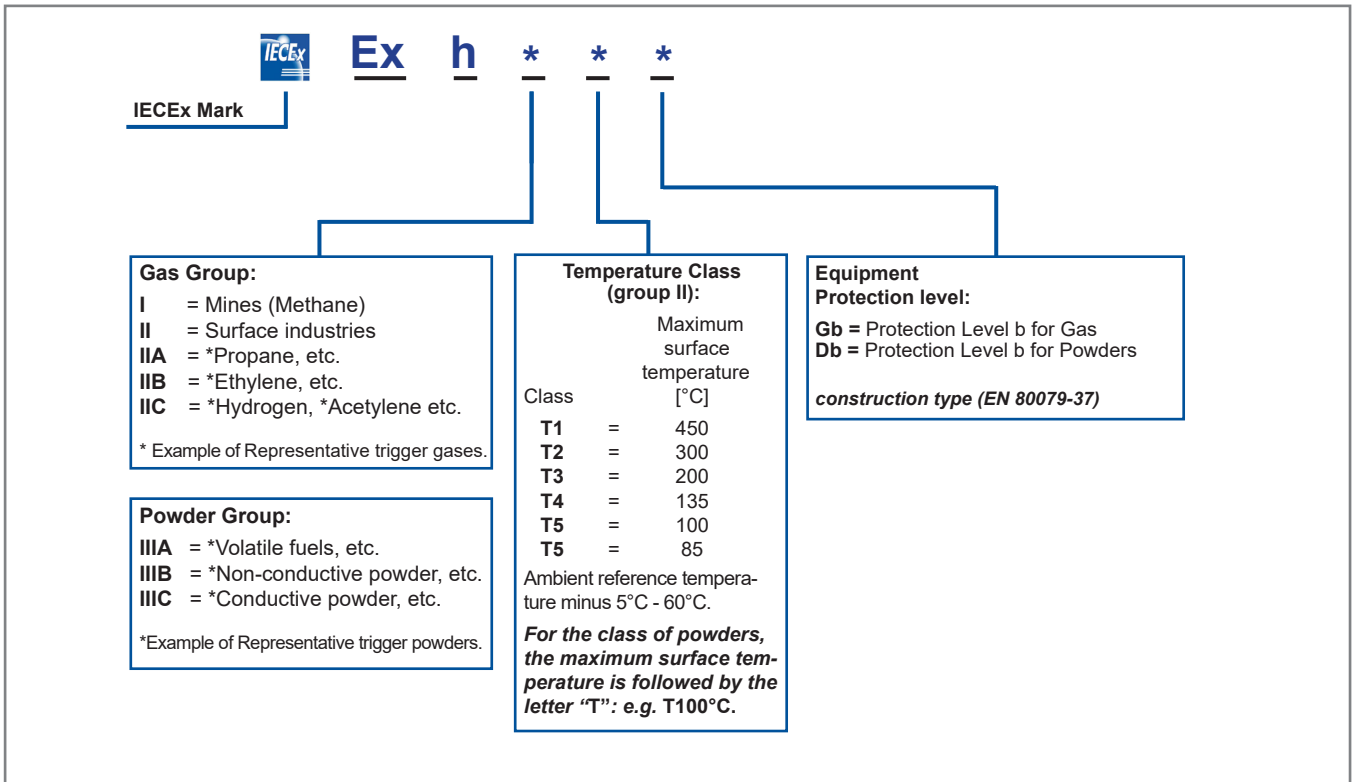


2.4 IECEX MARKING AND DEFINITION



All AISIBOXER and SANIBOXER Air-operated Pumps comply with the Community Directives for the free circulation of goods applicable to them (*see Declaration of Conformity*).

AISIBOXER and SANIBOXER Air-operated pumps are manufactured in CONDUCT version in IECEX execution with class **Ex h IIB T4 Gb** and **Ex h IIIC T135°C Db**.



CAUTION

The Identification Plate of the pump shows the IECEX marking and the category of the equipment. **Check compliance with the classification of the installation "Zone" before carrying out the installation. The equipment user is responsible for classifying their installation zone.**

Below is the definition of the IECEX marking of each execution.

Ex h : Protection equipment «c», «b», or «k», in accordance with EN 80079-37.

IIB : excluding the following gases: hydrogen, acetylene, carbon disulphide.

IIIB : excluding the following powders: conductive powder.

T4/T135°C : class of admitted temperatures. The processed fluid temperature value must fall within such class range and the user must comply with the instructions contained in the manual and with the current laws. The user must also take into account the ignition temperatures of the gases, vapours or mists and combustible dust clouds in the air in the area of use.

The Technical File is deposited with the Notified Body No. 0477 Eurofins Product Testing Italy S.r.l. Certificate of Conformity CoC No IECEX EUT 23.0008X dated 22-12-2023.



2.5 MOCA / FDA® DECLARATION AND DEFINITION



All SANIBOXER and AISIBOXER series Air-operated pumps comply with Directive 2006/42/EC and EU Regulation 1935/2004 on Materials and Objects intended for Food Contact - MOCA for the free movement of goods within the European market ([see MOCA Declaration of Conformity](#)) and are also FDA-compliant and subject to rigorous testing and stringent safety standards for globally recognised conformity approval.



The Air-operated pumps of the SANIBOXER and AISIBOXER series have been designed in accordance with UNI EN ISO 13951:2012 (Pumps for liquids - Safety requirements Agrifood applications) and comply with Cleanliness Level 3. The entire range of AISIBOXER and SANIBOXER pumps are made of electropolished AISI 316L steel in accordance with ASTM 8912 and have a roughness of $Ra < 0.8 \mu m$ (internal and external).

The results of the Migration Tests of the parts in contact with food were carried out by an accredited Laboratory in compliance with EU Regulation No. 10/2011 and Italian Ministerial Decree 21/03/1973 (Articles 36 and 37), and they comply with MOCA requirements.

In addition, the SANIBOXER and AISIBOXER series Air-operated pumps comply with the US Food and Drug Administration (FDA) Title 21 legislation as generally recognised as safe (GRAS).

The MOCA marking is a guarantee of food safety within Europe, while FDA compliance is recognised worldwide.

The entire production process of materials and objects in contact with food is managed with DEBEM internal Quality System procedures to ensure product traceability in compliance with EU Regulation no. 2023/2006.

DEBEM continuously pursues MOCA and FDA compliance through control procedures for monitoring compliance with defined food safety standards and traceability of materials and objects intended for food contact. The constant commitment of this activity is a guarantee of safety from a hygiene-sanitary point of view and is aimed at not compromising the physical, chemical and organoleptic characteristics of the food in order to protect public health.



CAUTION

The nameplate of the SANIBOXER and AISIBOXER series pump bears the CE and the MOCA markings. Always check compliance with the intended use and/or installation before installation.

It is the responsibility of the user and/or installer of the equipment to verify compliance with the intended installation.

It is always the responsibility of the installer and/or user to assess the microbiological hazards that could occur in the pump and/or system in which it is to be installed and to carry out all the necessary tests to adopt an appropriate risk reduction.

2.6 3-A® CERTIFICATION DEFINITION



In addition to complying with MOCA and FDA requirements, all SANIBOXER series Air-operated pumps also comply with Sanitary Standards 3-A (Sanitary Standards), which define specifications and best practices for the design, manufacture, installation, use and cleaning and sanitising of hygienic equipment. SANIBOXER series Air-operated pumps are subjected to rigorous testing and strict safety standards for approval to globally recognised 3-A (Sanitary Standards) standards.



The 3-A (Sanitary Standards) certification is a guarantee of sanitary safety worldwide. DEBEM continuously pursues 3-A (Sanitary Standards) compliance through control procedures to monitor compliance with defined sanitary safety standards and traceability of materials and objects intended for food contact. The constant commitment of this activity is a guarantee of safety from a hygiene-sanitary point of view and is aimed at not compromising the physical, chemical and organoleptic characteristics of the food in order to protect public health.



CAUTION

It is the responsibility of the user and/or installer of the equipment to verify compliance with the intended installation.

It is always the responsibility of the installer and/or user to assess the microbiological hazards that could occur in the pump and/or system in which it is to be installed and to carry out all the necessary tests to adopt an appropriate risk reduction.

Certification includes a unique authorisation number and quality identifier 3-A. The 3-A DEBEM certificate number is 1544.

2.7 PUMP DESCRIPTION



2.7.1 OPERATING PRINCIPLE

AISIBOXER and SANIBOXER Air-operated pumps consist of a Pneumatic Exchanger with a reduced number of components, which controls the diaphragms of the two pumping units via a central pin. The diaphragms integral with the central driving pin are operated with reciprocating motion in two stages (suction-delivery) and constitute the pumping elements.

The valve bodies with the respective balls are housed between the two pumping chambers and the pump delivery and suction ducts.

The two-stage operating principle takes place simultaneously (while one chamber is suction, the second chamber is discharged), ensuring negative suction, high head and the pumping of fluids with high viscosity and suspended solids (see Section 2.8 TECHNICAL SPECIFICATIONS).

2.7.2 INSTALLATION REQUIREMENTS AND FEATURES

The AISIBOXER and SANIBOXER series Air-operated pumps are self-priming, can run dry and allow the speed to be varied even during operation.

They can be used for recirculating and pumping agro-food liquids with high viscosity and suspended solids (see Section 2.8 TECHNICAL SPECIFICATIONS).

The pump stand (optional, supplied on request) facilitates manual emptying of the pump during cleaning and sanitising. The AISIBOXER and SANIBOXER series Air-operated pumps are designed for horizontal, negative and positive suction head installation on a suitable stand.

The suction and delivery pipes can be suitably sized (never smaller than the pump) to ensure minimum flow rates and optimal performance.

2.8 INTENDED USE AND IMPROPER USES



2.8.1 INTENDED USE

The AISIBOXER and SANIBOXER series air-operated pumps have been designed and manufactured with food safety in mind, for pumping pharmaceutical, agro-food and cosmetic liquids and suitable fluids for cleaning and sanitising operations at temperatures compatible with the pump's material composition and apparent viscosity between 1 and 20,000 Cps at 20°C (see pump model data sheet); **for viscosities higher than 20,000 Cps at 20°C, physical factors intervene that require a correct assessment, therefore it is always necessary to contact the Manufacturer's Technical Department in advance.**



CAUTION

The maximum temperature limits are given by the internal materials (seals, balls and diaphragms); **if the maximum temperature is exceeded, compliance with the ATEX marking on the pump is no longer guaranteed.**

Due to the countless variety of products and fluid compositions (process, flushing, and/or sanitising), the user is considered the most knowledgeable regarding chemical and temperature compatibility with the pump materials.

It is always the responsibility of the installer and/or user to assess the microbiological hazards that could occur in the pump and/or system in which it is to be installed and to carry out all necessary tests to adopt an appropriate risk reduction.

2.8.2 CALCULATION OF THE MAXIMUM FLUID TEMPERATURE (FOR ZONE 1 - ZONE 21)

Below is the formula for determining the maximum permissible fluid process temperature for AISIBOXER and SANIBOXER pumps in Ex h IIB T4 Gb execution II 2G for installations in Zone 1 - Zone 21.

Temperature Class ATEX		Calculation Factor (only for Zone 1- Zone 21)		Maximum temperature of Fluid process
ATEX T4	-	Tx 55°C	=	Tf 80°C



2.8.3 TEMPERATURE CLASSES FOR PUMPS TO BE INSTALLED IN AN EXPLOSIVE ENVIRONMENT:

The temperature class corresponding to the protection against the risk of explosion of the pumps designed for use in Zone 1 with the presence of explosive atmospheres is T135°C (T4); all the data for calculating the maximum fluid temperature under the operating conditions are shown below.



NOTE

The equipment's maximum temperature has been determined with no powder deposits on the external and internal surfaces.

Definition of the Calculation Data (Zone 1):

- T4** = ATEX temperature class 135°C;
- Ta** = maximum ambient temperature 40°C;
- Tl** = maximum temperature for dry use of the pump in the workplace (50°C);
- Δs** = safety factor (5°C);
- Tx** = calculation factor (Tl + Δs) only for Zone 1;
- Tf** = maximum allowed fluid processing temperature.



CAUTION

In consideration of the admitted ambient temperature variation range in Zone 1, fluid service temperature values higher than those indicated above will not permit compliance to the corresponding temperature classes, respectively T4 (135°C) and (150°C), besides causing damage to the pump.

Where the user presumes that the temperature limits set forth on the product marking and in this manual may be exceeded, a detection and protective device must be installed on the system to prevent the maximum allowed temperature from being reached.



NOTE

The user must consider the ratio between the pump's maximum surface temperature indicated on the marking and the minimum ignition temperature of the layers and clouds of powder.

2.8.4 IMPROPER USES

Any use of the AISIBOXER and SANIBOXER pumps other than that described above and specified in [Section 2.8 TECHNICAL SPECIFICATIONS](#) is considered improper and therefore prohibited by the manufacturer DEBEM.

In particular, the use of the AISIBOXER and SANIBOXER pump is prohibited for:

- production of vacuum;
- operation as a shut-off valve, as a check valve (non-return valve), or as a metering valve;
- pump operation with powders of all types and kinds (flammable and non);
- use with fluids (process, washing, and/or sanitising fluids) that are chemically incompatible with the construction materials;
- operation with air pressures, process temperatures (process, washing, and/or sanitising) and/or functional characteristics that are incompatible with the Technical Data of the pump and/or the Certification marking affixed;
- pump operation in potentially explosive environments that are not classified and/or compatible with the pump's type *of execution* (see *Certification marking affixed and Declaration of Conformity*).
- unsuitable use of the pump and/or (incorrect installation);
- the use of the pump without the emptying stand for cleaning and sanitising operations;
- the use of the pump with "Diaphragm rupture" sensors (if any), which are unsuitable and/or have an ATEX classification that does not comply with the classification of the installation environment;
- the use of the pump with "Diaphragm rupture" sensors positioned in the upper part of the pump body;
- use with flammable and explosive fluids not permitted by the marking.



CAUTION

The risks associated with the use of the pumps under the exact conditions outlined in the Manufacturer's use and maintenance manual have been analysed, whilst the analysis of the risks associated with the interface with other system components must be carried out by the installer/user.

Any use of the pump other than that covered by the Manufacturer in the Original Instructions is prohibited and will invalidate the Warranty and safety requirements.



2.9 TECHNICAL SPECIFICATIONS



The technical performance data of the AISIBOXER and SANIBOXER series pumps refer to standard designs. The 'MAX flow rate' values refer to pumping water at 20°C with an immersed suction pipe with a head of 50 cm (see figure 1). The "Suction Capacity" values are measured with a vacuum gauge.



NOTE

the declared capacity of dry negative suction refers to the intake of fluids with a viscosity and specific weight equal to 1. The performance and duration of the pump's diaphragms depend on the following factors:

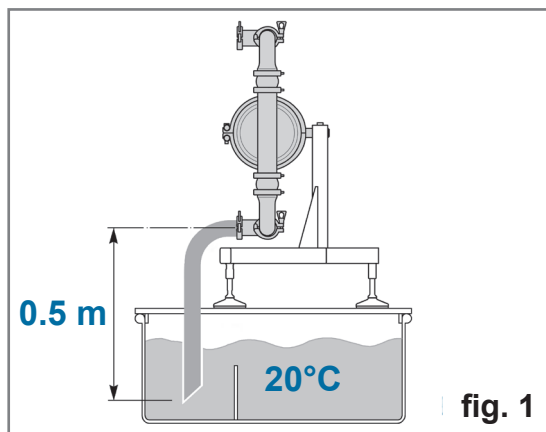
- The fluid's viscosity and specific weight;
- The length and diameter of the suction pipe and/or presence of suction bends on the product circuit;
- Presence of abrasive solid particles.

NEGATIVE ASPIRATION: with Max fluids up to 5,000 Cps at 20°C and a maximum specific weight of 1.4 Kg/l.

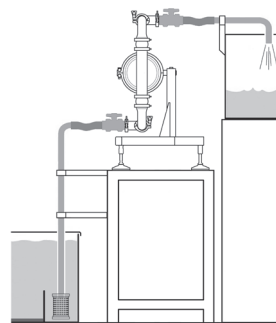
POSITIVE SUCTION: with fluids max up to 20,000 Cps at 20°C (see Pump model).

Higher viscosities result in physical factors that require correct evaluation; therefore, it is always necessary to contact the Manufacturer's Technical Department in advance.

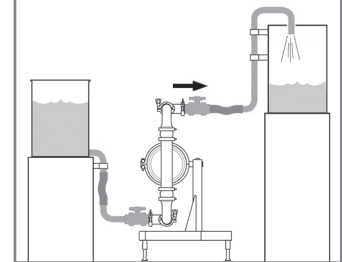
The tables below show the technical data and approximate overall dimensions and weights; for dimensional values and supply-specific technical data, please refer to the Technical Data Sheets of the specific model.



NEGATIVE SUCTION Max.
5,000 Cps at 20°C
(specific weight of 1.4 Kg/l)



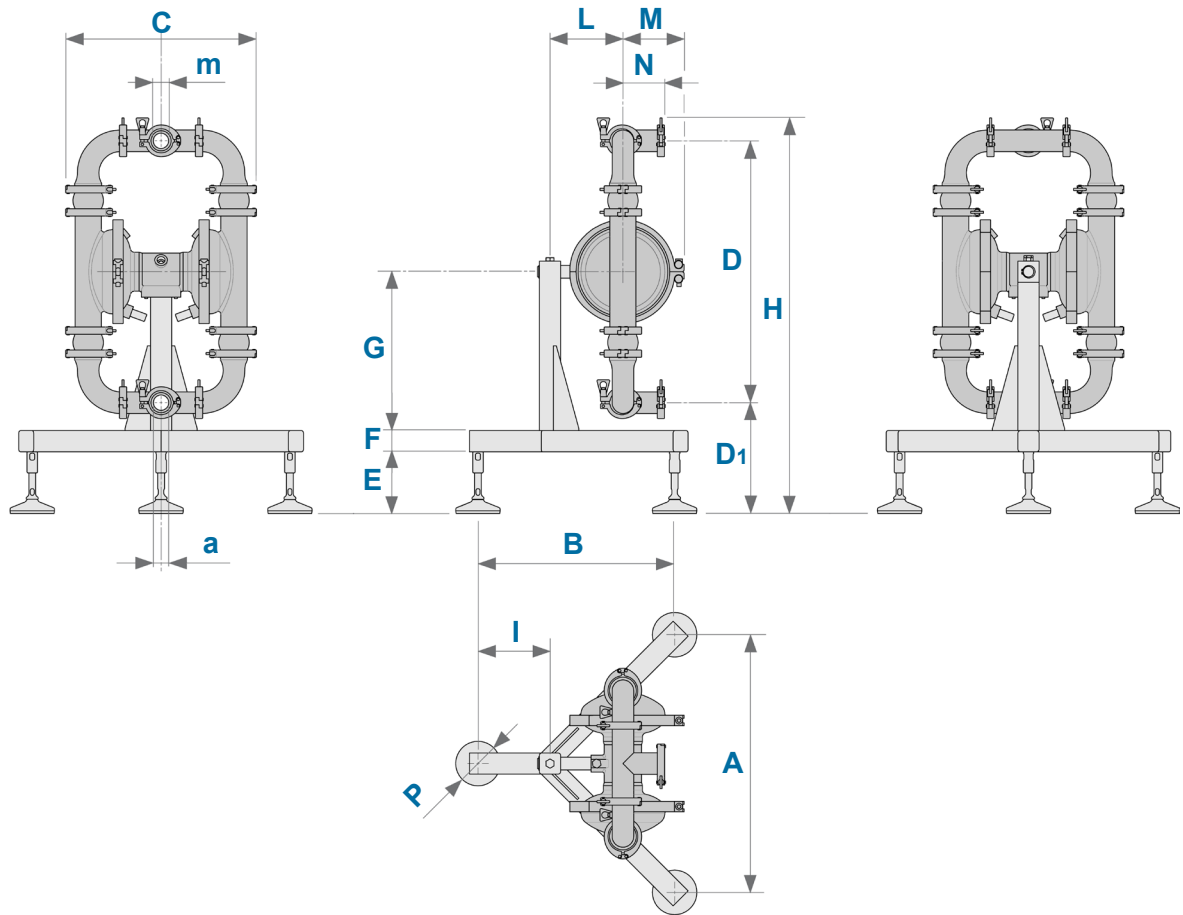
POSITIVE SUCTION
Max 20,000 Cps a 20°C



TECHNICAL DATA	unit of measurement	AISIBOXER 01	AISIBOXER 02	AISIBOXER 03	AISIBOXER 04	SANIBOXER 01	SANIBOXER 02	SANIBOXER 03	SANIBOXER 04
Suction connection - clamp	inches	1"	1 1/2"	2"	3"	1" (3-A)	1 1/2" (3-A)	2" (3-A)	3" (3-A)
Delivery connection - clamp	inches	1"	1 1/2"	2"	3"	1" (3-A)	1 1/2" (3-A)	2" (3-A)	3" (3-A)
Air fitting	BSPP	3/8"f	3/8"f	1/2"f	3/4"f	3/8"f	3/8"f	1/2"f	3/4"f
Air pressure (MIN-MAX)	bar	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8
Solids passing MAX*	∅ mm	5	7	15	19	5	7	15	19
Construction material	AISI	316L	316L	316L	316L	316L	316L	316L	316L
Internal roughness polishing	µm	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8
External roughness polishing	µm	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8	Ra < 0.8
Cleaning level (UNI EN ISO 13951:2012)	Level	3	3	3	3	3	3	3	3
Diaphragm rupture sensor	--	optional	optional	optional	optional	standard	standard	standard	standard
Support/emptying stand	--	optional	optional	optional	optional	optional	optional	optional	optional
Dry suction capacity (PTFE diaphragm)	m	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Max head (water 20°C)	m	80	80	80	80	80	80	80	80
MAX water flow rate 20°C (immersed suction manifold)	l/min	100	160	340	..	100	160	340	..
Weight (empty)	Kg	16	22	38	70	16	22	38	70
Noise (5 bar PTFE balls)	dB (A)	70	75	80	80	70	75	80	80

* Note: The values given are for the maximum diameter of a single solid; agglomerates of solids of the same diameter have not been taken into account as it is not possible to predict their movement within the pump.





PUMP	MATERIAL	WEIGHT Kg	clamps/inches		DIMENSIONS mm													
			a	m	A	B	C	D	D ₁	E	F	G	H	I	L	M	N	∅P
AISIBOXER 01*	AISI 316L stainless steel	16	1"	1"	372	278	274	366	180	20	35	308	599	95	136	92	70	40
AISIBOXER 02*	AISI 316L stainless steel	22	1 1/2"	1 1/2"	372	278	370	466	129	20	35	308	650	95	136	110	79	40
AISIBOXER 03*	AISI 316L stainless steel	38	2"	2"	608	464	450	616	142	25	50	375	812	170	172	145	98	75
AISIBOXER 04*	AISI 316L stainless steel	70	3"	3"	602	476	597	888	171	25	60	530	1112	185	242	200	104	75
SANIBOXER 01*	AISI 316L stainless steel	16	1"	1"	372	278	274	366	236	86	35	298	656	95	136	92	70	65
SANIBOXER 02*	AISI 316L stainless steel	22	1 1/2"	1 1/2"	372	278	390	467	186	86	35	298	707	95	136	110	79	65
SANIBOXER 03*	AISI 316L stainless steel	38	2"	2"	608	464	449	618	202	86	50	375	874	170	172	145	98	65
SANIBOXER 04*	AISI 316L stainless steel	70	3"	3"	601	476	597	888	232	86	60	530	1174	185	242	200	104	65

* Note: The support/removal stand is optional and is only supplied on request. The dimensions for the stand refer to the STANDARD model proposed by DEBEM.

"Diaphragm rupture" sensors are supplied as standard (disassembled - in Kit with Manufacturer's Certificate and Technical Data Sheet) only on SANIBOXER pumps, while on AISIBOXER pumps they are optional and are only supplied on request.



CHAPTER 3

This chapter deals with very important safety issues and how to safely install, use, or maintain the AISIBOXER and SANIBOXER series pumps. Strictly follow these simple principles and rules throughout the life of the pump.

THIS PART INCLUDES THE FOLLOWING TITLES	PAGE
3.1 SAFETY RULES	27 - 31

The following sections describe how to behave.

3.1 SAFETY RULES



The Original Instructions must always be available to operators. Dangerous or hazardous practices or interventions not complying with the Safety Rules and with the recommendations contained herein may cause material damage, serious injuries and, in extreme cases, even death for which the Manufacturer cannot be held responsible.

- 3.1.1 Personnel authorised for installation, inspection and maintenance of the pumps must have a suitable technical preparation, in addition to specific knowledge of the product to be pumped and for cleaning and sanitising operations, specific knowledge of chemical compatibility with materials of the pump and connected risks. In addition, for use in ATEX zones, he must have specialist knowledge of potentially explosive atmospheres and associated risks.



CAUTION

These instructions are indispensable for the compliance of the pump with the requirements (Agro-Food, Cosmetic and/or Pharmaceutical) laid down in Directive 2006/42/EC and EU Regulation No. 1935/2004 on Materials and Objects intended for Food Contact (MOCA), the FDA and 3-A (Sanitary Standards) health requirements and the requirements of Directive 2014/34/EU and must therefore be: available, known, understood and used by Operators and Technicians.

- 3.1.2 Any use of the pump outside the instructions given in the manufacturer's operating and maintenance manual invalidates the safety requirements of the certification and marking affixed for food safety and health protection and/or protection against explosion hazards.



CAUTION

The maximum allowed temperature for process fluids (in zone 1 and zone 21) is equal to 65°C or 80°C depending on the construction materials of the pump; **if exceeded, compliance with the affixed ATEX marking is not ensured.**

- 3.1.3 The air supply to the pump must always include the installation of a suitable shut-off valve (Emergency), 3-way valve and non-return valve, and the pressure must never be less than 2 bar or more than 8 bar. The pneumatic motor of the AISIBOXER and SANIBOXER pumps is self-lubricated (no further lubrication is required); feed the pump with dry and NON-lubricated filtered air. It is FORBIDDEN to feed the pump with lubricated, unfiltered and/or undried air.



CAUTION: danger of fluid entering the compressed air circuit and being discharged into the environment.

Installation of the pump without a shut-off valve, 3-way valve and check valve on the air supply line is prohibited to prevent the pumped fluid from accidentally entering the pneumatic circuit in the event of a diaphragm rupture. In battery installations, the check valve must also be installed on each pump.

- 3.1.4 The air of the pump's pneumatic circuit must always be discharged in a free, non-dusty atmosphere and free of saturated vapours that can damage the internal circuit.



CAUTION: danger of damage to the internal pneumatic circuit.

For installations and operations within environments with a heavy-duty atmosphere (dust, vapours, or saturated vapours), it is necessary to install a pipe and fittings (of suitable materials) to bring the air discharge point outside the operating environment.

- 3.1.5 Pump installations with high delivery heads, very dense fluids, high specific weight, and/or high back-pressures may cause the pneumatic circuit outlets to freeze.



CAUTION: danger of air discharge freezing and loss of efficiency and/or pump shutdown.

Provide for the installation of a glycol additive suitable for the environment of use (Agro-Food, Cosmetic and/or Pharmaceutical) on the air supply line upstream of the pump.

- 3.1.6 Where the user presumes that the temperature limits set forth in this manual may be exceeded, a protective device must be installed on the system to prevent the maximum allowed temperature from being reached by the pump.



CAUTION: risk of damage to the pump and voiding of the warranty and/or compliance with ATEX marking affixed and/or MOCA, FDA and 3-A.

It is forbidden to use the pump at temperatures higher than those permitted and specified in the manual; **if the maximum temperature is exceeded, conformity with the marking is not guaranteed.**



- 3.1.7 The AISIBOXER and SANIBOXER series pumps cannot be used for pumping flammable food fluids that are not permitted by the ATEX marking affixed to them .



CAUTION: danger of explosion.

The use of AISIBOXER and SANIBOXER series pumps for pumping flammable fluids and/or for use in unclassified potentially explosive environments is prohibited.

- 3.1.8 It is always necessary to carefully verify (if necessary by performing extensive tests) the suitability and chemical and temperature compatibility of the pump with the fluid (process, washing and sanitisation) before installing and using the pump.



CAUTION: danger of chemical reactions and high temperatures; possible breakage and/or spillage of the product.

It is forbidden to use the pump with fluids (process, cleaning and sanitising fluids) that have not been tested and/or are not compatible (chemical reactions and high temperatures) with the component materials.

- 3.1.9 When using the pump with aggressive washing and/or sanitising liquids or with liquids that may represent a health hazard, you must install suitable protection on the pump to contain, convey and collect the product in a safe area and signal any spills.



CAUTION: danger of pollution, contamination, injuries or, in extreme cases, death.

It is forbidden to install the pump in the absence of suitable protection for the containment and collection of aggressive or toxic liquids or liquids that may represent a health hazard.

- 3.1.10 Installation requires suitable valves (with a larger diameter than the pump) for the interception and sectioning of the product upstream and downstream of the pump to allow safe operation in case of anomalies and/or disassembly.



CAUTION: danger of uncontrolled product leakage.

Installing the pump without suitable on-off valves on the intake and delivery sides is forbidden.

- 3.1.11 The pump does not perform valve functions and does not ensure the seal against the non-return of the fluid. In the event of installation with a high delivery head and/or a fluid of high specific weight, it is necessary to install a suitable check valve (suitably sized) on the duct near the pump.



CAUTION: danger of uncontrolled product leakage.

Installations with a high delivery head and/or a fluid of high specific weight can generate strong back-pressures that prematurely wear the diaphragms and/or cause a possible breakage.

- 3.1.12 In installations where the presence of solid particulate suspended in the product is expected, install a suitable strainer on the suction inlet, with a surface area of 2.5 or 3 times the area of the suction pipe and passages smaller than the size of the particulate allowed by the pump.



CAUTION: risk of damage to the pump

Installing the pump without a suitable strainer or with an insufficient and undersized fluid flow rate and/or passage larger than the particulate allowed by the pump model is forbidden.

- 3.1.13 In general, all fittings, ducts, valves, and/or filters installed along the entire air circuit and product circuit, upstream and downstream of the pump, must never have a flow rate lower than the nominal values of the pump.



CAUTION: danger of rupture of diaphragms and product leakage

In addition to determining poor efficiency and performance, the presence of flow rate points lower than the nominal values of the pump along the product circuit ducts, upstream and downstream of the pump, can prematurely wear the diaphragms and/or cause breakage.

- 3.1.14 Clamp flanges of a suitable type and size must be used for the connection of the pump product circuit. The SANIBOXER series pumps are 3-A (Sanitary Standards) certified. To ensure compliance with the standard, the system (circuit and connections) in which it is installed must also be made from 3-A (Sanitary Standards) certified components.



CAUTION: danger of non-compliance and downgrading of the pump.

The use of system components (circuit and connections) made of unsuitable and/or non-certified construction material other than that of the pump is prohibited.

- 3.1.15 Using the pump in a potentially explosive environment must always provide for efficient earthing, regardless of any gear connected to it. To pump flammable liquids (permitted by the affixed marking), it is essential to use suitable pumps equipped with ATEX marking, with adequate earthing.



CAUTION: risk of explosions due to electrostatic charges.

Lack of earthing or incorrect earthing of the pump will cancel the requirements for safety and protection against the risk of explosion provided for by the affixed ATEX marking.

- 3.1.16 The presence of vortices on the suction point results in cavitation and malfunction. During operation, check for any abnormal noise and make sure the outlet fluid does not contain “gas”.



CAUTION: in the event of abnormal noise, stop the pump immediately.

Abnormal noise or the presence of “gas” in the fluid exiting the pump indicate an anomalous condition for which it is always necessary to determine the cause before continuing use.

- 3.1.17 Depending on the place of installation of the pump and the duration of exposure of operators near it, it is necessary to detect the emitted noise.



CAUTION: risk of exposure to noise.

If necessary, use suitable sound-absorbing barriers and/or Personal Protective Equipment (such as sound-absorbing plugs or earmuffs).

- 3.1.18 The diaphragms, (internal and in contact with the product) are components subject to wear. Their duration is strongly affected by the conditions of use and by the chemical and physical stresses to which they are subjected. From tests carried out on thousands of installed pumps (with heads equal to 0.5 m at 20°C), it was found that the duration exceeds 100,000,000 (one hundred million) cycles.



CAUTION: risk of rupture of diaphragms.

For safety reasons, the pump diaphragms must be disassembled and checked **every 10,000,000 (ten million) cycles and their replacement every 20,000,000 (twenty million) cycles.**

- 3.1.19 The operation of the pump must be adjusted only by choking the supply of compressed air through the adjustment valve or flow regulator.



CAUTION: risk of premature wear and/or diaphragm rupture.

It is forbidden to close or choke the shut-off valves of the product suction duct during pump operation. Changing the general performance and head of the pump and/or subjecting the diaphragms to strong stress affects their duration.

- 3.1.20 The pneumatic exchanger components (shaft included) are built with materials that are not specifically resistant to aggressive chemical sanitisation products; if the diaphragms rupture, the fluid can enter the pneumatic exchanger and the environment through the discharge circuit and damage the components.



CAUTION: damage of the pneumatic exchanger.

If the diaphragms rupture and come into contact with aggressive sanitisation fluid, it is necessary to replace the pneumatic exchanger.

- 3.1.21 The presence of dust and/or deposits on the external and internal surfaces of the pump can negatively affect the process temperatures. In environments with a potentially explosive atmosphere, it can even compromise safety and cancel the requirements envisaged by the affixed ATEX marking.



CAUTION: risk of overheating

It is necessary to periodically verify the absence of dust and/or deposits from the external and internal surfaces of the pump and, if necessary, remove and clean them with a damp cloth. It is forbidden to use the pump with powders and dehydrated and/or solid materials of any type and kind (flammable and non).

- 3.1.22 The silencer and the compressed air supply fitting must be disassembled in the absence of dust. Before disassembling, clean the outside of the pump to prevent deposits and impurities from entering the air circuit.



CAUTION: risk of damage to the pneumatic exchanger.

Before reassembling the silencer and the compressed air supply fitting on the pump, make sure that no deposited impurities or dust enter the pneumatic distributor of the pump.

- 3.1.23 In severe conditions, the pump can reach significant external temperatures (Max 70°C) during its intended operation; in these cases, it is necessary to provide a suitable guard and/or marking to signal the residual risk.



CAUTION: risk of high temperatures and/or burns.

Before intervening or coming into contact with the external surfaces of the pump, it is recommended to wait for it to cool and/or wear protective gloves.

- 3.1.24 Before disassembling the pump, the residual pressure of the internal pneumatic circuit must always be discharged by operating as described in Section [“5.2 PUMP STOP”](#).



CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with suitable ratchet straps.

- 3.1.25 The AISIBOXER and SANIBOXER series pumps comply with the Cleanliness Level 3 established by UNI EN ISO standard 13951:2012; in order to maintain the safety features unchanged, it is necessary to comply with the Manufacturer's instructions ([see Chapter 6 CLEANING AND SANITISING](#)).



CAUTION: risk of ferrous contamination and/or harm to health.

It is forbidden to use tools, abrasive and/or ferrous materials on the interior surfaces in contact with the food and exterior surfaces; the danger of food and/or ferrous contamination of the food ([see Section 6.4 MANUAL WASHING](#)). Using pickling and cleaning agents with chlorinated substances, e.g. hydrochloric acid or muriatic acid, on stainless steel parts is prohibited.

- 3.1.26 Residues of food fluid can cause dangerous contamination. Always wash and empty the internal circuit of the product and wash and treat the pump, before disassembling, storing and/or shipping it to the Manufacturer.



CAUTION: risk of environmental contamination and/or harm to health.

It is forbidden to disassemble, store, and/or return the pump with product residues, or not properly washed and sanitised to the Manufacturer or a Service Centre. Always complete and affix the wash and sanitisation form ([see Section 8.1.4 PUMP WASHING FORM](#)) to the pump after treatment and before dispatch; absence of the form or failure to complete it will result in NON-CONFORMITY in acceptance. Residues of food fluid can cause dangerous contamination. Always wash and sanitise the internal circuit of the product and wash and treat the pump before disassembling, storing and/or shipping it to the Manufacturer.

- 3.1.27 Using suitable cleaning and sanitising agents and respecting the manufacturer's intervention procedures allows food safety requirements to be met and public health to be safeguarded. The personnel involved in cleaning and sanitising processes must be familiar with and comply with the food safety regulations laid down for the working environment (Agro-Food, Cosmetic and/or Pharmaceutical) and with the procedures and methods laid down by the pump manufacturer.



CAUTION: risk of food contamination and/or harm to health.

It is forbidden to use cleaning and/or sanitising agents that are unsuitable and/or not certified for use in the food industry and/or that may subsequently release hazardous residues upon contact with food. It is forbidden not to properly plan and carry out the cleaning and sanitising operations prescribed by the pump manufacturer and/or not to comply with the safety procedures laid down (*see Chapter 6 CLEANING AND SANITISING*).

- 3.1.28 At the end of the washing cycle, all pump surfaces must be sanitised with particular care for the surfaces in contact with the food. Rinse the surfaces in contact with the foodstuff thoroughly with demineralised water and/or softened potable water and empty the pump before putting the pump back into production to remove traces of sanitiser (*see Chapter 6 CLEANING AND SANITISING*).



CAUTION: risk of food contamination and/or harm to health.

It is forbidden to use the pump without proper scheduled and periodic sanitisation.

- 3.1.29 In addition to fulfilling their primary function, the components of the AISIBOXER and SANIBOXER series pumps are designed and manufactured to ensure important general and food safety functions that directly affect the organoleptic and food safety of the processed fluid. **When replacing worn parts, only use original spare parts suitable for the pump model and markings.**



CAUTION: danger of lack of safety

Failure to comply with the above may result in dangers for the Operator, Technicians, people, the pump and/or the installation environment, for which the Manufacturer is not responsible. Furthermore, failure to comply with the safety warnings exposes the pump to dangerous contamination and, more generally, can lead to the food safety requirements of the pump itself and the processed foodstuff being compromised for reasons not attributable to the manufacturer.

- 3.1.30 The "diaphragm rupture" Sensor Kits that are selected and installed on the pump must be of a type suitable (*see marking affixed and Declaration of Conformity supplied with the product*) for the type of use and/or ATEX classification required by the environment in which the pump is installed.



CAUTION: danger of ATEX non-compliance and/or downgrading of the pump.

Installation and/or use of diaphragm rupture sensors that are not suitable (without marking and/or with unsuitable ATEX marking) for the ATEX classification of the pump and/or the environment in which it is installed is prohibited.

- 3.1.31 For correct operation in the event of a diaphragm rupture, the detection sensors must always be installed and positioned in the respective lower housings of the pump bodies.



CAUTION: danger of sensor non-tripping.

It is forbidden to direct the pump bodies and their respective housings with the diaphragm rupture sensors in the upper area of the pump.

CHAPTER 4

The AISIBOXER and SANIBOXER series pumps are normally shipped in a suitable wooden crate, or can be supplied with packaging for shipment by sea at the customer's request and location.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
4.1	STORAGE AND PRESERVATION	33
4.2	TRANSPORT AND HANDLING	34
4.3	POSITIONING AND INSTALLATION	35 - 38
4.4	INSTALLATION OF DIAPHRAGM RUPTURE SENSORS	39 - 42
4.5	PNEUMATIC CONNECTION	43 - 45
4.6	CHECKS BEFORE COMMISSIONING	45

Below is a description of how to behave in each of the cases described above.

4.1 STORAGE AND PRESERVATION



AISIBOXER and SANIBOXER series pumps are normally shipped in a wooden crate with internal shock protection.

The packaged pump can be stored for up to 6 months in a marine environment (protected, dry and clean) and 12 months in a terrestrial environment (clean, protected and dry), at temperatures from +5°C to +45°C, with relative humidity not exceeding 90%.

Upon delivery, check that the packaging and the pump are intact and undamaged; then, you can arrange for storage or assembly.

4.1.1 OPERATIONS FOR FUTURE STORAGE

Subsequent storage of the pump must always be carried out with the pump empty, without liquids, and after it has been properly flushed and sanitised.

- 4.1.1a Drain the pump of any process liquid residues.
- 4.1.1b Wash and sanitise the internal and external surfaces of the pump (*see Section 6.4 MANUAL WASHING*).
- 4.1.1c Close the suction and delivery pipe connections with suitable sealing plugs.



CAUTION: risk of pump damage.

The pump must be stored in suitable packaging, protected from sunlight and dust, and away from substances that react with the construction materials.

4.1.2 INTERVENTION AFTER PROLONGED STORAGE/STOPS, BEFORE OPERATION

After prolonged storage and/or stop, it is always necessary to perform the following checks before commissioning the pump:

- 4.1.2a Check the tightness of the pump clamps (*see Section 7.4 TIGHTNESS CHECK*).



CAUTION: risk of opening and/or damaging the pump.

Before carrying out the function test, check that all clamps are correctly closed and tightened. Overtightening can lead to dangerous stresses on certain components and/or damage to the seals, which cannot be attributed to constructional defects.

- 4.1.2b Carry out an initial check of the pump's no-load operation and pay attention to the correct operation of the pneumatic exchanger and the absence of abnormal noises.



CAUTION: in the event of abnormal noise, stop the pump immediately.

An abnormal noise from the pump indicates an irregular condition for which it is always necessary to determine the cause before continuing; in such cases, immediately stop the pump and resolve the anomalous condition before commissioning.

- 4.1.2c Carry out a manual cleaning of the pump and an internal check before installation (*see Section 6.4 MANUAL WASHING*).



CAUTION: risk of damage and breakages.

Before installing and/or recommissioning the pump after a prolonged shutdown (more than one week), it is always necessary to carry out an internal visual check of the diaphragms and a thorough cleaning and sanitising (internal/external).

4.2 TRANSPORT AND HANDLING



These operations are only reserved for handlers with appropriate Personal Protective Equipment (PPE), such as protective gloves, safety shoes and protective clothing.



CAUTION: risk of tipping and crushing.

The load inside the packaging can be unbalanced, therefore, do not use lifting equipment and gripping points other than those indicated on the packaging.

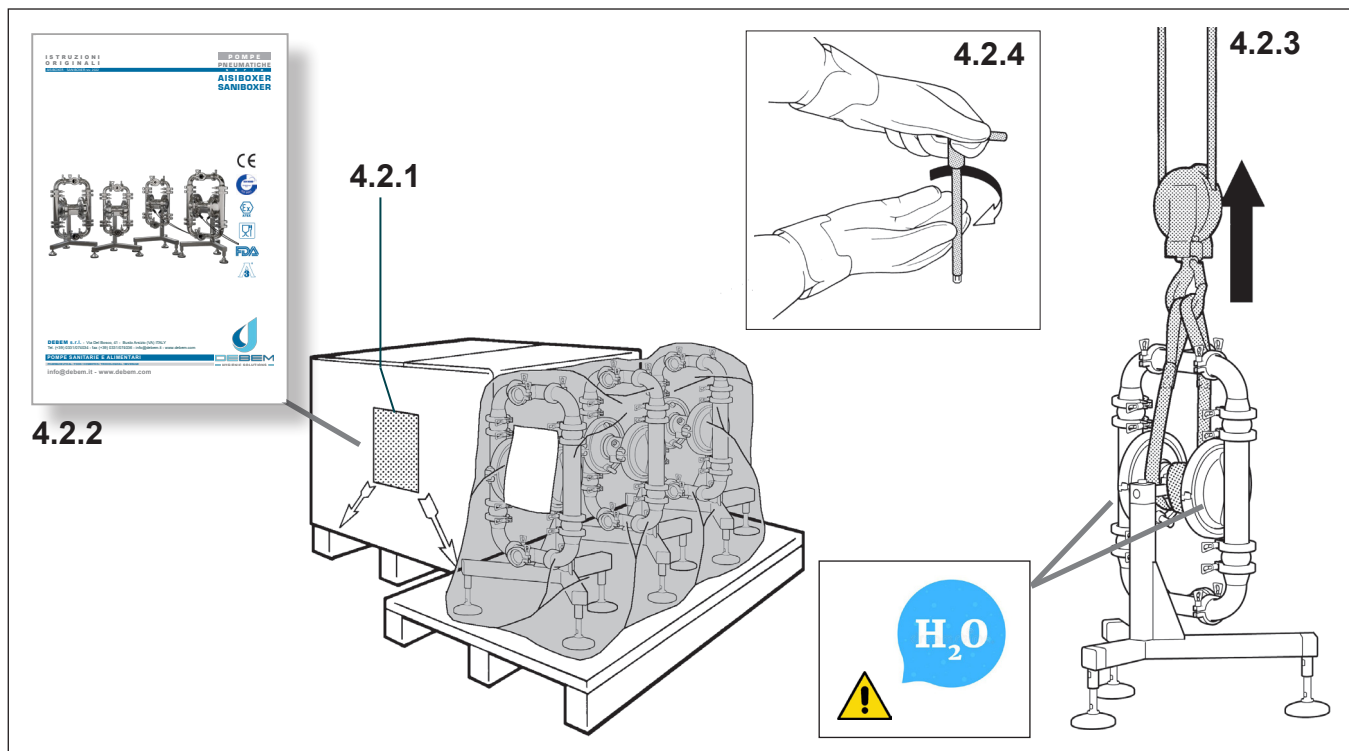
When the supply is received, check that the packaging and the pump are intact and have not been damaged, then:

- 4.2.1 Lift the supply using hoists of adequate capacity for the weight, respecting the instructions on the packaging. Handle the supplied items with slow movements, keeping them at a minimum height from the ground and place them at the place of installation (dry and covered). Remove the hoist.
- 4.2.2 Open the packaging, retrieve the use and maintenance manual, and work as described.



CAUTION: danger of pollution.

Do not release the packaging into the environment but contact specifically authorised disposal companies.



- 4.2.3 Lift the pump using suitable loading equipment depending on the indicated weight.
- 4.2.4 Check the tightness of all pump clamps (*see Section 6.4 MANUAL WASHING*).



CAUTION: risk of opening and/or damaging the pump.

Before carrying out the function test, check that all clamps are correctly closed and tightened (*see Section 7.4 TIGHTNESS CHECK*). Overtightening can lead to dangerous stresses on certain components and/or damage to the seals, which cannot be attributed to constructional defects.



CAUTION: risk of chemical reactions with water

Before installing the pump for use with liquids that react with tap water, it is necessary to open the product circuit and dry all internal surfaces.

- 4.2.5 Raise the pump and move it to the place of installation.

Pump handling is complete.



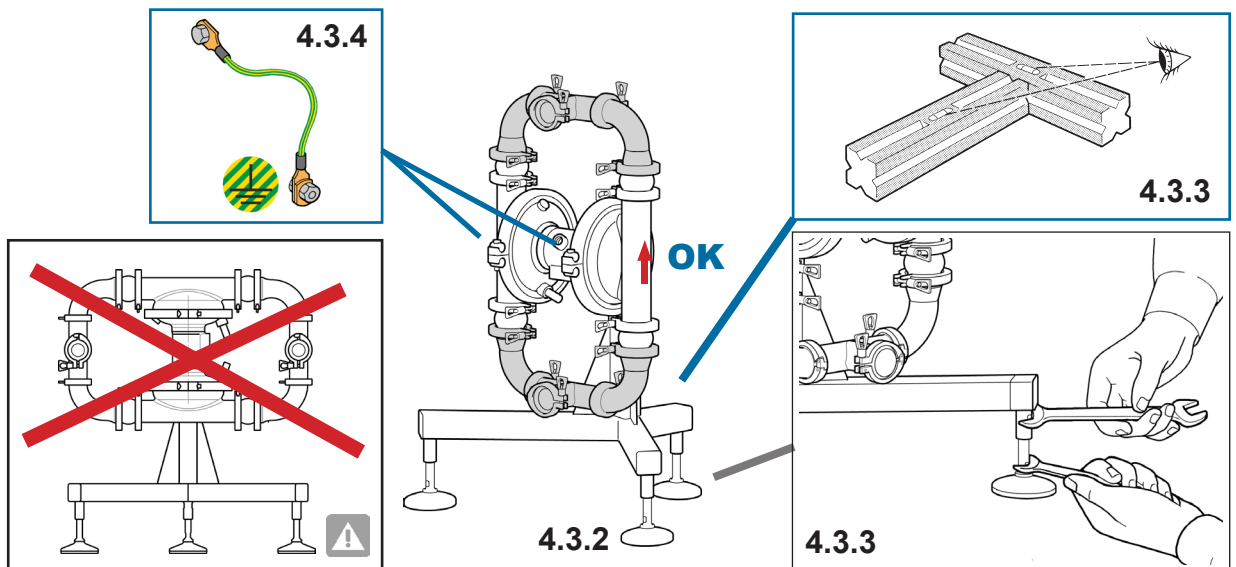
4.3 POSITIONING AND INSTALLATION



The installation operations are reserved for qualified and authorised Installers, equipped with suitable Personal Protective Equipment (PPE), who know and comply with the contents of this Manual. Due to the countless variety of products and fluid compositions (process, flushing, and sanitising), the user is considered the most knowledgeable regarding chemical and temperature compatibility with the pump materials. Before using and installing the pump, all necessary checks and tests must be performed with great care to avoid even the slightest risk, an event that the Manufacturer cannot foresee and for which he cannot be held responsible.

General installation requirements

- Adequate space to allow future maintenance;
- Installation of the pump with the horizontal axis on the emptying stand for washing;
- Protected installation environment, complying with safety requirements for Agro-Food, Cosmetic and/or Pharmaceutical processing;
- Compact, non-slip table top on protected location;
- With negative head for fluids with Max density up to 5,000 Cps at 20°C and a Max specific weight of 1.4 Kg/l;
- Installations with positive head for fluids with Max density up to 20,000 Cps at 20°C;
- Positioning near the point of collection (max 10 times the suction diameter);
- Suction inlet away from vortices;
- Pneumatic circuit supply with dried, non-lubricated air;
- Installation of shut-off valve, 3-way valve, and non-return valve on the air supply.



4.3.1 Flush and sanitise the pump as described in [Chapter 6 CLEANING AND SANITISING](#).

4.3.2 Position the pump on the stand with the axis horizontal at the place of installation (in a protected position), as close as possible to the point of collection, aligning it with the suction and delivery ducts.



NOTE

The product delivery manifold must always be positioned in the upper area; the arrows on the pump body must always be facing up.

4.3.3 Check that all three anti-vibration feet are perfectly adherent to the supporting surface; otherwise, adjust by checking the level of the stand. When adjustment is complete, retighten the locking nuts.



CAUTION: danger of vibrations and uncontrolled movement

Incorrect adjustment and adherence of the anti-vibration feet of the stand to the support surface can produce dangerous vibrations and uncontrolled movement of the pump during operation.

4.3.4 For installations in ATEX environments, an earthing cable must be installed on each pump body.



CAUTION: risk of explosion and/or fire due to electrostatic currents

The pump must always be earthed, regardless of other gear connected to it.

Pump positioning is thus completed.



4.3.5 PRODUCT CIRCUIT CONNECTION

After positioning, it is possible to connect the pump to the product circuit (Agro-Food, Cosmetic, and/or Pharmaceutical) as follows:

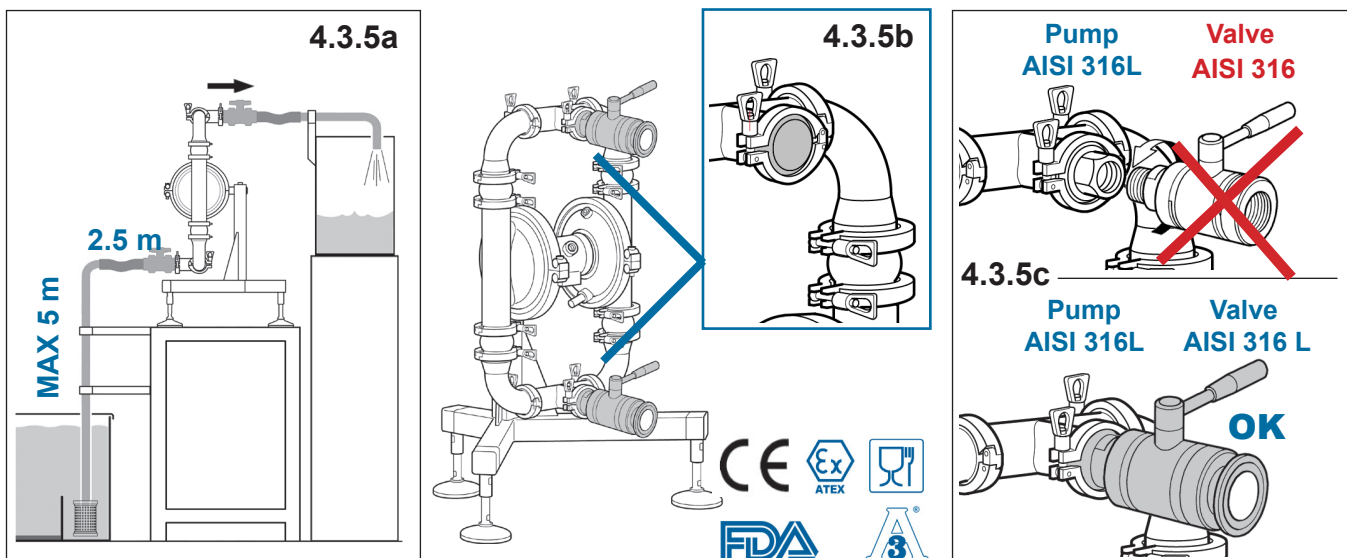
Product system piping requirements

- The product circuit must comply with safety requirements (Agro-Food, Cosmetic, and/or Pharmaceutical) and pump certification (AISIBOXER MOCA regulations; SANIBOXER 3-A certification);
- The connection to the product circuit pump must include a flexible element certified for use in the food industry with a metal reinforcement core; (connection with rigid and/or unsuitable hose is prohibited);
- Piping must be self-supported and must not weigh on the pump;
- Correct sizing of the ducts (suction and delivery) for correct suction speed;
- Product on/off valves (suction and delivery, that do not cause pressure drops);
- With suspended particulate, install a properly sized suction strainer on the suction (surface 2.5/3 times the suction section of the pump with maximum allowed flow);
- Product ducts clean inside and without solid processing residues (shavings, particulates, etc.).

4.3.5a Diaphragm pumps with negative suction are affected by the following factors:

- **Fluid viscosity - specific fluid weight - diameter - length and/or bends on the suction pipe.**

Position the pump as close as possible to the point of collection (within 2.5 m) and, in all cases, never higher than 5 m vertically. The diameter of the suction pipe must never be smaller than that of the pump connection. The diameter must be appropriately sized as the distance or viscosity of the fluid increases.



CAUTION: risk of premature wear and/or diaphragm rupture.

The fluid to be pumped with negative suction must never exceed a viscosity of 5,000 Cps at 20°C and a specific weight of 1.4 Kg/l.

With higher viscosities, physical factors intervene that require a correct evaluation; therefore, it is always necessary to contact the Manufacturer's Technical Department in advance.

4.3.5b Remove the Clamp connection and plugs from the suction and discharge lines.

4.3.5c AISIBOXER and SANIBOXER series pumps are supplied with a product clamp connection. For connections to SANIBOXER pump manifolds, only use clamp fittings of the same material type as the pump and with the same 3-A (Sanitary Standards) certification. On the delivery and discharge manifold, install a manual valve of the same diameter as the pump inlet (never smaller) or larger for negative suction or fluids with high viscosity.



CAUTION: danger of contamination and/or non-compliance with pump certification.

It is forbidden to use valves made of material other than the pump and/or not certified for food use and/or undersized.

4.3.5d In case of a vertical product delivery higher than 5 meters, it is necessary to install a check valve on the system piping, to prevent the fluid from clogging inside the pump.

4.3.5e Provide food-grade hose sleeves for attaching hoses to both valves.



CAUTION: do not attach the pump directly with rigid pipe.

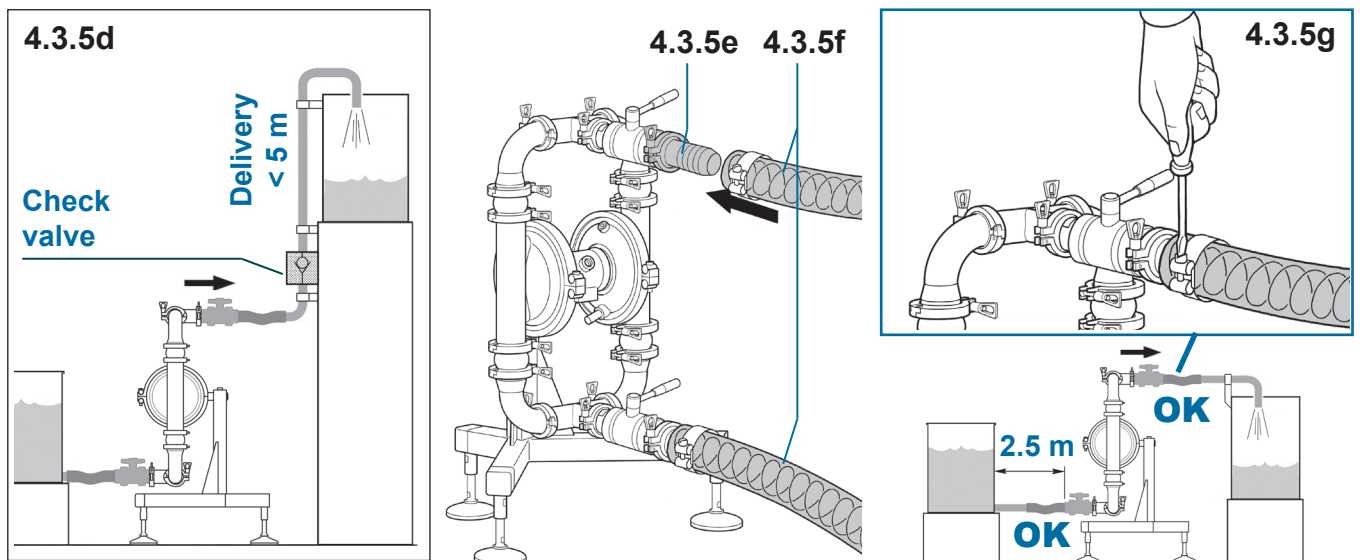
In case of negative installations and/or high-viscosity fluids, use hoses with an OVERSIZE DIAMETER, especially on the intake side. The filters or other equipment installed at the intake side must be suitably dimensioned to avoid pressure drops.

4.3.5f Fit the food-grade reinforced hose to the suction - LOWER and delivery - UPPER product connections (the arrows on the pump body must always point upwards).



CAUTION: danger of loss of performance and/or danger of contamination

Check that the connection piping to the pump is clean inside and does not contain solid and/or processing residues. Reinforced hoses must be food grade and certified with the same certification as the pump to avoid downgrading the entire system.



4.3.5g Connect the food-grade certified hoses to the rigid system pipes (suction and discharge) upstream and downstream of the pump. Check that the system ducts are fixed and self-supporting and that they do not weigh on the pump.



CAUTION: Danger of stress due to loads on the pipes and/or pump.

The hoses must not deform under suction and must never put any strain on the pump and vice versa.

4.3.5h Fix flexible hoses on the pump and the system with appropriate hose clamps.



CAUTION: risk of premature wear and/or diaphragm rupture.

Apart from the shut-off valve, do not install any other components on the pump suction (couplings, elbows, valves, filters, coiled flexible hoses, etc. - [see diagram on page 36](#)), which could compromise the pump suction performance and cause premature breakage of the diaphragms. **The product on-off valves must always be fully open during operation (never choked).**

With high negative heads and/or high viscosity (if necessary), the pump must be pneumatically fed gradually using a “soft start” valve.

- 4.3.5i If used for drum suction (not positive suction head), the submerged end of the intake hose must be provided with a diagonally cut fixing to prevent it from adhering to the drum bottom.
- 4.3.5j In installations where the presence of solid particulate is expected, install a suitably oversized strainer (which does not cause pressure drops) on the suction inlet, with a surface area of 2.5 / 3 times the area of the suction pipe and passages smaller than the particulate allowed by the pump model being installed.



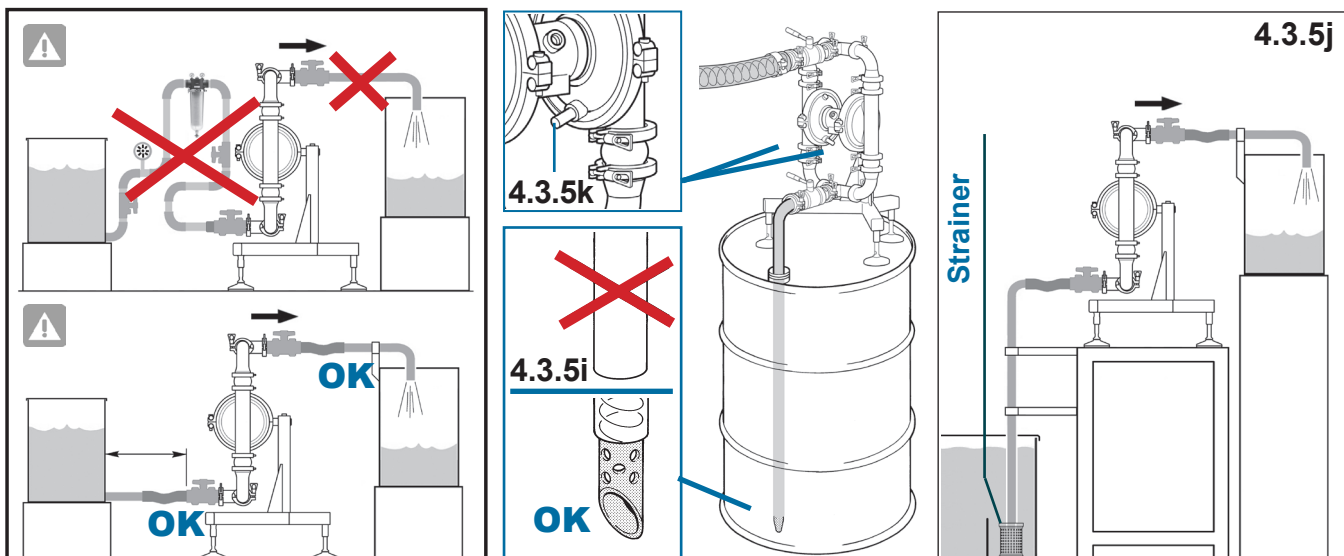
CAUTION: risk of pump damage.

It is forbidden to install the pump in the absence of a suitable and correctly sized strainer.

Check that the treated fluid does not contain any large solid parts or with a harmful shape and that there are no restrictions to the pump inlet or outlet to avoid cavitation and stress to the pneumatic motor and diaphragms.

4.3.5k CONNECTION OF DIAPHRAGM RUPTURE SENSORS:

SANIBOXER series pumps are equipped with diaphragm rupture sensors as standard (AISIBOXER on request). Make the electrical connection of the diaphragm rupture sensors on the control unit and/or the system on which the pump has been installed as described in [Section 4.4 DIAPHRAGM RUPTURE CONNECTION](#).



CAUTION: Danger of spillage of food-grade fluid.

In case of heavy-duty use (high heads and high viscosity), it is necessary to use diaphragm rupture sensors on board the pump to control the automatic stop. If the installation involves working temperatures close to the maximum allowed by the pump, a temperature detector must be installed to control the automatic stop when the indicated thresholds are reached.

The product circuit connection is thus completed.

4.4 INSTALLATION OF DIAPHRAGM RUPTURE SENSORS



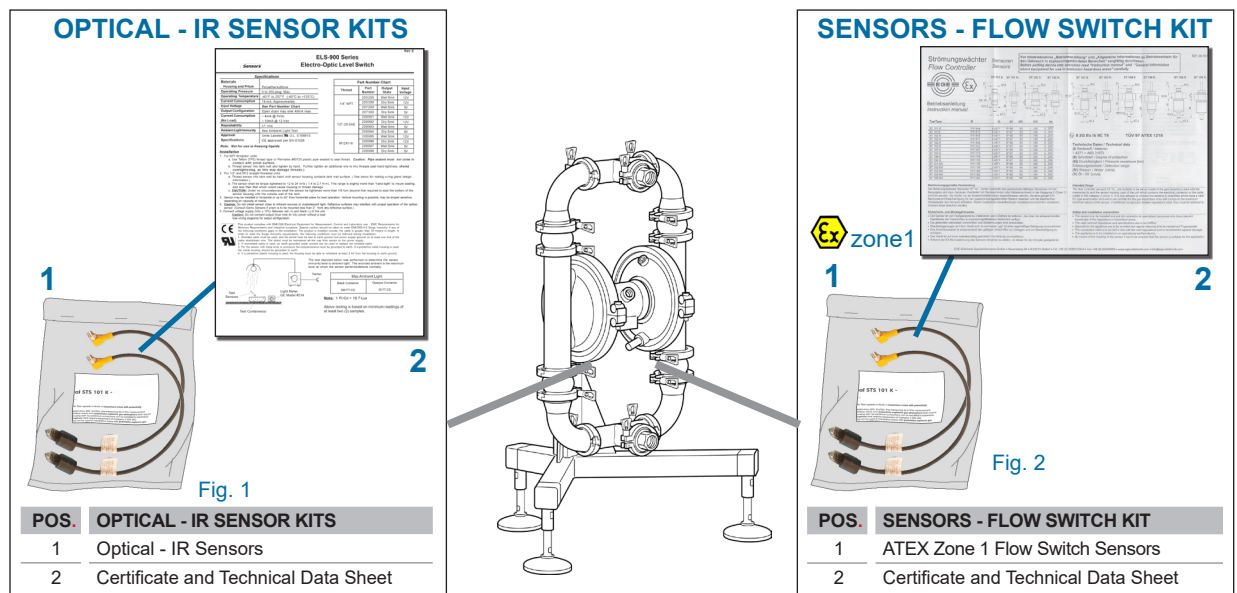
The “Diaphragm rupture” detection sensors are only supplied as standard on SANIBOXER pumps (disassembled - in KIT with Manufacturer's Certificate and Technical Data Sheet - *Fig. 1*), while on AISIBOXER pumps they are optional and are only supplied on request (disassembled - in KIT with Manufacturer's Certificate and Technical Data Sheet - *Fig. 2*). The choice of the type of “diaphragm rupture” detection sensor is up to the Customer depending on the intended use and/or the ATEX classification of the pump installation environment.



CAUTION: danger of ATEX non-compliance and/or downgrading of the pump.

Installation and/or use of diaphragm rupture sensors that are not suitable (without marking and/or with unsuitable ATEX marking) for the ATEX classification of the pump and/or the environment in which it is installed is prohibited.

The electrical connection of the “Diaphragm rupture” detection sensors must be made on the Safety Circuit of the machine/plant on which the pump is installed in order to ensure a stop under emergency conditions. The installation of the “Diaphragm rupture” detection sensors emits the signal to manage the automatic shutdown and remote signalling of the pump in Emergency conditions (in the event of a diaphragm rupture), to prevent fluid from entering the pneumatic circuit and subsequently escaping (into the environment) from the pump's air outlet.



CAUTION: danger of damage to the internal pneumatic circuit.

For installations involving operation in environments with a potentially dangerous atmosphere and/or hazardous fluid, the air outlet and fluid collection point (in the event of a diaphragm rupture) must be located outside the pump installation environment.

There are two types of “diaphragm rupture” detection sensors (depending on the intended use):

- OPTICAL- IR SENSOR KIT: suitable for use in non-ATEX classified environments;
- SENSORS - FLOW SWITCH KIT: suitable for use in an ATEX Zone 1 classified environment (see marking affixed and the Certificate of Conformity supplied with the Product Kit).

4.4.1 INSTALLATION OF OPTICAL - IR SENSORS(for non-ATEX use)

“Diaphragm rupture” detection sensors are optical sensors and work by emitting a beam of IR (infrared) inside a prism and measuring the amount of reflected light detected by the receiver.

When the fluid reaches the prism of the optical sensor (in the event of diaphragm rupture), the amount of light emitted and received decreases instantaneously and thus activates the electrical signal for automatic pump shutdown, preventing damage to the internal circuit and leakage of the pumping fluid from the compressed air circuit outlet.

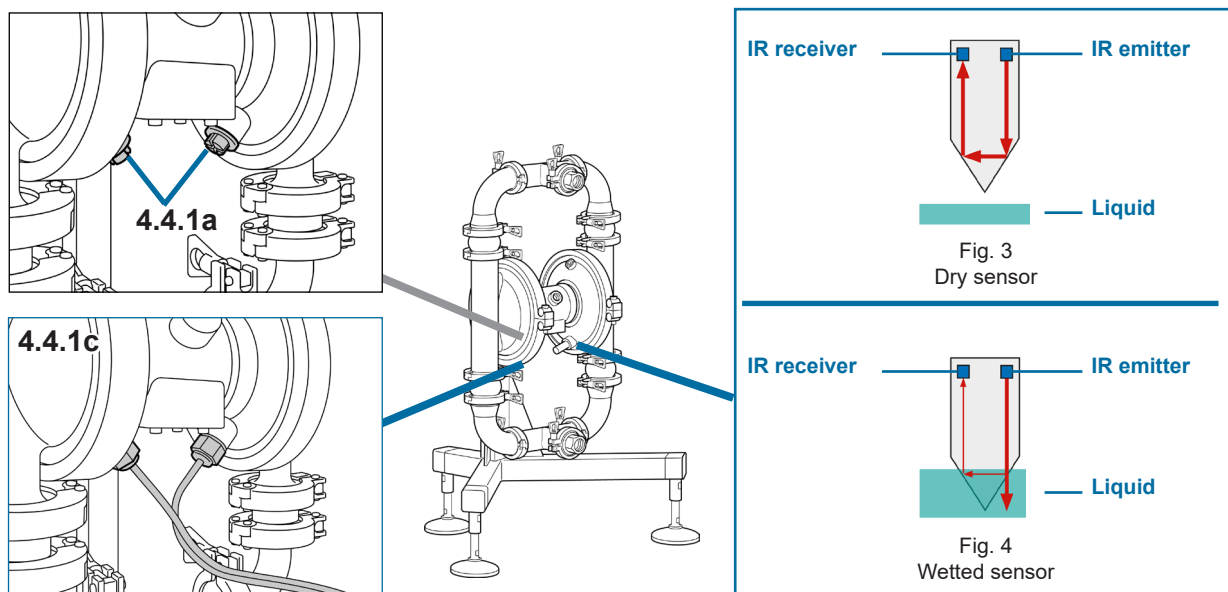
When the sensor is dry, the transmitted light is reflected from the prism to the receiver (*Fig. 3*).

On the other hand, when the sensor is wetted by the presence of liquid, only part of the transmitted light is reflected back to the receiver, while most of it scatters in the liquid (*Fig. 4*).



CAUTION: danger of sensor non-tripping.

For correct operation in the event of a diaphragm rupture, the detection sensors must always be installed and positioned in the respective lower housings of the pump bodies. It is forbidden to direct the pump bodies and their seats with the diaphragm rupture sensors in the upper area of the pump.



To install the optical “Diaphragm rupture” detection sensors on the pump, proceed as follows:

General installation requirements

- Positioning of the pump with the axis in the horizontal working position (air discharge below) with sensor connections arranged on the lower top;
- Disconnection of the compressed air supply line and release of internal residual pressure.

4.4.1a Loosen and remove the plugs from the sensor connections on the two pump bodies.

4.4.1b Remove the optical sensors and if necessary clean the prism with a soft cloth.

4.4.1c Screw both optical sensors with their respective O-rings onto the connections of the two pump housings until the pneumatic circuit of the inner chamber is properly sealed.



CAUTION: danger of loss of pressure and loss of pump performance.

The O-rings of both optical sensors must be intact and must not be crushed to ensure proper sealing of the pneumatic circuit of the inner chamber.

The installation of the optical “diaphragm rupture” detection sensors on the pump is thus completed.

4.4.2 SENSORS - FLOW SWITCH INSTALLATION (for use in ATEX ENVIRONMENT)



The Flow Switch Sensors are suitable for use in an ATEX classified environment (see affixed marking and Certificate of Conformity supplied with the “diaphragm rupture” Detection Sensor Kit). “Diaphragm rupture” detection sensors are flow switch sensors that detect the absence and/or presence of fluid (in the event of a diaphragm rupture) in the air-side chamber of the diaphragm. When the fluid reaches the flow switch (in the event of a diaphragm rupture), the sensor detects the presence of liquid and thus activates the electrical signal to automatically stop the pump, preventing damage to the internal circuit and the escape of pumping fluid from the compressed air circuit outlet. The “Diaphragm Rupture” sensor kits installed on the pump must be of a type suitable (see *marking and Declaration of Conformity supplied with the product*) for the type of use and/or ATEX classification required by the environment in which the pump is installed.



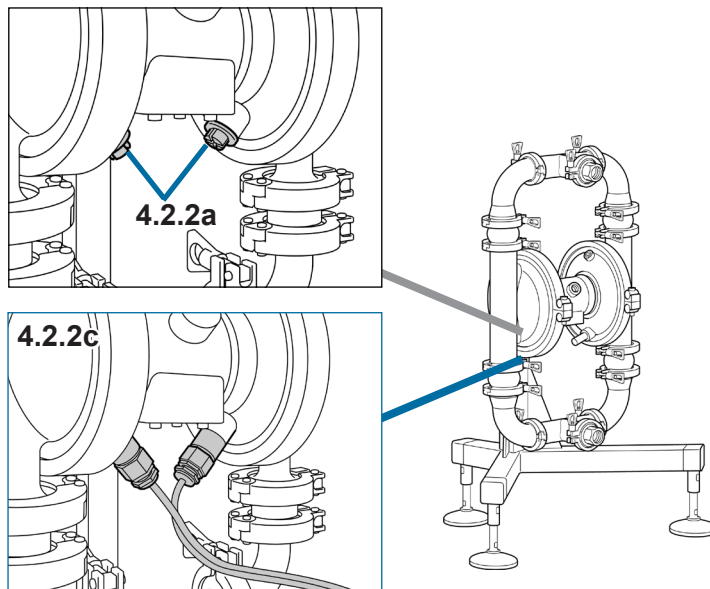
CAUTION: danger of ATEX non-compliance and/or downgrading of the pump.

Installation and/or use of diaphragm rupture sensors that are not suitable (without marking and/or with unsuitable ATEX marking) for the ATEX classification of the pump and/or the environment in which it is installed is prohibited.



CAUTION: danger of sensor non-tripping.

For correct operation in the event of a diaphragm rupture, the detection sensors must always be installed and positioned in the respective lower housings of the pump bodies. It is forbidden to direct the pump bodies and their seats with the diaphragm rupture sensors in the upper area of the pump.



In order to install the “Diaphragm Rupture” Flow switch Sensors on the pump, proceed as follows:

General installation requirements

- Positioning of the pump with the axis in the horizontal working position (air discharge below) with sensor connections arranged on the lower top;
- Disconnection of the compressed air supply line and release of internal residual pressure;
- Verification of the conformity of the sensor and the marking affixed and the Certificate of Conformity supplied with the product with the ATEX classification of the pump installation environment.

- 4.4.2a Loosen and remove the plugs from the sensor connections on the two pump bodies.
- 4.4.2b Remove the Flow switch sensors and, if necessary, clean the bulb with a soft cloth.
- 4.4.2c Screw both Flow switch sensors with their respective O-rings onto the connections of the two pump housings until the pneumatic circuit of the inner chamber is properly sealed.



CAUTION: danger of loss of pressure and loss of pump performance.

The O-rings of both Flow switch sensors must be intact and must not be crushed to ensure proper sealing of the pneumatic circuit in the inner chamber.

The installation of “Diaphragm rupture” detection flow switch sensors on the pump is thus completed.

4.4.3 RUPTURE SENSORS ELECTRICAL CONNECTION

Connection operations to the electrical system are reserved for qualified and licensed electricians. After completing the installation operations, it is possible to carry out the electrical connection of the Diaphragm Rupture Sensors of the pump to the Safety Circuit of the Machine/Plant, respecting the requirements. The connection of Diaphragm Rupture Sensors to the machine/plant safety electrical circuit must fulfil two important safety requirements of the process in which the pump is installed:

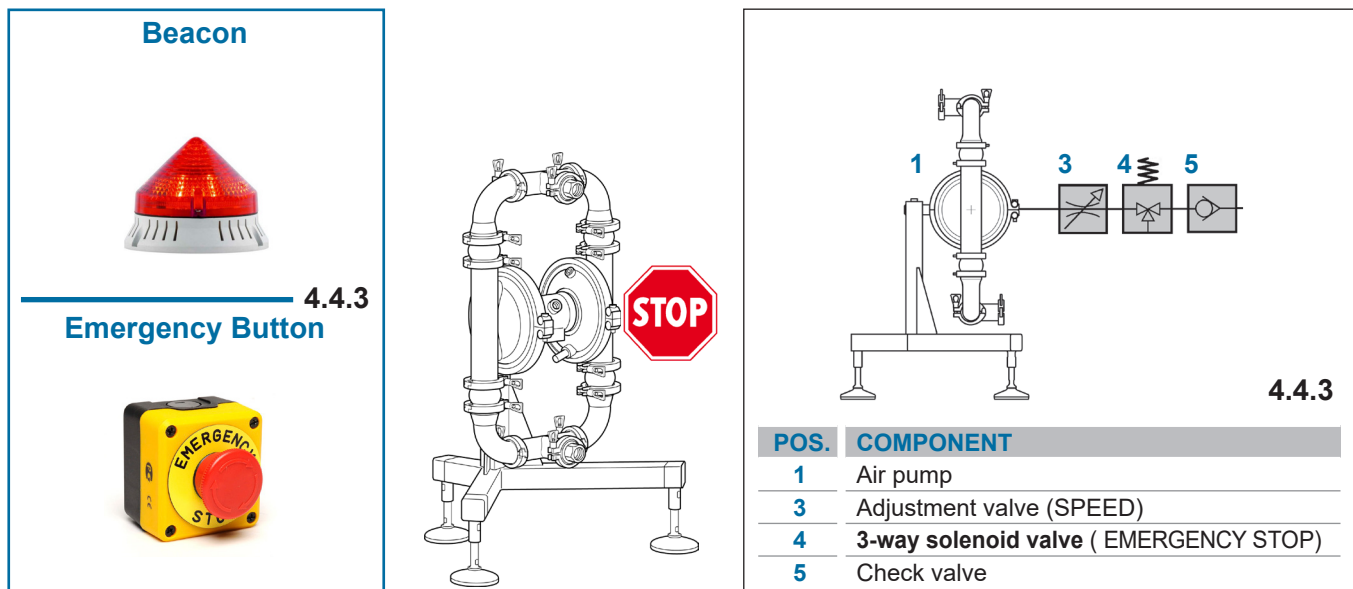
FAULT DETECTION AND SIGNALLING - DIAPHRAGM RUPTURE

Should one of the two diaphragms inside the pump rupture, the process liquid will propagate in the air chamber behind it to the sensor, which is then activated. Activation of one of the two Diaphragm Rupture sensors must determine:

- Automatic disconnection of the compressed air supply solenoid valve, which instantly stops the air-operated pump.
- Automatic activation of an alarm signal to the Operator due to the condition that has occurred.

REMOTE EMERGENCY STOP

From a remote and secure location, the Operator must be able to command an Emergency Stop without having to intervene near the pump installation area. Activation of the remote Emergency control must result in the disconnection of the compressed air supply and the instantaneous stop of the pneumatic pump by means of a 3-way solenoid valve.



Machine/Pump Installation Electrical System Requirements

- Machine/Plant Electrical Circuit with Safety Chain;
- Electrical circuit with Emergency Stop command;
- Installation of shut-off solenoid valve, 3-way solenoid valve, and non-return valve on the compressed air supply.

4.4.3a Make the electrical connection of the connectors of the two sensors on the electrical circuit equipment of the safety chain of the machine/plant in which the pump was installed.

The installation and connection of the pump's "diaphragm rupture" detection sensors is thus completed.

4.5 PNEUMATIC CONNECTION



The connection operations to the pneumatic system are reserved for qualified and authorised Installers who know and follow the contents of this Manual and are equipped with suitable Personal Protective Equipment (PPE). After completing the installation, it is possible to connect the pump to the pneumatic supply circuit as follows:

Pneumatic system requirements

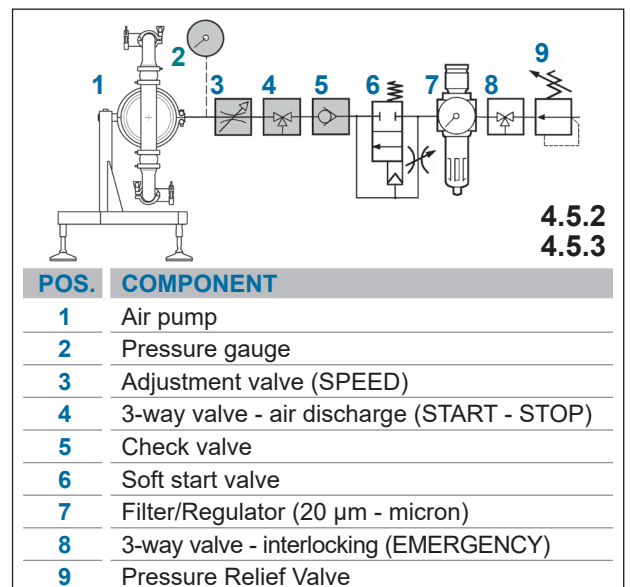
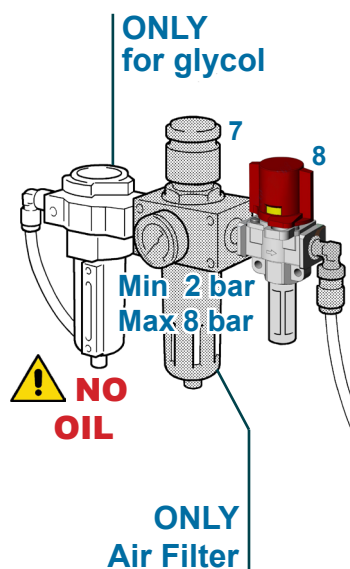
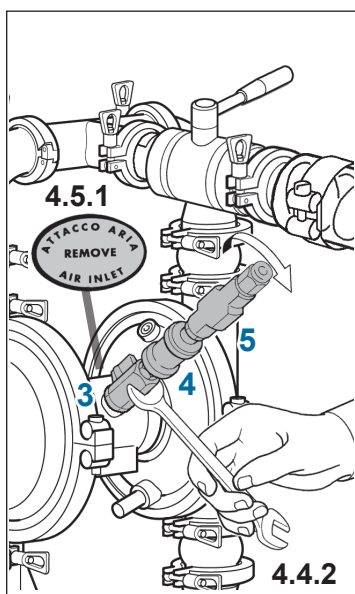
- Supply with non-lubricated, dried air, with suitable pressure (Min 2 bar - Max 8 bar);
- Use of pneumatic components with air flow rates suitable for the pneumatic circuit of the pump;
- Glycol Admixture (suitable for Agro-Food, Cosmetic, and/or Pharmaceutical installations) for installations with high delivery head and/or back-pressure;
- Installation of a shut-off valve, 3-way valve and check valve on the air supply;
- Installation of exhaust air pipe (with collection) outside rooms with saturated vapour atmosphere.

4.5.1 Remove the sticker from the air connection of the pump.



CAUTION: danger of pump blocking.

AISIBOXER and SANIBOXER series pumps must be pneumatically fed using NON-LUBRICATED, FILTERED AND DRIED compressed air at a pressure of no less than 2 bars and not more than 8 bars.



4.5.2 Tighten a compressed air flow control valve, a 3-way valve (START - STOP with air discharge) and a check valve on the pneumatic circuit connection of the pump, as per the diagram in the figure. Install a pressure gauge on the compressed air connection of the pump itself and check the value with the pump running to check the actual pressure of the supply air.



CAUTION: danger of fluid entering the compressed air circuit and being discharged into the environment.

Do not install the pump without the 3-way valve (START-STOP) on the air supply duct to prevent the pumped fluid from entering the pneumatic circuit if the diaphragms break. Even in battery installations, the check valve must always be installed on each pump.

4.5.3 Install a 3-way EMERGENCY stop valve upstream of the pneumatic supply circuit (disconnecter with interlock) in a protected and easily accessible position.

4.5.4 Installations where operation with many Start/Stop cycles is expected (with high delivery heads and/or with strong back-pressures) require the installation of a pneumatic soft start valve to protect the product diaphragms.



NOTE

Besides providing a more smooth and fluid pumping of the product during the start-up phase, installing the soft start pneumatic valve protects the diaphragms and preserves the operating life of the pump.



- 4.5.5 Pump installations with high delivery heads and/or strong back-pressures may cause the pneumatic circuit outlets to freeze.

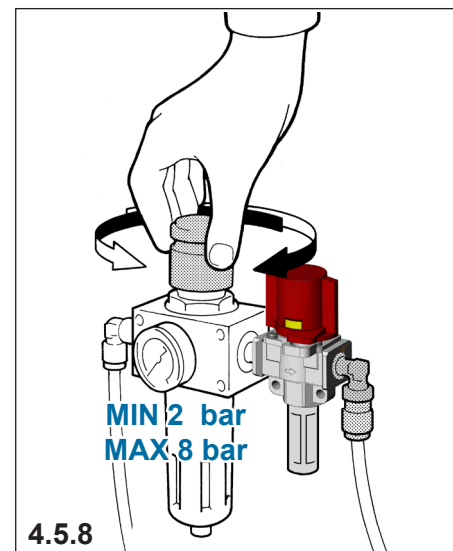
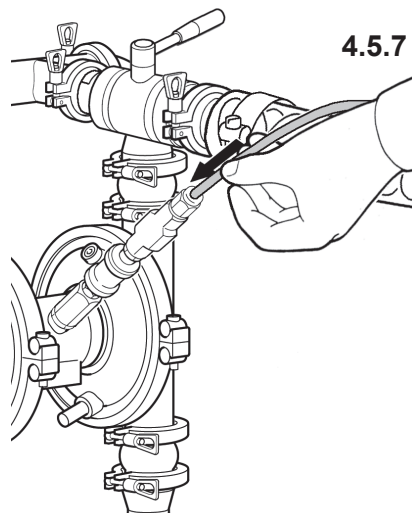
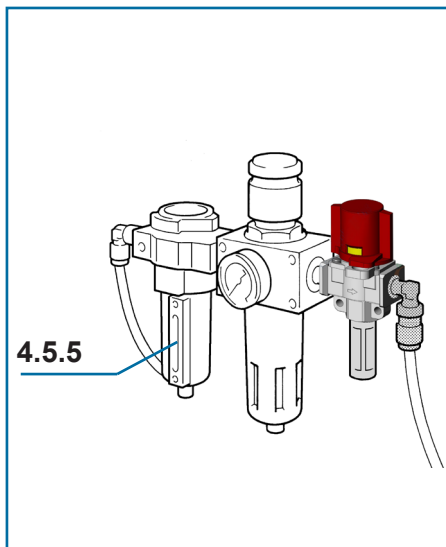
CAUTION: danger of loss of efficiency and/or pump shutdown.
With strong heads and/or high viscosity, provide for the installation of a food-grade glycol dispenser on the air supply line upstream of the pump.

- 4.5.6 The air of the pump's pneumatic circuit must always be discharged in a free, non-dusty atmosphere and free of saturated vapours that can damage the internal circuit. In the event of a total rupture of the diaphragms, the fluid can enter the pneumatic circuit and exit from the discharge outlet.

CAUTION: danger of damage to the internal pneumatic circuit.
For installations involving operation in environments with a harsh atmosphere (dusts, vapours or saturated vapours), provision must be made to take the air outlet point outside the environment.

- 4.5.7 Connect the compressed air supply pipe to the pump circuit.

CAUTION: risk of pneumatic pressure drop.
Use pipes, accessories and control and compressed air regulation elements with flow and pressure characteristics suitable for the characteristics of the pump in order not to cause pressure drops. **Pay attention to snap-on fittings: most of them cause pressure drops.**



- 4.5.8 Adjust the network pressure of the compressed air to guarantee pressures of not less than 2 bars and not more than 8 bars when the pump is running.

CAUTION: risk of pump stall and/or diaphragm rupture.
To feed more than one pump with the same air control device, contact the DEBEM Technicians.
Lower or higher pressures may cause functional problems or pump breakage, product spills and damage to persons and/or objects.

4.5.9 FOR INSTALLATIONS IN ZONE 1 - ZONE 21

Should the user think that there is a risk of exceeding the temperature limits set forth in the marking affixed to the pump for use in a potentially explosive classified ZONE 1 or 21, a protective device must be installed on the system to prevent the global temperature (fluid + ambient) from being reached as indicated in [Section "2.8 TECHNICAL SPECIFICATIONS"](#).

CAUTION:
It is forbidden to use the pump with temperatures higher than those allowed and specified in the manual; if exceeded, warranty and conformity with the affixed ATEX marking are cancelled.

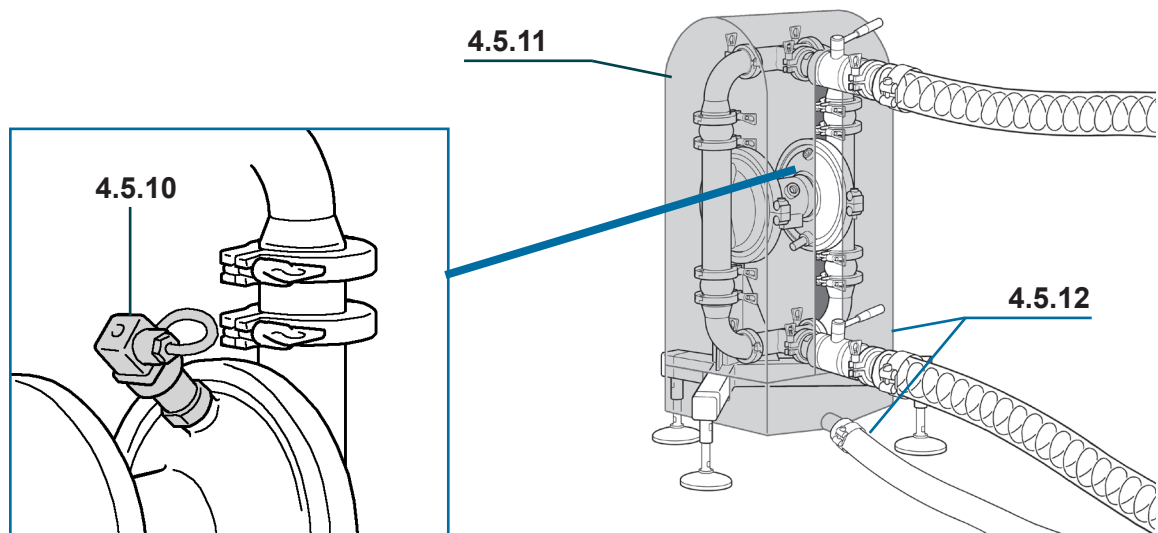
- 4.5.10 If the pump is equipped with the COUNTING device (only on AISIBOXER - to detect and/or display the number of cycles of the pump), make the electrical connection.
- 4.5.11 Always protect the pump from possible accidental blows and contact with incompatible fluids that can damage and/or react upon contact with it.
- 4.5.12 If the pump is used with fluids (process, washing, and sanitising fluids) that are aggressive and/or hazardous to health, the pump must be fitted with suitable protection (to contain, collect, and discharge the product in a safe area) and a leakage detector.



CAUTION: danger of contamination and/or injury.

It is forbidden to install the pump in the absence of a suitable protection for containment with a collection tank and outflow in a safe area of flammable, aggressive or toxic liquids or with liquids that may pose a health hazard.

The pneumatic circuit connection and the pump installation are thus completed.



4.6 CHECKS BEFORE COMMISSIONING



Depending on the type of application and Residual Risk detected by the installation, appropriate markings and signs must be placed in the vicinity of the pump and the system.



Before commissioning the pump, to verify that the installation meets the intended operating conditions, it is essential to carry out the following checks with the pump running:

- 4.6.1 With a pressure gauge positioned directly on the pump air inlet (downstream of all devices and fittings installed on the supply line), check that the detected pressure does not have any pressure drops compared to the reading on the pressure gauge of the filter of the pneumatic network supply line.
- 4.6.2 With a pressure gauge directly on the pump delivery manifold, check that the actual pressure of the pumped fluid at the pump outlet is correct compared to the Technical data of the installed Model.



The pump is ready for commissioning.

CHAPTER 5

The topics in this chapter are divided into sections, taking into account the operational phases for commissioning, operation and stop methods.

THIS PART INCLUDES THE FOLLOWING TITLES	PAGE
5.1 COMMISSIONING AND OPERATION	47 - 48
5.2 NORMAL SHUTDOWN OF THE PUMP	49
5.3 EMERGENCY STOP OF THE PUMP	50

Below is a description of how to behave in each of the phases listed above.

5.1 COMMISSIONING AND OPERATION



The start-up and commissioning of the pump are reserved for trained and authorised Installers who know and follow the Original Instructions.

The user must always use fluid compatible with the original design conditions of the pump itself and the marking of the pump itself.



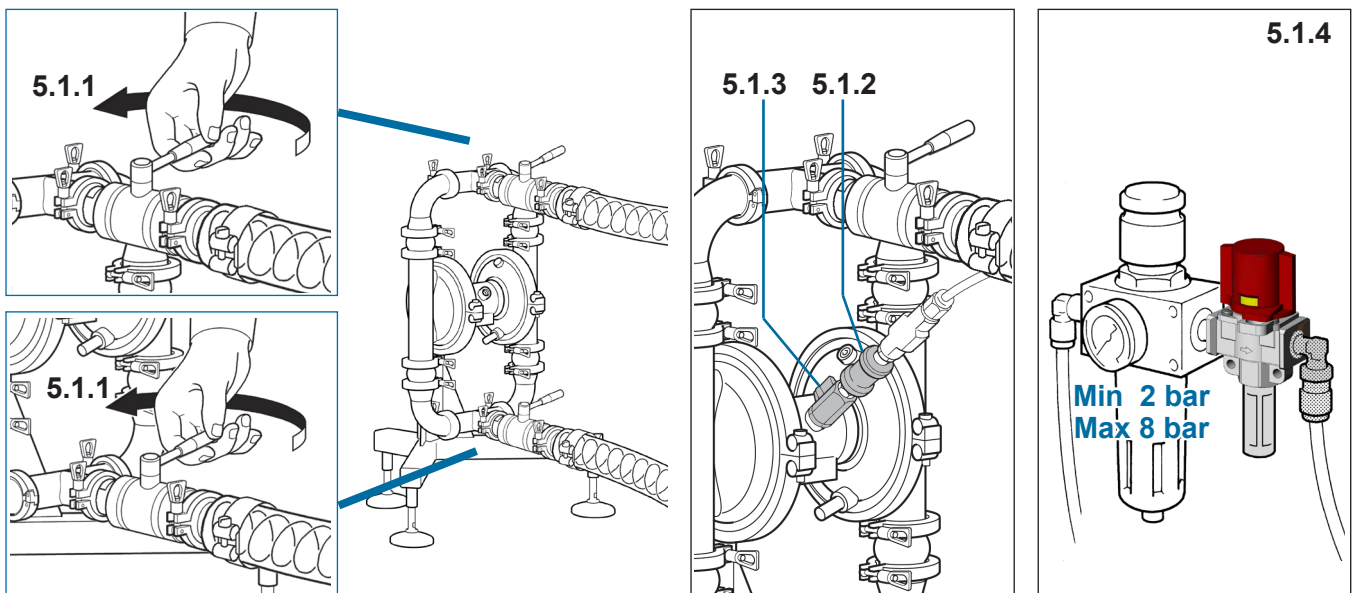
CAUTION: risk of damaging the pump and product leakage.

It is forbidden to use the pump with non-compatible fluids (cleaning and/or sanitising process fluids) and/or at temperatures and/or in environments that are not compatible with the construction materials of the components.

Proceed as follows to commission the pump:

Presence of fluid in the collection tank;

- Presence of fluid in the collection tank;
- Pump fluid compatible with characteristics and temperature of pump materials and marking (ATEX, MOCA, FDA, 3-A Sanitary Standards);
- Product circuit and pump cleaned and sanitised;
- Suction and delivery circuits are in working order, and no maintenance is being carried out on the system.



- 5.1.1 Open the product shut-off valves of the suction and delivery pipes.



CAUTION: risk of premature wear and/or diaphragm rupture.

It is forbidden to start the pump with the product valves (suction and delivery) closed or choked.

- 5.1.2 Open the 3-way pneumatic valve on the pump.

- 5.1.3 Gradually open the compressed air control valve mounted on the pump connection; the pump will start running.

- 5.1.4 Check and adjust the air pressure on the mains (while the pump is running): MIN 2 bar MAX 8 bar.



CAUTION risk of pumps stall and/or early wear and/or diaphragm rupture.

The pump may STALL with pressures below 2 bar (with the pump running). With pressures higher than the MAXIMUM threshold (Max 8 bar), failures, pressurised product leakage and/or pump breakage may occur.

5.1.5 If an adjustment of the pump speed is required according to the viscosity of the fluid to be pumped, it is possible to operate in two different ways:

5.1.5a Adjust the network air supply pressure;

5.1.5b Choke the air volume (flow rate) using the air control valve on the pump.

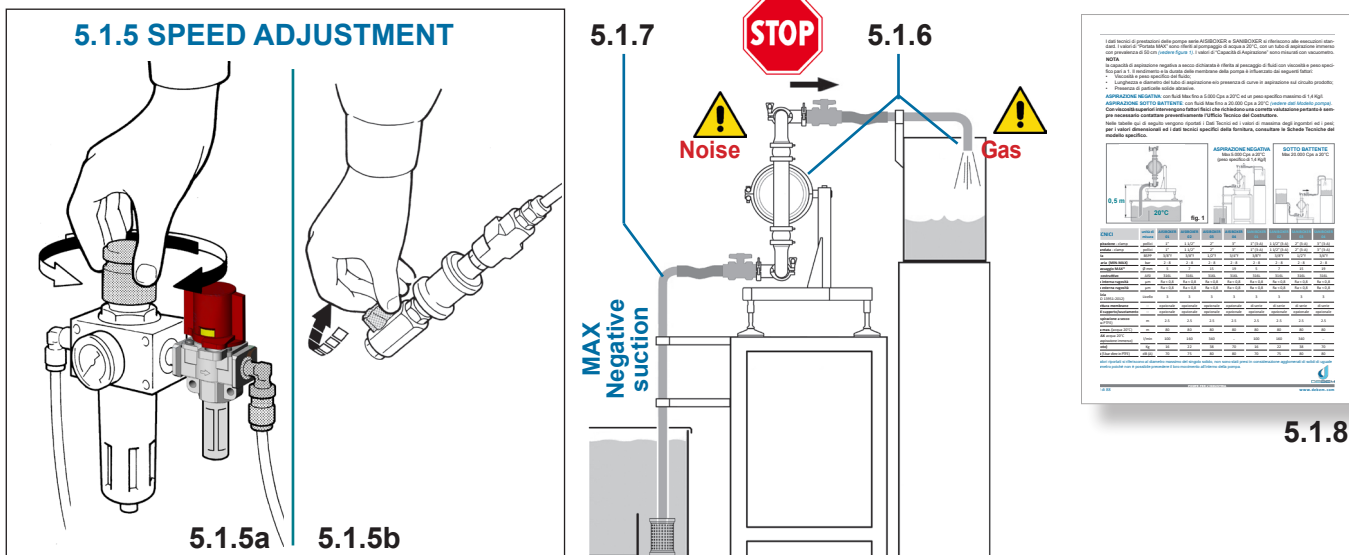


CAUTION: risk of premature wear and/or diaphragm rupture.
Do not close or operate on the product suction valve to choke the fluid.

5.1.6 Check that there is no abnormal noise during operation and that “gas” is not present in the outlet fluid; the presence of vortices on the suction point results in cavitation and malfunctions. Check that the pump has been correctly sized; if **indoubt, do not hesitate to contact DEBEM technicians.**



CAUTION: risk of damaging the pump and/or premature wear/diaphragm rupture.
Abnormal noise or the presence of “gas” in the fluid exiting from the pump indicate an abnormal condition for which it is always necessary to determine the cause before continuing; in such cases, immediately stop the pump and resolve the anomalous conditions before continuing.



5.1.7 If the installed pump has negative suction or is used with highly viscous fluid, reduce the pump speed by acting on the air control valve. Non-primed pumps have a lower negative suction capacity; **FOR FURTHER INFORMATION, CONTACT THE MANUFACTURER SERVICE.**

5.1.8 The diaphragms (internal and in contact with the product) are components subject to wear. Their service life is strongly affected by the conditions of use and the chemical temperature and physical stresses with the fluid (cleaning and/or sanitising process fluids). From tests carried out on thousands of installed pumps (with head equal to 0.5 m at 20°C), it was found that the normal duration exceeds 100,000,000 (one hundred million) cycles.



CAUTION

For safety reasons, the pump diaphragms must be dismantled and checked every 10,000,000 (ten million) cycles and replaced every 20,000,000 (twenty million) cycles for heavy-duty applications (high viscosity, high negative head and/or suction and temperatures close to the threshold).

Perform the maintenance and replacements provided for by the Manufacturer on a regular basis.



5.2 NORMAL SHUTDOWN OF THE PUMP



Do not stop pumping the liquid and/or the operating pump by closing the on/off valves of the product suction and/or delivery duct. The pump and the fluid must always be stopped by switching off the pump pneumatic motor by disconnecting the air.

Requirements after the normal shutdown of the pump

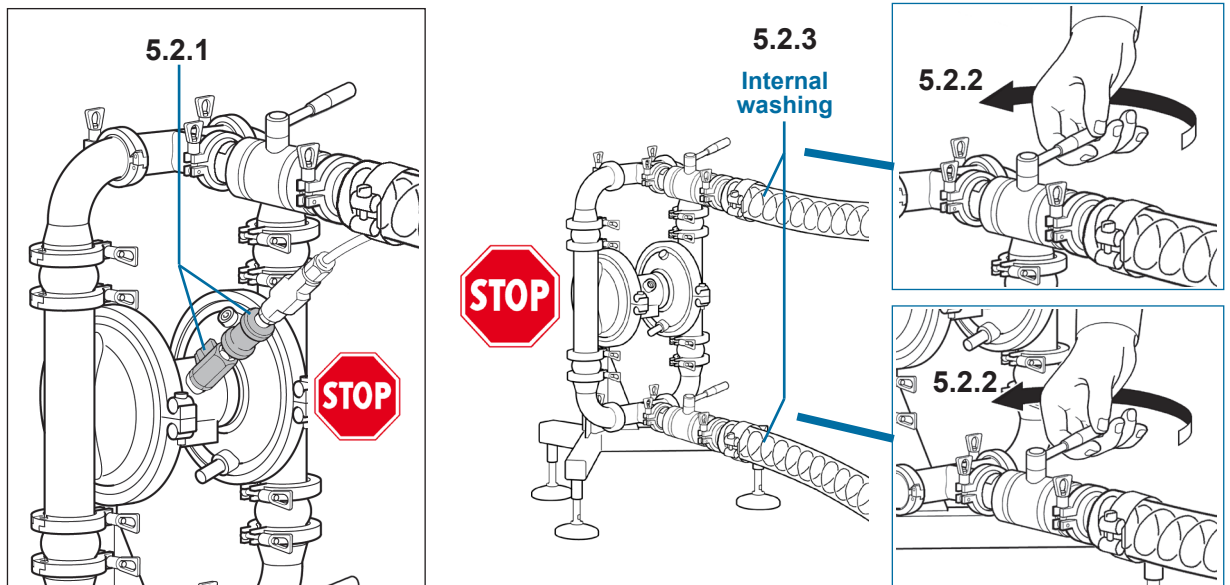
- After a prolonged stop of the pump, empty the pump of the processed fluid;
- If the pump has been out of operation for longer periods of time, the pump must always be flushed and sanitised as described in [Chapter 6 CLEANING AND SANITISING](#), before being put back into operation;
- After the pump has come to a complete standstill, the pump must be promptly emptied of the processed fluid and flushed and sanitised as described in [Chapter 6 CLEANING AND SANITATION](#).

- 5.2.1 Only act on the air supply to shut down the pump normally: close the control valve, the 3-way valve **and discharge the residual pressure of the pump pneumatic system.**



CAUTION: risk of stall, premature wear/rupture of the diaphragms.

Never stop the pump (when it is running and/or when the pneumatic circuit is under pressure) by closing the product circuit suction and flow valves to avoid premature wear and/or breakage of the diaphragms and residual pressures in the pneumatic circuit inside the pump.



- 5.2.2 If the shutdown is prolonged and/or permanent, the product valves can only be closed after stopping the pump pneumatically.

- 5.2.3 The AISIBOXER and SANIBOXER series pumps are not self-draining; therefore, it is always necessary to empty, flush and sanitise as described in [Chapter 6 CLEANING AND SANITATION](#), immediately after shutdown.



CAUTION: danger of contaminating the pump and fluid.

The prolonged shutdown of the pump can cause oxidation of the fluid and subsequent contamination of the pump product and the system.

- 5.2.4 After the first two hours of operation of the pump and after it has been properly shut down, check the sealing and tightness of the pump clamp flanges and connections to the circuit.



CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with a suitable ratchet strap and wear suitable Personal Protective Equipment (PPE).



Pump stop is thus completed.

5.3 EMERGENCY STOP OF THE PUMP

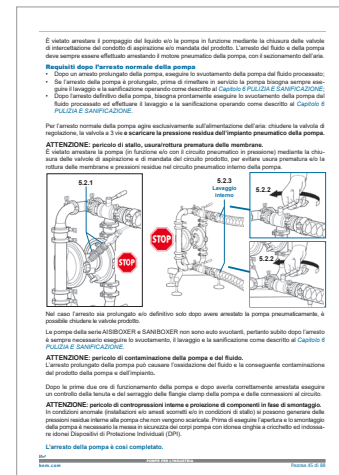
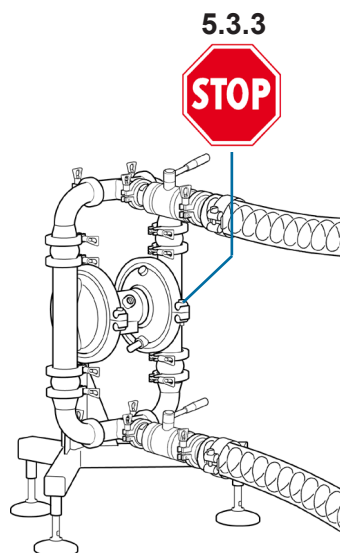
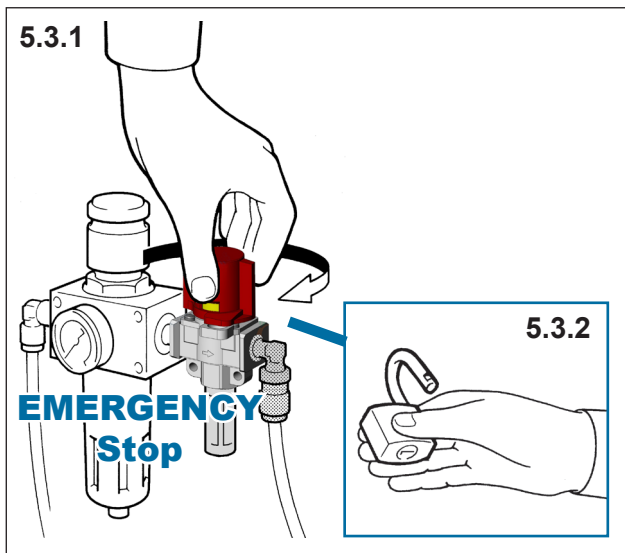


In conditions of detected danger and/or malfunction of the pump, it is necessary to promptly stop it in emergency conditions proceeding as follows.

Requirements after the pump shutdown

- After an emergency stop, resolve the dangerous situation before restarting the pump;
- After a prolonged stop of the pump, empty the pump of the processed fluid;
- If the pump has been out of operation for longer periods of time, the pump must always be flushed and sanitised as described in [Chapter 6 CLEANING AND SANITISING, before being put back into operation](#);
- After the pump has come to a complete standstill, the pump must be promptly emptied of the processed fluid and flushed and sanitised as described in [Chapter 6 CLEANING AND SANITISATION](#).

5.3.1 To stop the pump in emergency conditions, act only on the compressed air supply. Readily operate on the 3-way shut-off valve (from a protected position upstream of the supply circuit) for the EMERGENCY stop command.



5.3.4



CAUTION: risk of stall, premature wear/rupture of the diaphragms.

Never stop the pump (when it is running and/or when the pneumatic circuit is under pressure) by closing the product circuit suction and flow valves to avoid premature wear and/or breakage of the diaphragms and residual pressures in the pneumatic circuit inside the pump.

5.3.2 Interlock the 3-way safety valve of the compressed air supply before operating.

5.3.3 Resolve the hazardous condition permanently before restoring the compressed air supply to the pump.

5.3.4 If the stop is prolonged and/or permanent, proceed as described in [Section 5.2 NORMAL SHUTDOWN OF THE PUMP](#).

5.3.5 The AISIBOXER and SANIBOXER series pumps are not self-draining; therefore it is always necessary to empty, flush, and sanitise them as described in [Chapter 6 CLEANING AND SANITATION](#).



CAUTION: danger of contaminating the pump and fluid.

The prolonged shutdown of the pump can cause oxidation of the fluid and subsequent contamination of the pump product and the system.

Pump emergency stop has thus completed.



CLEANING AND SANITISING



TRANSLATION OF ORIGINAL INSTRUCTIONS AISIBOXER - SANIBOXER rev. 2023

CHAPTER 6

This chapter contains the safe working methods and cleaning and sanitising procedures for AISIBOXER and SANIBOXER series pumps provided by the manufacturer.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
6.1	C.I.P. WASHING (Cleaning In Place)	52 - 54
6.2	C.O.P. WASHING (Cleaning Out Place)	55 - 57
6.3	STERILISATION S.I.P. - S.O.P (Sterilisation In Place - Out Place)	58 - 59

Below is a description of how to behave in each of the procedures listed above.

6.1 C.I.P. WASHING (Cleaning In Place)



The AISIBOXER and SANIBOXER series pumps are designed for C.I.P. flushing (Cleaning In Place) to allow internal washing of all surfaces in contact with the food fluid without disassembling it at the workstation. At the end of a C.I.P. wash, it is always necessary to carry out sterilisation of the internal surfaces ([see Section 6.3 S.I.P. STERILISATION PROCEDURE](#)) to ensure correct sanitisation and food safety of the pump and the product to be treated.



CAUTION: Danger of pump damage and/or contamination

The washing fluid must be compatible with the pump materials, and the maximum temperature must not exceed that permitted by the Manufacturer; the use of non-compatible washing fluids and/or temperatures higher than those permitted is prohibited.



The use of cleaning agents not expressly permitted for food use, abrasives, pickling agents or cleaning agents containing chlorinated substances, e.g. hydrochloric acid, on stainless steel parts is prohibited.

The water used for the washing fluid must be potable water that has been suitably softened or demineralised.



CAUTION: Danger of pump fouling and/or contamination

Water with a high degree of hardness tends to create limescale deposits and contamination on the internal surfaces of the pump, which subsequently come into contact with the food-grade fluid.



In installations subject to restrictions or where it is not possible to rotate the pump to empty the fluids, the procedure described in [Section 6.2 C.O.P. WASHING PROCEDURE](#) must be followed. ([Cleaning Out Place](#)).

When to perform the C.I.P. wash.

- Before commissioning the pump for the first time;
- At the end of a production cycle, before the product change;
- At the end of a daily production cycle and before starting production;
- Before and after a prolonged standstill and/or inactivity period of the pump;
- Before putting the pump back into service after maintenance work.

Phases of the C.I.P. washing cycle.

- Internal pre-rinse with water at 80°C for 30 min.;
- Internal washing with a mild sodium hydroxide solution (1.5%-2.5%) at 70-75°C for 20-30 minutes;
- Rinse with hot potable water at 70-75°C (suitably softened or demineralised);
- Internal washing with nitric acid solution (1%) at 70-75°C for 15-20 minutes;
- Rinse with cold water (suitably softened or demineralised);
- Sterilisation of internal surfaces ([see Section 6.3 S.I.P. STERILISATION PROCEDURE](#)).



NOTE

The washing cycle duration may vary depending on the field of application, the type of product, and the type of system where the pump is installed. The pump operating speed must be set to a minimum during the washing cycle.



CAUTION: danger of contamination

In the event of a prolonged standstill of the pump/plant (e.g. weekends or holidays), the pump/plant must be filled with a suitable food-grade sanitiser with acidity between pH 8 and pH 10.



6.1.1 C.I.P. WASHING PROCEDURE (Cleaning In Place)

After stopping the pump as described in *Section 5.2 NORMAL SHUTDOWN OF THE PUMP*, C.I.P. washing can be carried out as follows:



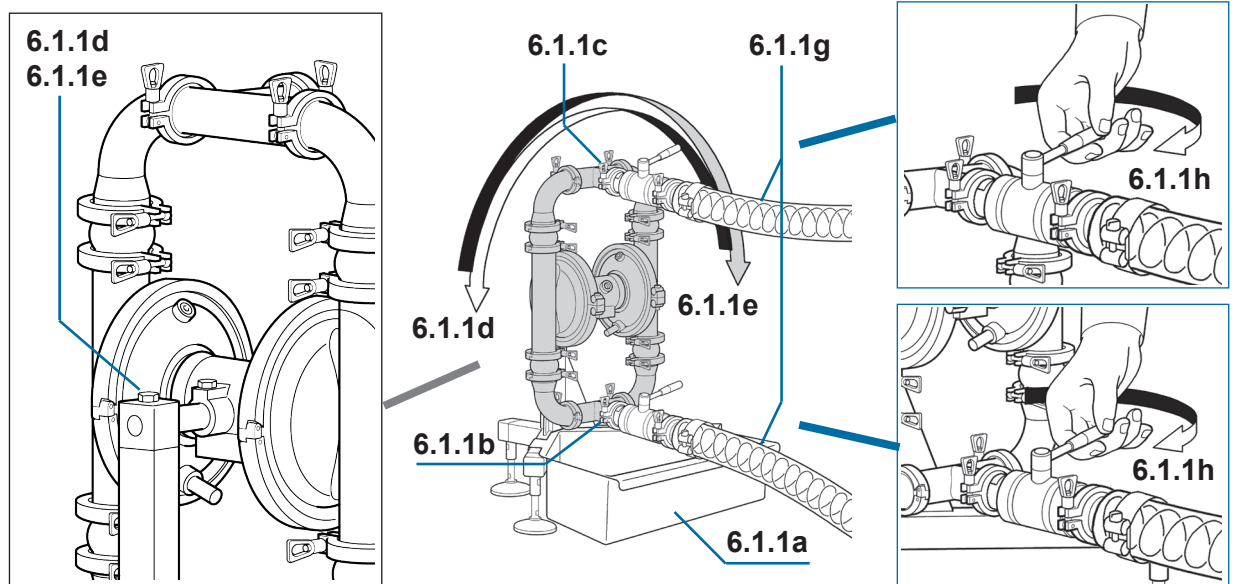
CAUTION: burn and/or contact hazard

During C.I.P. washing, the external surfaces of the pump can reach high temperatures, so use suitable P.P.E. before working near the pump. Washing and sanitising fluid solutions can be very aggressive and harmful to health; always wear suitable P.P.E. (gloves, face mask, aprons and boots). In case of contact with unprotected parts of the body, consult the Technical and Safety Data Sheets and seek medical advice.

Safety requirements before starting the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Closed suction and delivery valves;
- Pump and suction and delivery circuits cooled.
- Use appropriate P.P.E. (Nitrile gloves, face mask, aprons and boots) during emptying;
- Use of disposable food-grade cloths.

6.1.1a The AISIBOXER and SANIBOXER series pumps are not self-draining, so a drip tray must be provided under the pump to collect the internal fluid.



- 6.1.1b Loosen and remove the clamp on the pump suction inlet and drain the residual fluid.
- 6.1.1c Loosen and remove the clamp on the pump delivery outlet and wait for the internal fluid to drain.
- 6.1.1d Loosen the locking screw of the swivel coupling pin and rotate the pump 180° to allow the residual fluid to drain.
- 6.1.1e Reposition the pump in the working position (delivery line above) and tighten the locking screw of the swivel port pin.
- 6.1.1f Remove the drip tray and drain the fluid.
- 6.1.1g Connect the suction (lower) and delivery (upper) connections of the pump to the pipes of the centralised C.I.P. washing system and secure them with the appropriate clamps.
- 6.1.1h Open the pump product circuit and steam generator valves.

6.1.1i Start the pump and set the speed to a minimum to allow better washing of the interior surfaces.



NOTE

The washing fluid must not be pressurised but must be introduced into the pump circuit through the suction generated by the pump.

6.1.1j Carry out all "Steps of the C.I.P. wash cycle" described on [page 48](#).



NOTE

The washing cycle duration may vary depending on the field of application, the type of product, and the type of system where the pump is installed.

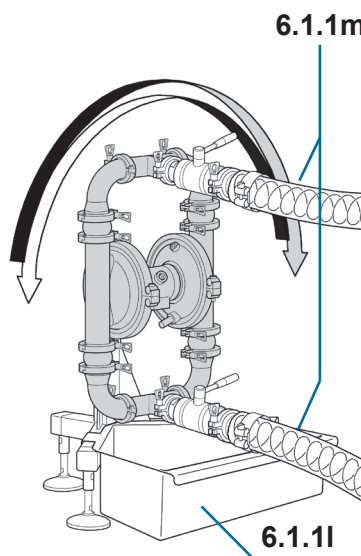
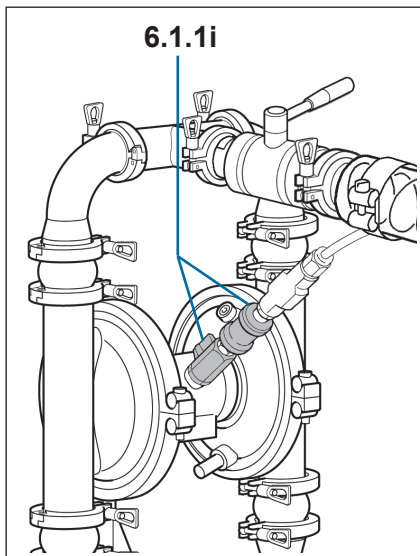
6.1.1k At the end of the C.I.P. washing cycle, carry out sterilisation as described in [Section 6.3 S.I.P. STERILISATION PROCEDURE](#).

6.1.1l At the end of the C.I.P. washing cycle, a drip tray must be placed under the pump, and the internal washing fluid must be emptied as previously described in [6.1.1a to 6.1.1f](#).



CAUTION: Danger of slipping.

Promptly remove any fluid spillage from the ground.



6.1.1j

Le pompe della serie AISIBOXER e SANIBOXER sono progettate per effettuare lavaggi C.I.P. (Cleaning in Place) per consentire il lavaggio interno di tutte le superfici a contatto con il fluido alimentare senza effettuare lo smontaggio della stessa sulla posizione di lavoro o un'opportuna posizione di lavaggio. La Sterilizzazione S.I.P. offre una completa sanificazione e sicurezza alimentare della pompa e del prodotto da trattare.

ATTENZIONE: per il fluido di lavaggio che non deve essere compresso, il sistema deve essere compatibile con il tipo di lavaggio che si intende effettuare. Il liquido di lavaggio deve essere compatibile con i materiali di costruzione della pompa e la temperatura massima non deve essere superiore a quella ammessa dal Costruttore. I vassoi (tray) di fluidi di lavaggio non compatibili (con acidi superiori a pH 10) e/o con temperature superiori a quelle ammesse. È vietato l'impiego di prodotti non espressamente consentiti per l'uso alimentare, agricolo, disinfettanti o sanificanti con percentuali di sostanze cloroate, ad esempio acido cloridrico, sulle parti in acciaio inox.

Le linee impiegate per il fluido di lavaggio deve essere possibilmente opportunamente addobbata o demineralizzata.

ATTENZIONE: pericolo di incrostazioni della pompa e/o contaminazione

Focus: non lasciare a lungo il liquido di lavaggio in circolazione e contaminazione sulle superfici interne della pompa che vengono successivamente a contatto con il fluido alimentare.

Quando eseguire la Sterilizzazione S.I.P.

- A seguito di C.I.P. (C.O.P.) prima di effettuare la prima messa in servizio della pompa;
- A seguito di C.I.P. (C.O.P.) al termine di un ciclo produttivo, prima del cambio prodotto;
- A seguito di C.I.P. (C.O.P.) al termine di un ciclo produttivo giornaliero e prima di iniziare la produzione;
- A seguito di C.I.P. (C.O.P.) prima e dopo un periodo di fermo prolungato e/o di inattività della pompa;
- A seguito di C.I.P. (C.O.P.) prima di ritrarre in servizio la pompa e a seguito di un'interruzione di manutenzione.

Fasi del Ciclo di Sterilizzazione S.I.P.

- Dopo aver completato il lavaggio C.I.P. ripete il Lavaggio C.O.P.;
- Sterilizzazione delle superfici interne con vapore saturo a 120-140°C erogato a una pressione di 2 bar (per 60/70 minuti);
- Riscaldamento della pompa sulla posizione di lavoro.

NOTA:

La durata del ciclo di sterilizzazione varia in funzione del campo di applicazione, del tipo di prodotto e del tipo di impianto in cui viene installata. La velocità di funzionamento della pompa deve essere regolata al minimo durante il ciclo di sterilizzazione.

ATTENZIONE: pericolo di contaminazione

In caso di fermo prolungato della pompa (settimane, o flessibilità) bisogna effettuare il riempimento della pompa con liquore sanificante alimentare con acido cloridrico tra pH 4 e pH 10 e chiudere gli attacchi dei collettori di aspirazione e mandata con idonei tappi a tenuta per clamp.

6.1.1m Reconnect the suction and delivery lines of the processing system to the respective pump connections and secure them with the appropriate clamps.

The C.I.P. washing procedure is now complete.

6.2 C.O.P. WASHING (Cleaning Out Place)



The AISIBOXER series pumps are designed for C.O.P. washing. (Cleaning Out Place) to enable the internal washing of all surfaces in contact with the foodstuff fluid on a special washing station (after removal of the same from the workstation). At the end of a C.O.P. wash it is always necessary to carry out sterilisation of the internal surfaces (*see Section 6.3 S.I.P. STERILISATION PROCEDURE*) to ensure correct sanitisation and food safety of the pump and the product to be treated.



CAUTION: Danger of pump damage and/or contamination

The washing fluid must be compatible with the pump materials, and the maximum temperature must not exceed that permitted by the Manufacturer; the use of non-compatible washing fluids and/or temperatures higher than those permitted is prohibited.



The use of cleaning agents not expressly permitted for food use, abrasives, pickling agents or cleaning agents containing chlorinated substances, e.g. hydrochloric acid, on stainless steel parts is prohibited.

The water used for the washing fluid must be potable water that has been suitably softened or demineralised.



CAUTION: Danger of pump fouling and/or contamination

Water with a high degree of hardness tends to create limescale deposits and contamination on the internal surfaces of the pump, which subsequently come into contact with the food-grade fluid.



When to perform C.O.P. washing

- Before commissioning the pump for the first time;
- At the end of a production cycle, before the product change;
- At the end of a daily production cycle and before starting production;
- Before and after a prolonged standstill and/or inactivity period of the pump;
- Before putting the pump back into service after maintenance work.

Phases of the C.O.P. Washing Cycle

- Internal pre-rinse with water at 80°C for 30 min.;
- Internal washing with a mild sodium hydroxide solution (1.5%-2.5%) at 70-75°C for 20-30 minutes;
- Rinse with hot potable water at 70-75°C (suitably softened or demineralised);
- Internal washing with nitric acid solution (1%) at 70-75°C for 15-20 minutes;
- Rinse with cold water (suitably softened or demineralised);
- Sterilisation of internal surfaces (*see Section 6.3 S.I.P. STERILISATION PROCEDURE*);
- Repositioning the pump in working position.



NOTE

The washing cycle duration may vary depending on the field of application, the type of product, and the type of system where the pump is installed. The pump operating speed must be set to a minimum during the washing cycle.



CAUTION: danger of contamination

In case of prolonged standstill (e.g. weekends or holidays), the pump must be filled with a suitable food-grade sanitiser with an acidity between pH 8 and pH 10, and the suction and delivery manifold connections must be closed with suitable clamp plugs.



6.2.1 C.O.P. WASHING PROCEDURE (Cleaning Out Place)

After stopping the pump as described in *Section 5.2 NORMAL SHUTDOWN OF THE PUMP*, C.O.P. washing can be carried out as follows:



CAUTION: burn and/or contact hazard

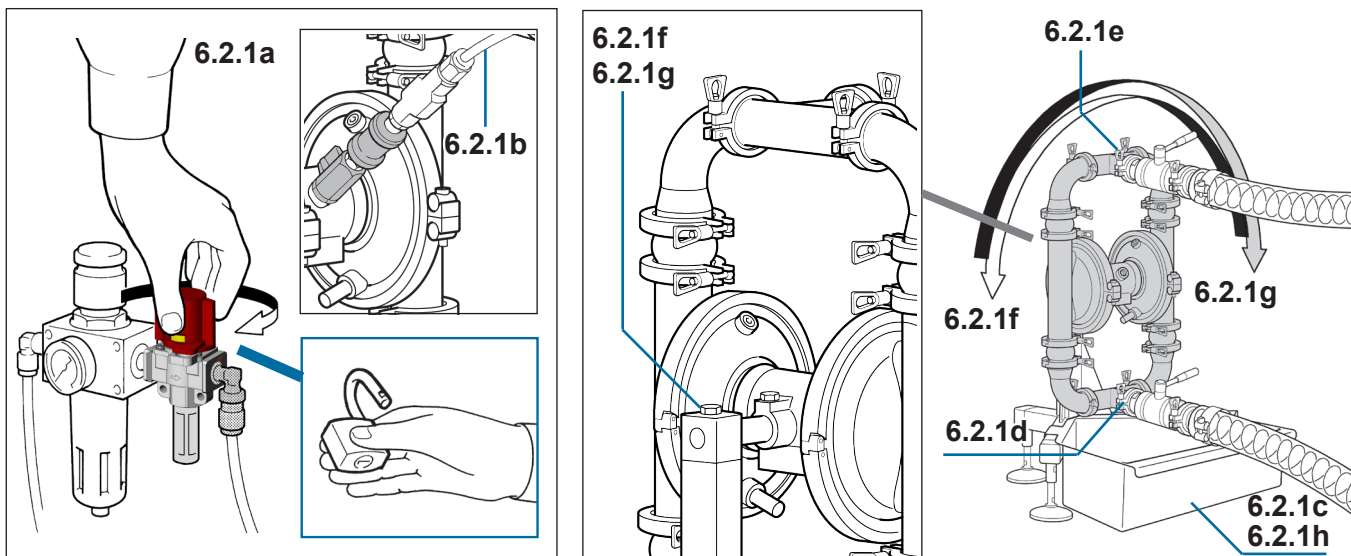
During C.O.P. washing, the external surfaces of the pump can reach high temperatures, so use suitable P.P.E. before working near the pump. Washing and sanitising fluid solutions can be very aggressive and harmful to health; always wear suitable P.P.E. (gloves, face mask, aprons and boots). In case of contact with unprotected parts of the body, consult the *Technical and Safety Data Sheets* and seek medical advice.



Safety requirements before starting the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Closed suction and delivery valves;
- Pump and suction and delivery circuits cooled.
- Use appropriate P.P.E. (Nitrile gloves, face mask, aprons and boots) during emptying;
- Use of disposable food-grade cloths.

6.2.1a Close the mains compressed air cut-off switch (upstream of the pump) and padlock it.



6.2.1b Disconnect the compressed air supply pipe from the pump.

6.2.1c The AISIBOXER and SANIBOXER series pumps are not self-draining, so a drip tray must be provided under the pump to collect the internal fluid.

6.2.1d Loosen and remove the clamp on the pump suction inlet and drain the residual fluid.

6.2.1e Loosen and remove the clamp on the pump delivery outlet and wait for the internal fluid to drain.

6.2.1f Loosen the locking screw of the swivel coupling pin and rotate the pump 180° to allow the residual fluid to drain.

6.2.1g Reposition the pump in the working position (delivery line above) and tighten the locking screw of the swivel port pin.

6.2.1h Remove the drip tray and drain the fluid.



6.3 S.I.P. - S.O.P. STERILISATION (Sterilisation In Place - Out Place)



The AISIBOXER and SANIBOXER series pumps are designed for S.I.P. sterilisation. (Sterilisation In Place) and S.O.P. (Sterilisation Out Place) to allow internal sanitisation of all surfaces in contact with the food fluid without disassembling it at the workstation or at a special washing station. S.I.P. Sterilisation offers proper sanitisation and food safety of the pump and the product to be treated.



CAUTION: Danger of pump damage and/or contamination

The sterilisation fluid must be compatible with the pump materials, and the maximum temperature must not exceed that permitted by the Manufacturer; the use of non-compatible sanitising fluids (with acidity higher than pH 10) and/or temperatures higher than those permitted is prohibited.



The use of products not expressly permitted for food use, abrasives, pickling agents or sanitising agents with chlorinated substances, e.g. hydrochloric acid, on stainless steel parts is prohibited.

The water used for the washing fluid must be potable water that has been suitably softened or demineralised.



CAUTION: Danger of pump fouling and/or contamination

Water with a high degree of hardness tends to create limescale deposits and contamination on the internal surfaces of the pump, which subsequently come into contact with the food-grade fluid.



When to perform S.I.P. sterilisation

- Following C.I.P. / C.O.P. before commissioning the pump for the first time;
- Following C.I.P. / C.O.P. at the end of a production cycle, before the product change;
- Following C.I.P. / C.O.P. at the end of a daily production cycle and before starting production;
- Following C.I.P. / C.O.P. before and after a prolonged standstill and/or inactivity period of the pump;
- Following C.I.P. / C.O.P. before putting the pump back into service after maintenance works.

Stages of the S.I.P. sterilisation cycle.

- After completing the C.I.P. Wash or the C.O.P. Wash;
- Sterilisation of internal surfaces with saturated steam at 120-140°C delivered at a pressure of 2 bar for 60-70 minutes;
- Repositioning the pump in working position.



NOTE

NOTE

The sterilisation cycle duration may vary depending on the field of application, the type of product, and the type of system where the pump is installed. The pump operating speed must be set to a minimum during the sterilisation cycle.



CAUTION: danger of contamination

In case of prolonged standstill (e.g. weekends or holidays), the pump must be filled with a suitable food-grade sanitiser with an acidity between pH 8 and pH 10, and the suction and delivery manifold connections must be closed with suitable clamp plugs.



6.3.1 S.I.P. - S.O.P. STERILISATION PROCEDURE (Sterilization In Place - Out Place)

At the end of the C.I.P. or the C.O.P. Wash, it is possible to sterilise the internal product circuit of the pump as follows:



CAUTION: burn and/or contact hazard

During S.I.P. and/or S.O.P. sterilisation, the external surfaces of the pump can reach high temperatures, so use suitable P.P.E. before working near the pump.

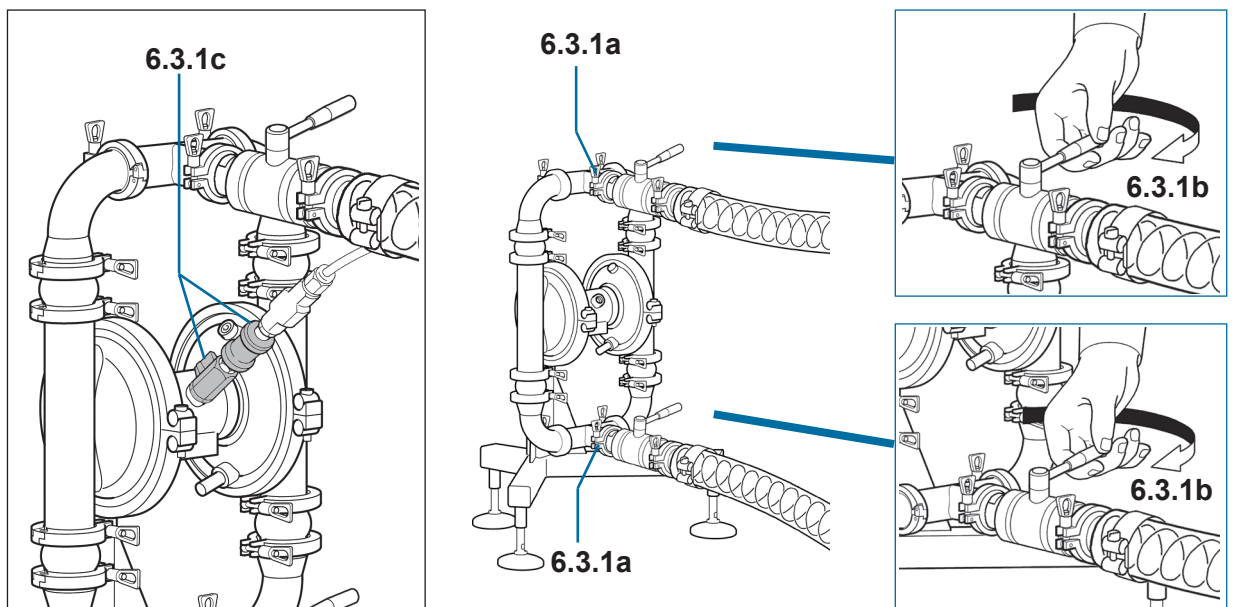


Washing and sanitising fluid solutions can be very aggressive and harmful to health; always wear suitable PPE (gloves, face mask, aprons and boots) when washing. In case of contact with unprotected parts of the body, consult the Technical and Safety Data Sheets and seek medical advice.



Safety requirements before starting the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Closed suction and delivery valves;
- Pump and suction and delivery circuits cooled.
- Use appropriate P.P.E. (Nitrile gloves, face mask, aprons and boots) during emptying;
- Use of disposable food-grade cloths.



6.3.1a Connect the suction (lower) and delivery (upper) connections of the pump to the piping of the S.I.P. or S.O.P. sterilisation system and secure them with the appropriate clamps.

6.3.1b Open the pump product circuit and steam generator valves.

6.3.1c Start the pump and set the speed to a minimum to allow better sterilisation of the inner surfaces.

6.3.1d Carry out the sterilisation of internal surfaces with saturated steam at 120-140°C delivered at a pressure of 2 bar for 60-70 minutes.



NOTE

The sterilisation cycle duration may vary depending on the field of application, the type of product, and the type of system where the pump is installed.

The S.I.P. and/or S.O.P. sterilisation procedure is completed as follows.

CHAPTER 7

This chapter provides the maintenance schedule, i.e. the interventions planned by the manufacturer for the safe and durable maintenance of the AISIBOXER and SANIBOXER series pumps.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
7.1	SCHEDULED MAINTENANCE TABLE	61
7.2	EXTERNAL CLEANING AND LEAK CHECK	62 - 63
7.3	PUMP DISASSEMBLY AND REASSEMBLY	64 - 66
7.4	TIGHTNESS CHECK	67
7.5	MANUAL INTERIOR WASHING	68 - 70
7.6	PRODUCT CIRCUIT MAINTENANCE	71 - 73
7.7	AIR CIRCUIT MAINTENANCE	74 - 75

Below is a description of how to behave in each of the phases listed above.

7.1 SCHEDULED MAINTENANCE TABLE



The scheduled maintenance operations are reserved for qualified and authorised Mechanical Maintenance Technicians, equipped with suitable Personal Protective Equipment (PPE), who know and comply with the contents of this Manual.

To ensure optimal performance and safe use of the pump, it is necessary to periodically perform the routine maintenance operations indicated in the following table and dealt with in the following sections.

The service intervals shown refer to use under normal conditions; for severe installations and operating conditions (high viscosity, high heads and/or negative suction and temperatures close to the threshold values), the intervals indicated must be adjusted accordingly.

SEC.	SCHEDULED MAINTENANCE	every 500 hours	500,000 cycles	10,000,000 cycles	20,000,000 cycles
7.2	EXTERNAL CLEANING AND LEAK CHECK:	check	check	check	replacement
7.2.1	• Pump external cleaning procedure	✓	--	--	--
7.2.2	• Product Circuit Leak Check	✓	--	--	--
7.3	PUMP DISASSEMBLY AND REASSEMBLY	check	check	check	replacement
7.3.1	• Pump Disassembly	When necessary			
7.3.2	• Pump Re-assembly	When necessary			
7.4	TIGHTNESS CHECK:	check	check	check	replacement
7.4.1	• Tightness check	--	✓	--	--
7.5	MANUAL INTERIOR WASHING	When necessary	check	check	replacement
7.5.1	• Manual internal washing procedure	--	--	✓	✓
7.6	PRODUCT CIRCUIT MAINTENANCE:	check	check	check	replacement
7.6.1	• Check and/or replacement of diaphragms	--	--	✓	✓
7.6.2	• Check and/or replacement of valves	--	--	✓	✓
7.7	AIR CIRCUIT MAINTENANCE	replacement			
7.7.1	• Coaxial exchanger replacement	50,000,000 cycles			



CAUTION

For safety reasons, the pump diaphragms must be dismantled and checked every 10,000,000 (ten million) cycles and replaced every 20,000,000 (twenty million) cycles for heavy-duty applications (high viscosity, high negative head and/or suction and temperatures close to the threshold).



CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with a suitable ratchet strap and wear suitable Personal Protective Equipment (PPE).

7.2 EXTERNAL CLEANING AND TIGHTNESS CHECK



This operation is reserved for trained and qualified Mechanical Maintenance Technicians equipped with suitable Personal Protective Equipment (PPE); *see the Technical and Safety Data Sheets* of the (fluid cleaning and/or sanitising process).

The external cleaning and leak check of the suction and delivery circuit of the pump must be carried out periodically following the procedures described below.

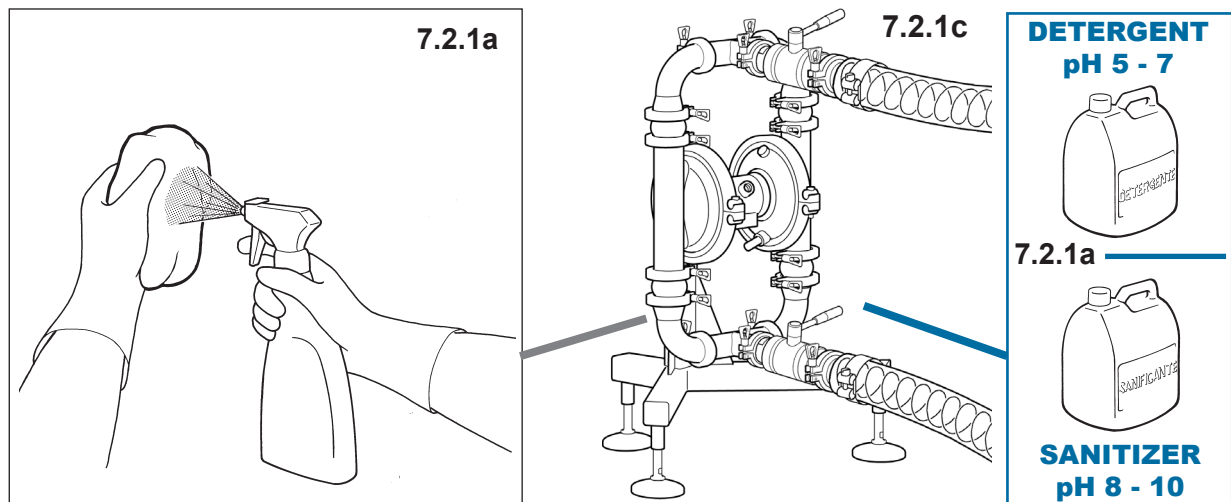
7.2.1 EXTERNAL CLEANING OF THE PUMP

The pump must be cleaned externally every 40 hours of operation to allow visual inspections and safe operations. Buildups on the external surfaces of the pump not only result in dangerous bacterial growth but can also adversely affect process temperatures.



CAUTION: Danger of bacterial contamination and overheating

Buildups on external surfaces not only negatively affect the food safety of the environment but can also result in higher pump and process fluid temperatures.



Safety requirements before starting the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Closed suction and delivery valves;
- Pump and suction and delivery circuits at MAX ambient temperature 40°C.

Proceed as follows to clean the outside of the pump:

- 7.2.1a Remove deposits from the outer surfaces of the pump and the installation compartment with a sponge moistened with a suitable food-grade cleaning agent with an acidity of pH 5 to pH 7. Then pass the external surfaces with a suitable food sanitiser with acidity between pH 8 and pH 10.



CAUTION: danger of corrosion and/or iron contamination

Using ferrous tools, abrasives, pickling agents, or cleaning agents containing chlorinated substances, e.g. hydrochloric acid, on stainless steel parts is prohibited.

- 7.2.1b Remove residues of sanitiser from the outer surfaces of the suction and delivery pipes in the vicinity of the pump with potable water, possibly demineralised and/or softened. Dry surfaces with disposable food-grade cloths.
- 7.2.1c Remove any tools and cloths used from the pump.

The external cleaning of the pump is complete.



7.2.2 PRODUCT CIRCUIT LEAK TEST

The pump product circuit tightness must be checked after the first 2 hours of operation and then periodically every 500 hours.



CAUTION: risk of contact with fluids and/or ejection of pressurised fluid.

Before working in the vicinity of the pump, suitable P.P.E. must be worn (gloves, face mask, aprons and boots); *see Technical and Safety Data Sheets* of the liquid used.

Safety requirements for the tightness check:

- Pump with the external surfaces clean;
- Open product shut-off valves (suction and delivery);
- Pump overflowed and in operation.

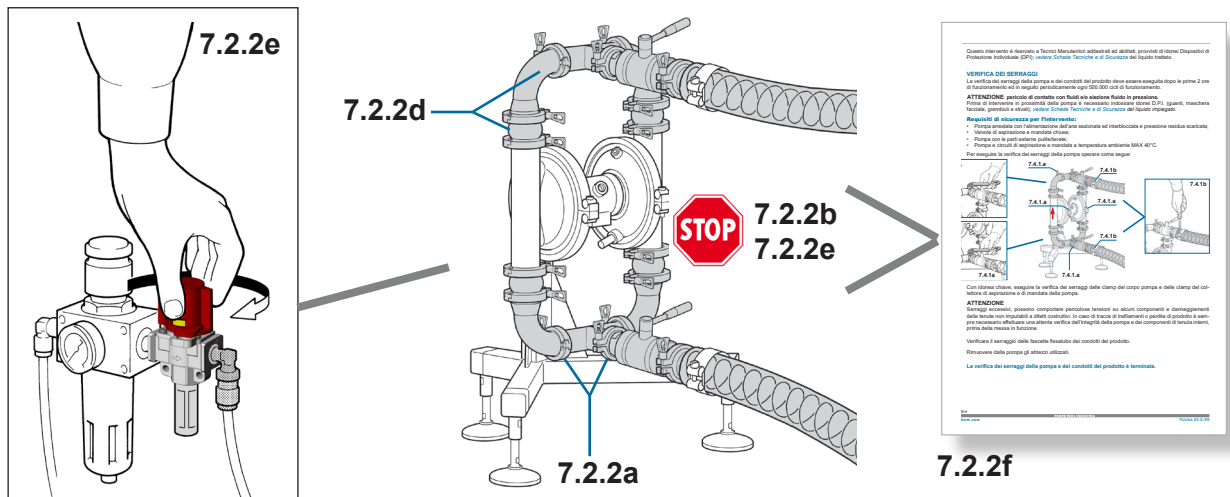
CHECKING THE SUCTION TIGHTNESS

The pump suction tightness must be checked with the pump running, operating as follows:

7.2.2a Visually check for leaks on the suction circuit and on the pump;

7.2.2b If leaks are detected, immediately stop the pump, disconnect the air supply and discharge the residual pressure from the internal pneumatic circuit.

7.2.2c If leaks are detected, check the tightening of the fastening parts that are part of the suction circuit (hose connection, clamps, fittings) and/or of the clamps of the pump body and of the manifold (*see section 7.4 TIGHTNESS CHECK*).



CAUTION: risk of product leakage.

The clamps tightness check ensures a correct seal of the product circuit; in the event of leaks, it is always necessary to carefully check that the pump and the internal sealing components are intact before commissioning.

The check of the hydraulic tightness of the suction product circuit is completed.

CHECKING THE DELIVERY TIGHTNESS

The pressure check must be carried out with the pump running, as follows:

7.2.2d Visually check for leaks on the delivery circuit and the pump.

7.2.2e If leaks are detected, immediately stop the pump, disconnect the air supply and discharge the residual pressure from the internal pneumatic circuit.

7.2.2f Check the tightness of the parts concerned on the delivery side (pipe connection, clamps, fittings), the pump body clamps, and the manifold clamps (*see Section 7.4 TIGHTNESS CHECK*).



CAUTION: risk of product leakage.

The clamps tightness check ensures a correct seal of the product circuit; in the event of leaks, it is always necessary to carefully check that the pump and the internal sealing components are intact before commissioning.

The check of the hydraulic tightness of the product delivery circuit is completed.



7.3 DISASSEMBLY AND REASSEMBLY OF THE PUMP



This operation is reserved for trained and qualified maintenance technicians, equipped with appropriate Personal Protective Equipment (PPE); (see *Technical and Safety Data Sheets of the liquid treated*).



CAUTION: risk of contact with fluids and/or ejection of pressurised fluid.

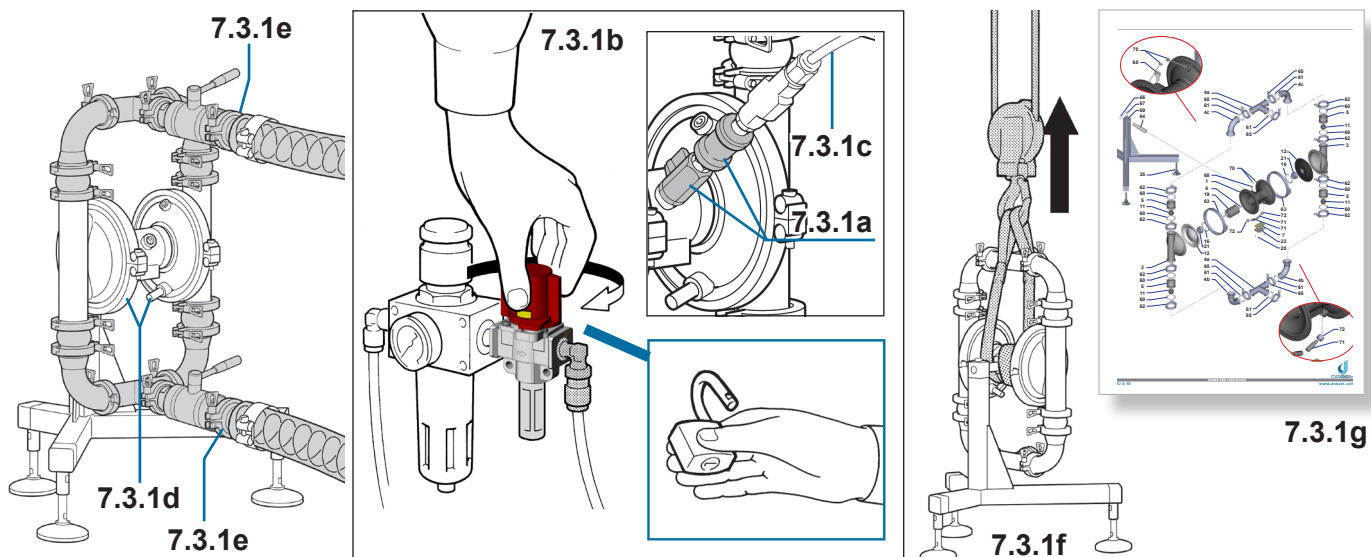
Before working in the vicinity of the pump, suitable P.P.E. must be worn (gloves, face mask, aprons and boots); see *Technical and Safety Data Sheets* of the liquid used.

7.3.1 PUMP DISASSEMBLY

In order to carry out maintenance on the product circuit, the pump must be disassembled as follows:

Safety requirements for the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Pump with external parts cleaned/washed (see *Section 7.2.1 PUMP EXTERNAL CLEANING*);
- Pump with flushed and sterilised internal product circuit (see *Chapter 6 CLEANING AND SANITISING*);
- Pump with product circuit emptied of washing fluid (see *Chapter 6 CLEANING AND SANITISING*);
- Closed product shut-off valves (suction and delivery);
- Pump and suction and delivery circuits at ambient temperature.



- 7.3.1a To shut down the pump, only operate on the air supply: close the ball valve and the 3-way shut-off valve.
- 7.3.1b Close the upstream 3-way safety valve, discharge the residual pressure of the pump's pneumatic system and apply the safety interlock.
- 7.3.1c Disconnect the compressed air supply pipe from the pump connection.
- 7.3.1d If the pump is equipped with diaphragm rupture sensors, the electrical signal connectors must be disconnected.
- 7.3.1e Disconnect the suction and delivery pipes of the pump fluid.
- 7.3.1f Remove the pump from the installation site with suitable lifting equipment.
- 7.3.1g Please use the respective *table of SPARE PARTS* for the disassembly and reassembly sequences of the pump to access the internal parts of the treated interventions.

7.3.1h Loosen the clamps of the suction and delivery manifolds and remove them from the pump.

7.3.1i Loosen the clamps of the suction and delivery valve bodies and remove them from the pump.

7.3.1j Loosen the clamps on the pump bodies and remove them.



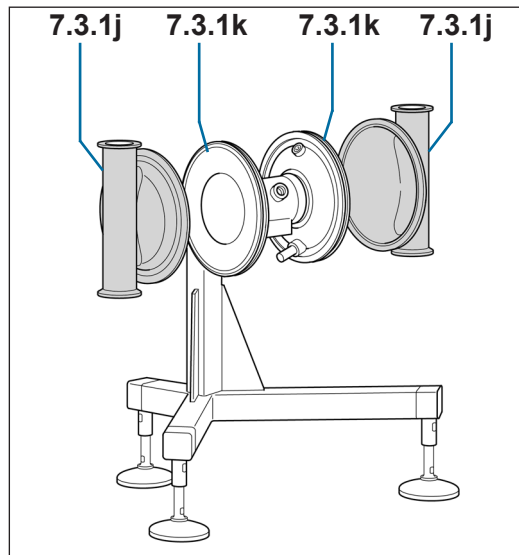
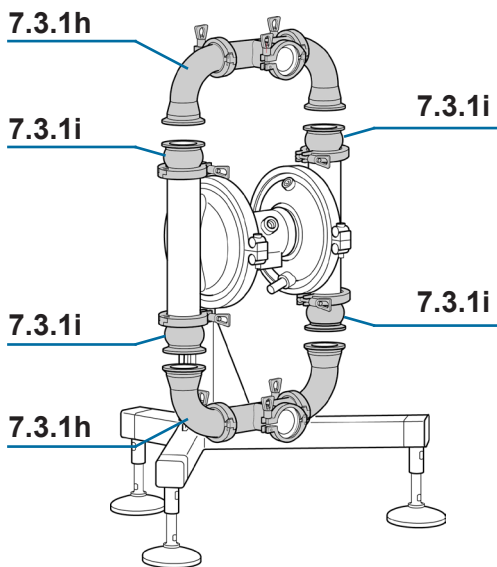
CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with a suitable ratchet strap and wear suitable Personal Protective Equipment (PPE).



7.3.1k Unscrew the diaphragm from the pump shaft.

7.3.1l Perform cleaning of the components in contact with foodstuff as described in [Section 7.5 INTERNAL MANUAL WASHING](#).



Il Lavaggio Manuale Interno deve essere effettuato come manutenzione ordinaria per consentire lo spegnimento di eventuali rischi di incendio e per garantire un'igiene alimentare sicura della pompa.

Il Lavaggio Manuale Interno deve essere effettuato prima di operazioni di manutenzione di ogni natura della pompa e dopo ogni intervento di manutenzione.

ATTENZIONE: pericolo di contaminazione alimentare.
La presenza di depositi di contaminazione nella pompa deve essere eliminata prima di qualsiasi intervento di manutenzione e di pulizia. Assicurarsi che la pompa sia pulita e igienizzata in conformità con le norme vigenti, le norme CEI, le norme UNI, le norme EN e le norme ISO.

ATTENZIONE: pericolo di innescamento della pompa in contaminazione.
Il rischio di innescamento della pompa in contaminazione è elevato in presenza di depositi di contaminazione nella pompa e in presenza di depositi di contaminazione nella pompa. Assicurarsi che la pompa sia pulita e igienizzata in conformità con le norme vigenti, le norme CEI, le norme UNI, le norme EN e le norme ISO.

ATTENZIONE: pericolo di innesco della pompa in contaminazione.
Il rischio di innesco della pompa in contaminazione è elevato in presenza di depositi di contaminazione nella pompa e in presenza di depositi di contaminazione nella pompa. Assicurarsi che la pompa sia pulita e igienizzata in conformità con le norme vigenti, le norme CEI, le norme UNI, le norme EN e le norme ISO.

Preparazione del Lavaggio Manuale:

- Adeguate precauzioni di sicurezza prima del lavaggio della pompa.
- Ogni 10.000.000 di cicli di funzionamento.
- Quando necessario.

Fasi del Ciclo del Lavaggio Manuale:

- Lavaggio manuale della pompa in conformità con le norme vigenti, le norme CEI, le norme UNI, le norme EN e le norme ISO.
- Smontaggio della pompa in conformità con le norme vigenti, le norme CEI, le norme UNI, le norme EN e le norme ISO.
- Lavaggio manuale dei componenti della pompa con detergenti adatti e acqua pulita.
- Smontaggio dei componenti della pompa e controllo con l'aiuto della pompa con un soffietto.
- Pulizia dei componenti della pompa con un panno pulito e asciutto.
- Asciugatura manuale dei componenti della pompa a contatto con l'aiuto della pompa con un soffietto e getto d'aria.
- Riposizionamento della pompa sulla posizione di lavoro.

ATTENZIONE: pericolo di ustione da vapore.
Da evitare il contatto con i vapori di vapore emessi dalla pompa durante il lavaggio. Assicurarsi che la pompa sia pulita e igienizzata in conformità con le norme vigenti, le norme CEI, le norme UNI, le norme EN e le norme ISO.

Per informazioni e supporto tecnico, consultare il sito web www.debem.com.

7.3.1l



CAUTION: Danger of food contamination

To ensure safe food use of the pump, internal cleaning must be carried out (before reassembly) each time the pump is opened and periodically every 10,000,000 operating cycles to allow visual inspections of the product circuit. The presence of deposits and/or fouling on the internal surfaces of the pump can cause contamination and adversely affect the food safety and organoleptic safety of the food-grade fluid that is not the fault of the product or the manufacturer.

Disassembly of the pump is complete.



7.3.2 PUMP RE-ASSEMBLY

After completing the internal cleaning and checking and/or replacing the valves and diaphragms and reassembling, the pump can be reinstalled on the system as follows:

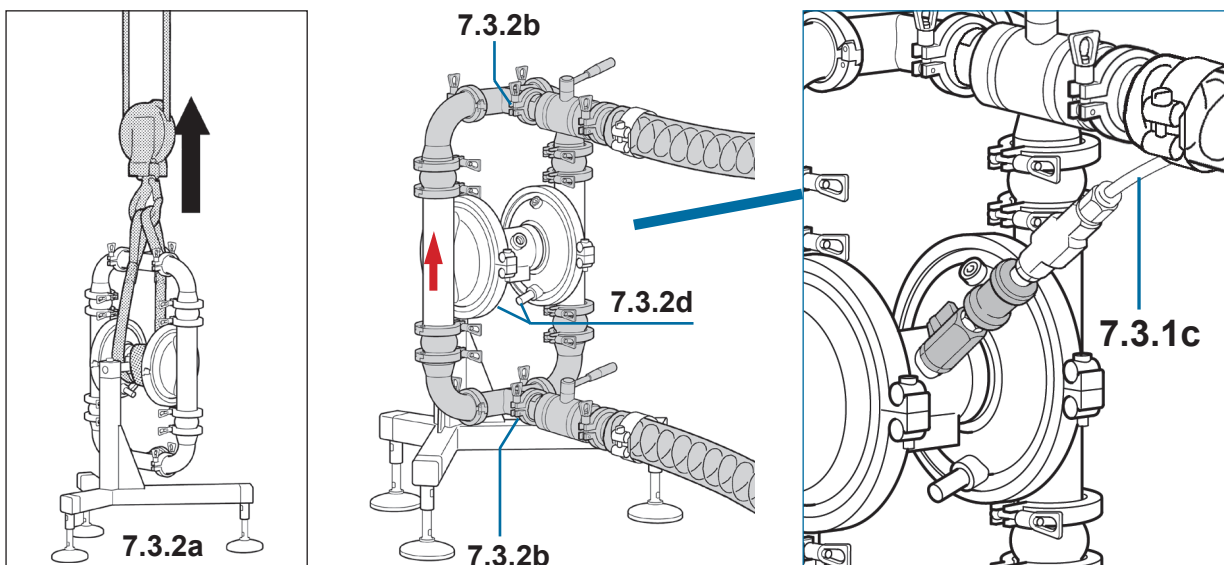
Safety requirements before starting the operation:

- Pump with no residual pressure inside the exhausted air circuit;
- Pump reassembled with internal product circuit flushed and sterilised (*see Chapter 6 CLEANING AND SANITISING*);
- Pump with external parts cleaned/washed (*see Section 7.2.1 PUMP EXTERNAL CLEANING*);
- Use Nitrile gloves suitable for food contact during drying;
- Use of disposable food-grade cloths.

7.3.2a Reposition the pump at the point of installation with suitable lifting equipment.

7.3.2b Reconnect the fluid suction and delivery hoses to the respective pump connections, suction below and delivery above (with the pump bodies pointing upwards).

7.3.2c Reconnect the compressed air supply pipe to the pump connection.



7.3.2d If the pump is equipped with diaphragm rupture sensors, the connection of the electrical signal connectors must be reset.

The maintenance of the product circuit of the pump is completed.

7.4 TIGHTNESS CHECK



This operation is reserved for trained and qualified maintenance technicians equipped with appropriate Personal Protective Equipment (PPE); (see *Technical and Safety Data Sheets* of the liquid treated).

7.4.1 TIGHTNESS CHECK

The tightness of the pump and product ducts must be checked after the first 2 hours of operation and then periodically every 500,000 cycles.



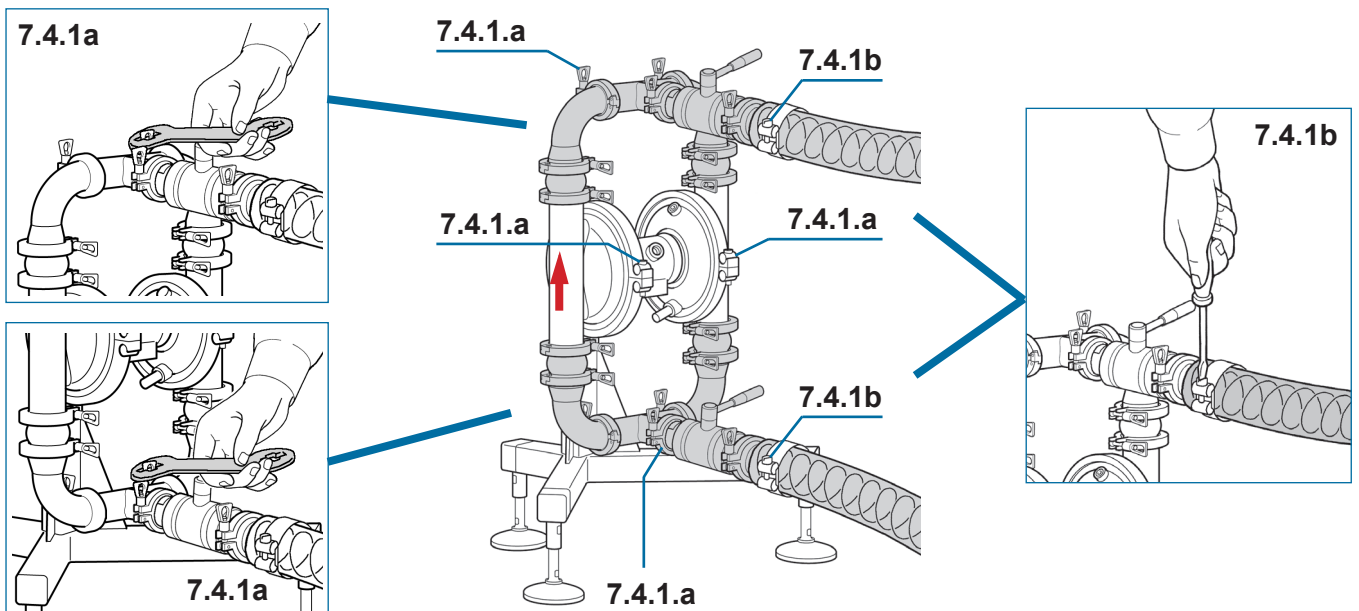
CAUTION: risk of contact with fluids and/or ejection of pressurised fluid.

Suitable PPE (gloves, face mask, aprons and boots) must be worn before working near the pump; see *Technical and Safety Data Sheets* of the liquid used.

Safety requirements for the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Closed suction and delivery valves;
- Pump with the external parts cleaned/washed;
- Pump and suction and delivery circuits at MAX ambient temperature 40°C.

Proceed as follows to check the tightness of the pump:



- 7.4.1a Using a suitable spanner, check the tightness of the pump body clamps and the pump suction and delivery manifold clamps.



CAUTION

Overtightening can lead to dangerous stresses on certain components and damage to the seals, which cannot be attributed to constructional defects. In the event of leaks, it is always necessary to carefully check that the pump and the internal sealing components are intact before commissioning.

- 7.4.1b Check the tightness of the pipe clamps of the product.

- 7.4.1c Remove the tools used from the pump.

The tightness check of the pump and product ducts is completed.

7.5 MANUAL INTERIOR WASHING



Manual Interior Washing must be carried out as routine maintenance to allow visual inspections of the product circuit to ensure safe food use of the pump.

Manual Interior Washing must be carried out before reassembly each time the pump is opened and as a scheduled and periodic intervention every 10,000,000 operating cycles.



CAUTION: Danger of food contamination

The presence of deposits and/or scales on the internal surfaces of the pump can cause contamination and adversely affect the food and organoleptic and/or health safety of the fluid (Food, Cosmetic and/or Pharmaceutical) that cannot be attributed to the product and the manufacturer.



CAUTION: Danger of pump damage and/or contamination

The washing and sanitising fluid must be compatible with the materials of which the pump is composed, and the maximum temperature must not exceed that permitted by the Manufacturer; the use of non-compatible sanitising fluids (with acidity higher than pH 10) and/or temperatures higher than those permitted is prohibited. The use of products not expressly permitted for food use, abrasives, pickling agents or sanitising agents with chlorinated substances, e.g. hydrochloric acid, on stainless steel parts is prohibited. The water used for the washing fluid must be potable and suitably softened or demineralised.



CAUTION: Danger of pump fouling and/or contamination

Water with a high degree of hardness tends to create limescale deposits and contamination on the internal surfaces of the pump, which subsequently come into contact with the food-grade fluid.

Manual Wash Timing

- After opening and before reassembling the pump.
- Following maintenance of the product circuit before reassembling the pump.
- Every 10,000,000 operating cycles.
- When necessary.

Manual Washing Cycle Phases

- Manual external pumpcleaning (*see Section 7.2.1 EXTERNAL PUMP CLEANING*);
- Dismantling of the pump (*see Section 7.6 PRODUCT CIRCUIT MAINTENANCE*);
- Manual washing of internal pump components with food-grade detergent with acidity between pH 5 and pH 7;
- Manual sterilisation of the pump's internal food-contact components with food-grade sanitiser with acidity between pH 8 and pH 10;
- Manual drying of internal pump components in contact with the food with disposable food-grade cloths ;
- Repositioning the pump in working position.



CAUTION: burn and/or contact hazard

Washing and sanitising fluid solutions can be very aggressive and harmful to health; always wear suitable PPE (gloves, face mask, aprons and boots) when washing. In case of contact with unprotected parts of the body, consult the Technical and Safety Data Sheets and seek medical advice.



7.5.1 MANUAL INTERIOR WASHING PROCEDURE

After opening the pump and/or carrying out maintenance work on the product circuit before reassembling it, the internal components of the pump in contact with the foodstuff must be flushed by hand as follows:



CAUTION: burn and/or contact hazard

During washing, the concentrations of washing fluids and sanitising fluids can be high, so use suitable P.P.E.



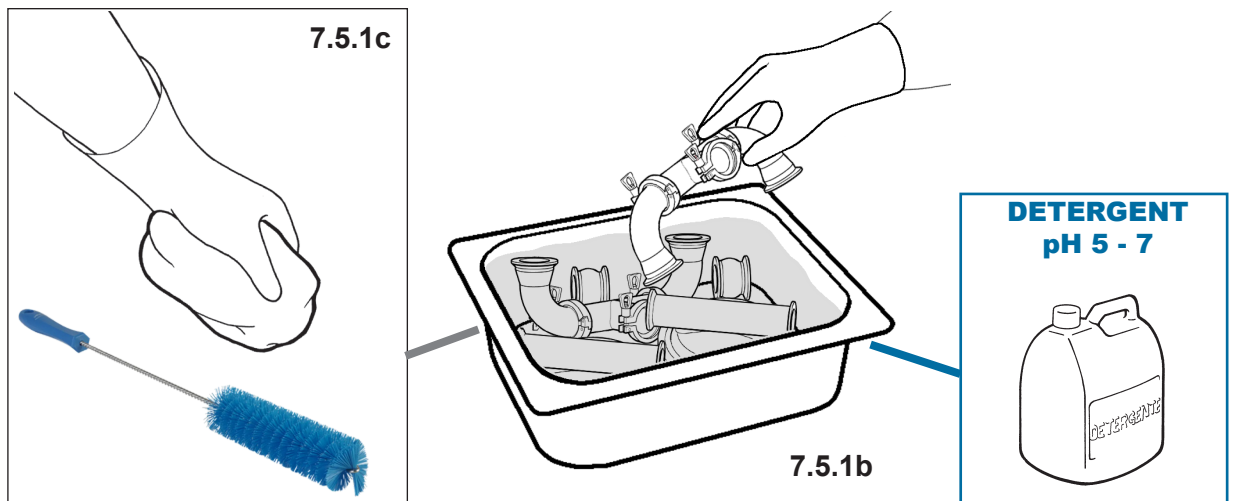
Washing and sanitising fluid solutions can be very aggressive and harmful to health; always wear suitable PPE (gloves, face mask, aprons and boots) when washing. In case of contact with unprotected parts of the body, consult the *Technical and Safety Data Sheets* and seek medical advice.



Safety requirements before starting the operation:

- Pump and components dismantled;
- Use of appropriate P.P.E. (gloves, face mask, aprons and boots) when washing;
- Use Nitrile gloves suitable for food contact during drying;
- Use of disposable food-grade cloths.

7.5.1a Check the condition of the wetted surfaces of all disassembled pump components.



7.5.1b MANUAL WASHING

Immerse all disassembled components whose surfaces are in contact with foodstuffs in hot, demineralised potable water with a suitable food-grade detergent/alkali cleaner (or acid solution).



CAUTION: burn and/or contact hazard

Washing and sanitising fluid solutions can be very aggressive and harmful to health; always wear suitable PPE (gloves, face mask, aprons and boots) when washing. In case of contact with unprotected parts of the body, consult the *Technical and Safety Data Sheets* and seek medical advice.

7.5.1c Manually remove any stubborn deposits from component surfaces with suitable sponges and pipe cleaners.



CAUTION: Danger of pump damage and/or ferrous contamination

The surfaces of the AISIBOXER and SANIBOXER series pumps are specially polished with very low roughness (Ra 0.8 µm) to meet the food safety requirements of current standards. The use of ferrous tools, abrasive cleaning agents, pickling agents or cleaning agents containing chlorinated substances, e.g. hydrochloric acid, on polished stainless steel parts is prohibited.

7.5.1d Rinse component surfaces thoroughly with suitably softened (or demineralised) potable water to remove the cleaning agents used.

7.5.1e Immerse all disassembled components whose surfaces are in contact with food in a hot food-grade sanitising solution (suitably softened or demineralised potable water).

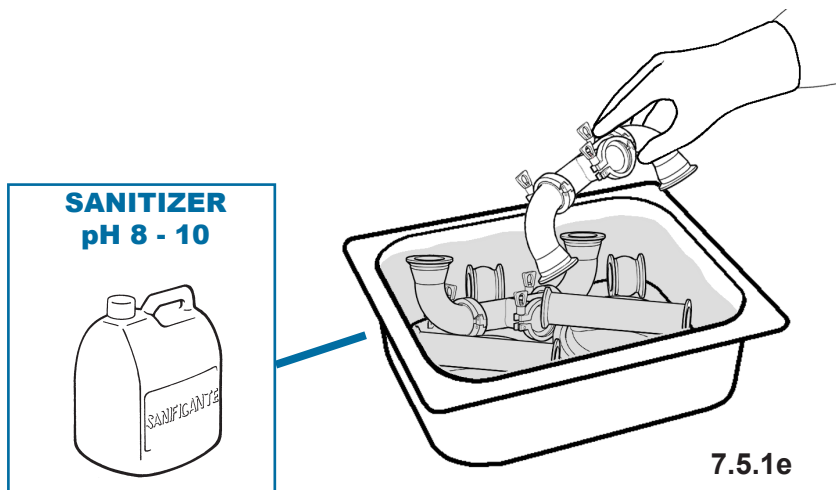


CAUTION: Danger of pump damage and/or contamination

The washing and sanitising fluids must be suitable for food use and compatible with the materials of the pump, and their maximum temperature must not exceed that permitted by the manufacturer. The use of sanitising fluids that are not compatible with the sector of use (Agro-Food, Cosmetic and/or Pharmaceutical), have an acidity higher than pH 10 and/or a temperatures higher than those permitted is forbidden.

7.5.1f Rinse component surfaces thoroughly with suitably softened (or demineralised) potable water to remove the cleaning and sanitising agents used.

7.5.1g Dry the surfaces in contact with the food with disposable food-grade wipes and place them on a clean, sanitised and protected surface.



The internal manual pump washing is now complete; reassembly is possible.

7.6 PRODUCT CIRCUIT MAINTENANCE



This operation is reserved for trained and qualified Mechanical Maintenance Technicians equipped with suitable Personal Protective Equipment (PPE); see the Technical and Safety Data Sheets of the treated liquid.

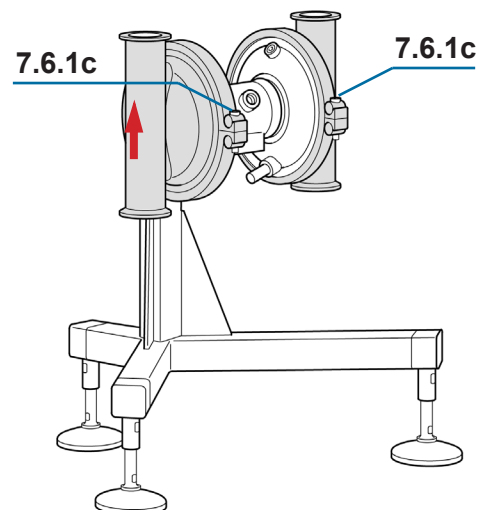
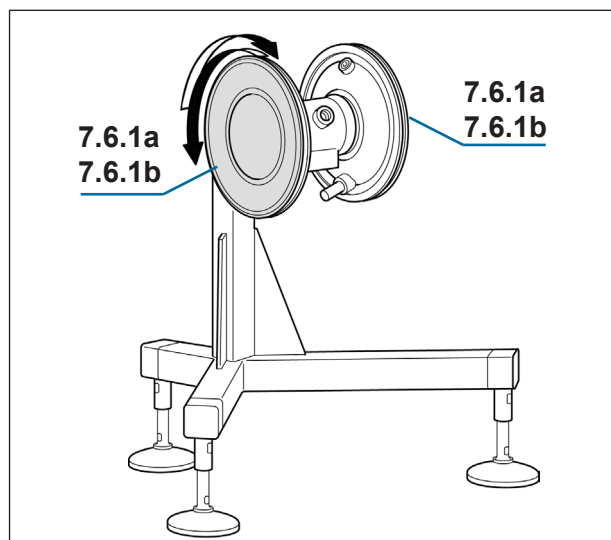
7.6.1 CHECK AND/OR REPLACEMENT OF DIAPHRAGMS (END OF LIFE)

The diaphragms (internal and in contact with the product) are components subject to wear. Their service life is strongly affected by the conditions of use and the chemical temperature and physical stresses with the fluid (cleaning and/or sanitising process fluids). From tests carried out (with head equal to 0.5 m at 20°C), it was found that the normal duration exceeds 100,000,000 (one hundred million) cycles.



CAUTION: For safety reasons, the diaphragms of the pump **must be disassembled and checked every 10,000,000 (ten million) cycles and preventively replaced every 20,000,000 (twenty million) cycles.**

MANDATORY OPERATIONS	CLEANING every 500 hours	CHECK every 10,000,00 cycles	REPLACEMENT every 20,000,00 cycles
INTERNAL CLEANING AND CHECK	✓	--	--
DIAPHRAGM CHECK	--	✓	--
DIAPHRAGM REPLACEMENT	--	--	✓



Safety requirements before starting the operation:

- Pump removed from the working position and residual pressure inside the air circuit discharged;
- Pump with external parts cleaned/washed (*see Section 7.2.1 PUMP EXTERNAL CLEANING*);
- Pump with flushed and sterilised internal product circuit (*see Chapter 6 CLEANING AND SANITISING*);
- Pump disassembled (*see Section 7.3.1 PUMP DISASSEMBLY*);
- Use of Nitrile gloves suitable for food contact;
- Use of disposable food-grade cloths.

- 7.6.1a Check the condition of the diaphragms and that there are no yield points, cracks or breaking points. Based on the outcome of the performed checks and the timing provided for the replacement of the diaphragms, establish whether to reuse them and/or replace them with Original Spare Parts of the same type and material (*see the 10SPARE Parts CHAPTER*).



CAUTION: risk of fluid leakage.

Do not use the pump if the diaphragms are compromised, damaged, or of a different type and material to the original (reported on the Composition Code) or that have reached their "End of Life".

- 7.6.1b Screw the diaphragms back on to both sides of the pump and tighten them.

- 7.6.1c Reposition the pump bodies in contact with the diaphragms and clamps and tighten them beforehand.

**NOTE**

The pump bodies must be at right angles to the joint of the stand, with the arrows indicating the product direction and the delivery manifold connection pointing upwards.

7.6.1d Remove the central body of the pump from the stand, place it on a clean and sanitised work surface, and align the valve connection flanges.

7.6.1e Make a final tightening of the pump body clamps (*see Section 7.4 TIGHTNESS CHECK*).

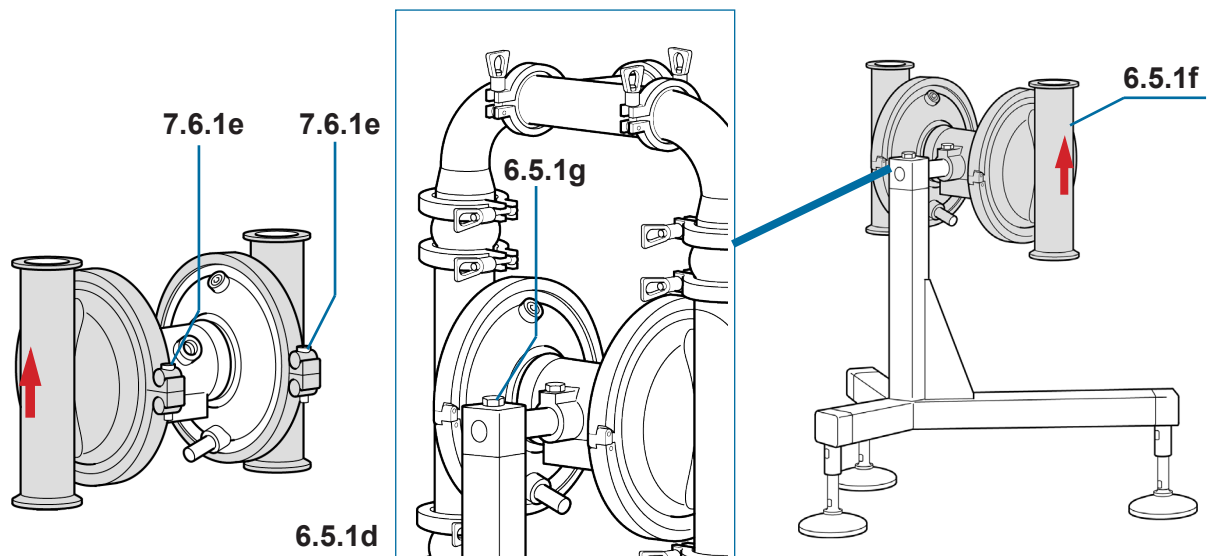
**CAUTION**

Overtightening can lead to dangerous stresses on certain components and damage to the seals, which cannot be attributed to constructional defects.

7.6.1f Refit the central pump body to the swivel mount of the stand and place it with the arrows pointing upwards.

7.6.1g Re-lock the central body of the pump onto the swivel mount of the stand.

7.6.1h



The check and/or replacement of the pump diaphragms is completed.



DEBEM

7.6.2 CHECK AND/OR REPLACEMENT OF VALVES (Suction and Delivery)

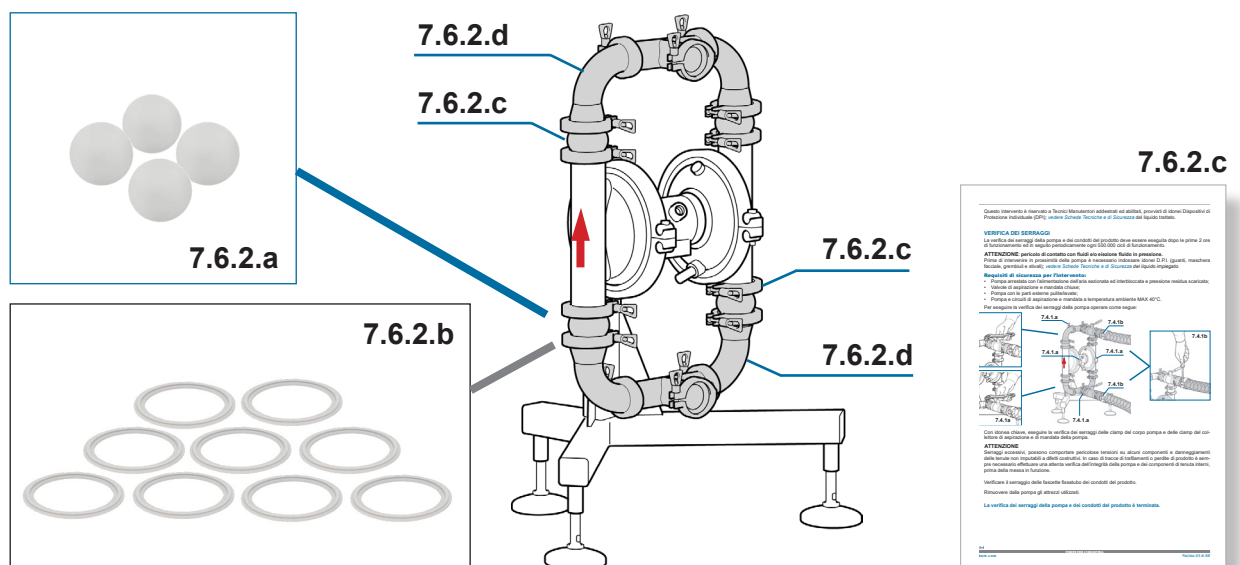
The suction and delivery valves (ball and ball seats) are components subject to wear. Their service life is strongly affected by the conditions of use and the chemical temperature and physical stresses with the fluid (cleaning and/or sanitising process fluids). The suction and delivery valves must be periodically checked every 10,000,000 cycles of operation to ensure correct operation (replacement after 20,000,000 cycles of the product seals and the best performance of the pump).

Safety requirements before starting the operation:

- Pump removed from the working position and residual pressure inside the air circuit discharged;
- Pump with external parts cleaned/washed (*see Section 7.2.1 PUMP EXTERNAL CLEANING*);
- Pump with flushed and sterilised internal product circuit (*see Chapter 6 CLEANING AND SANITISING*);
- Pump disassembled (*see Section 7.4.1 PUMP DISASSEMBLY*);
- Use Nitrile gloves suitable for food contact during drying;
- Use of disposable food-grade cloths.

Proceed as follows to check and/or replace the pump valves:

- 7.6.2a Check that the balls of the suction and delivery valves are not worn or crushed, and if necessary, replace them with Original Spare Parts of the same type and material (*see Chapter 10 SPARE PARTS MANUAL*).



CAUTION

The use of worn or compressed ball seats can impair the performance and efficiency of the pump.

- 7.6.2b Check the condition of the clamps' static seal gaskets and, if necessary, replace them with Original Spare Parts of the same type and material (*see Chapter 10 SPARE PARTS*).



NOTE

The orientation and positioning of the valves on the connections of the pump bodies must respect the arrows indicating the product direction (the delivery manifold connection positioned above).

- 7.6.2c Refit the suction (lower) and delivery (upper) valves to the pump bodies and tighten the pump clamps (*see Section 7.4 TIGHTNESS CHECK*).

The check and/or replacement of the pump valves is completed.

7.7 AIR CIRCUIT MAINTENANCE



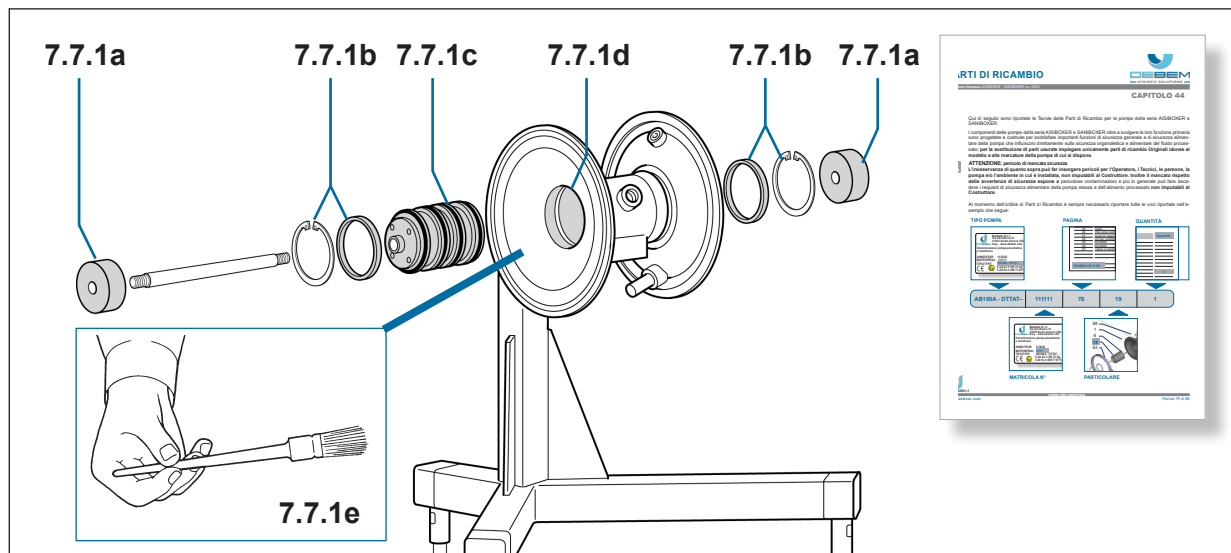
This operation is reserved for trained and qualified maintenance technicians equipped with appropriate Personal Protective Equipment (PPE) (see Technical and Safety Data Sheets of the liquid treated).

7.7.1 COAXIAL PNEUMATIC EXCHANGER REPLACEMENT

The AISIBOXER and SANIBOXER series pumps house a coaxial pneumatic exchanger, which must be replaced with Original Spare Parts of the same type (see Chapter 10 SPARE PARTS), on a scheduled basis after 50,000,000 cycles; to replace the pneumatic exchanger, proceed as follows:

Safety requirements for the operation:

- Pump removed from the working position and residual pressure inside the air circuit discharged;
- Pump with external parts cleaned/washed (see Section 7.2.1 PUMP EXTERNAL CLEANING);
- Pump with internal product circuit washed and sterilised (see Chapter 6 CLEANING AND SANITISING);
- Dismantled pump (see Section 7.6.1 CHECK AND/OR REPLACEMENT OF DIAPHRAGMS - End of Life);
- Use Nitrile gloves suitable for food contact during drying;
- Use of disposable food-grade cloths.



7.7.1a Remove the spacers (on both sides) and the shaft from the pump distributor.

7.7.1b Remove the locking Seeger rings and spacers.

7.7.1c Remove the pneumatic coaxial exchanger from the central body.

7.7.1d Clean the control unit and diaphragms with a clean disposable cloth dampened with neutral detergent.



CAUTION: risk of damage.

Do not use detergents that are not compatible with the construction materials of the pump, solvents or abrasive substances.

7.7.1e Sprinkle a layer of suitable grease (MOLYKOTE®) over the centre hole.



CAUTION: danger of pump blocking.

Do not use any type of oil; the oil removes the grease and once discharged, it causes consequent blockage due to lack of lubrication.



CHAPTER 8

The following instructions are intended exclusively for authorised skilled Maintenance Engineers who know and comply with the contents of the Original Instructions. In the event of abnormal behaviour and in order to fix faults, please refer to the following troubleshooting instructions. The graphic setting is in table format with direct correspondence between Anomaly, Possible Cause and Suggestion.



NOTE

For more serious problems, we strongly recommend contacting the DEBEM SERVICE DEPARTMENT or an Authorised Assistance Centre; our Engineers will provide you with assistance as quickly as possible.



CAUTION

Before performing any operation and accessing the pump, it is necessary to:

- Disconnect and interlock the compressed air supply and relieve residual pressure from the pump's internal pneumatic circuit;
- disconnect the product on/off valves (suction and delivery);
- if necessary, clean the outside of the pump;
- if necessary, wash the product circuit inside the pump.



CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with a suitable ratchet strap and wear suitable Personal Protective Equipment (PPE).

ANOMALY	POSSIBLE CAUSE	ADVICE
1 The pump does not start.	1.1 No air in the circuit.	1.1a Check circuit, valves, and connections.
	1.2 Air pressure too low.	1.2a Adjust pressure on the relevant reducer.
	1.3 Insufficient air flow rate.	1.3a Check that piping and accessories have suitable passage.
	1.4 Control valve damaged.	1.4a Check and replace the control valve.
	1.5 Delivery or suction of the closed pump.	1.5a Disconnect the pressure and suction pipes and check whether the pump starts.
	1.6 Pneumatic exchanger damaged pump.	1.6a Replace exchanger; check whether the air discharge is obstructed by ice. If this is the case, it must be removed (<i>see paragraph air supply</i>).
	1.7 Broken diaphragm.	1.7a Check if any air comes out from the product delivery pipe; if so, replace diaphragm. 1.7b Dry the sensors and inner tube.
	1.8 The sensor of membrane rupture has tripped.	1.8a Repair the pump (replace diaphragms), and dry the sensors and inner tube.
2. The pump exchanges but does not move the fluid.	2.1 The balls do not close.	2.1a Disassemble the manifolds and clean the ball seats or replace both balls and their seats.
	2.2 Suction height too high.	2.2a Reduce intake height.
	2.3 Fluid too viscous.	2.3a Install oversized pipes, especially in the intake and decrease pump cycles.
	2.4 Suction clogged.	2.4a Check and clean.

Continues on the next page

Continued from the previous page

ANOMALY	POSSIBLE CAUSE	ADVICE
3. The pump operates irregularly.	3.1 Pneumatic exchanger worn or defective interior	3.1a Replace pneumatic exchanger.
	3.2 Worn shaft.	3.2a Replace the shaft of the pneumatic exchanger.
	3.3 Ice on the drain.	3.3a Dehumidify and filter air.
	3.4 Lack of air volume.	3.4a Check all air control accessories, especially the quick-release couplings.
	3.5 Internal exchanger dirty.	3.5a Replace pneumatic exchanger.
4. The pump works with slow cycles.	4.1 Fluid too viscous.	4.1a No remedy.
	4.2 Supply pipe clogged.	4.2a Check and clean.
	4.3 Suction clogged.	4.3a Check and clean.
5. The pump does not exchange.	5.1 Suction becomes blocked during operation.	5.1a Replace intake hose.
	5.2 Dirty air, full of condensate or oil.	5.2a Check air line.
	5.3 Air volume or pressure insufficient	5.3a Check the pressure with a pressure gauge fitted on the pump and when the pump is running: see page 39 . If the pressure at that point is too low in relation to the mains pressure, check all connections of the air, especially those with quick-release couplings. Check that all air control devices have sufficient flow rate. CAUTION: in 90% of cases, it depends on snap-on fittings.
	5.4 Faulty distributor.	5.2a Check air line.
	5.5 Shutdown procedure not complied with.	5.5a Comply with stop procedure, see Section 5.2 NORMAL SHUTDOWN OF THE PUMP page 45 .
6. The pump does not deliver the table flow rate.	6.1 The suction pipe produced is poorly connected.	6.1a Check and reconnect.
	6.2 Clogged pipes.	6.2a Check and clean.
	6.3 Fluid too viscous.	6.3a Install oversized pipes, especially in the intake and decrease pump cycles.
	6.4 The balls do not close.	6.4a Disassemble the manifolds, clean the seats or replace the balls and their seats.
	6.5 Insufficient air volume.	6.5a Check the pressure with a pressure gauge installed on the pump and when the pump is running: see page 39 . If the pressure at that point is too low in relation to the mains pressure, check all connections of the air, especially those with quick-release couplings. Check that all air control devices have sufficient flow rate. CAUTION: in 90% of cases, it depends on snap-on fittings.
	6.6 Possible pressure losses on the air supply line to the pump.	6.6a Check the pressure at the pump inlet. Eliminate pressure losses on the compressed air supply line to the pump.
	6.7 Possible back pressure or heads higher than those allowed by the Model of the pump used based on the flow rate delivered.	6.7a Check the actual product pressure delivered by the pump to the outlet manifold. Eliminate backpressures on the product delivery line or use the pump model suitable for the desired flow rate.

CHAPTER 9

This chapter deals with the operations envisaged by the Manufacturer to decommission and dispose of the AISIBOXER and SANIBOXER series pumps at the end of their life.

THIS PART INCLUDES THE FOLLOWING TITLES	PAGE
9.1 DECOMMISSIONING AND WASHING FORM	79 - 81
9.2 DISPOSAL	82

Below is a description of how to behave in each of the phases listed above.

9.1 DECOMMISSIONING



This operation is reserved for trained and qualified maintenance technicians equipped with appropriate Personal Protective Equipment (PPE) (*see Technical and Safety Data Sheets of the liquid treated*).



CAUTION

In case the pump remains inactive for long periods or leaks or malfunctions may affect the safety of the pump or system, or at the "End of Life" of the diaphragms, it is necessary to decommission it until the restoration of the necessary safety conditions and optimal operation of the same.



CAUTION: risk of fluid leakage.

Do not operate the pump in a compromised condition or with diaphragms that have reached the "End of Life", as indicated by the manufacturer.

9.1.1 DECOMMISSIONING DUE TO INACTIVITY

Before decommissioning due to long periods of inactivity, it is necessary to proceed as follows:

- 9.1.1a Clean the outside of the pump with cloths moistened with a suitable cleaning agent (*see Section 7.2.1 CLEANING THE OUTSIDE OF THE PUMP*).
- 9.1.1b Flush the inside of the pump (*see Chapter 6 CLEANING AND SANITISING*).
- 9.1.1c Close the product suction and delivery on/off valves mounted on the pump.
- 9.1.1d Close the air supply using the 3-way valve and discharge the residual pressure from the pneumatic circuit inside the pump and then disconnect the air supply on the network node.



CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with a suitable ratchet strap and wear suitable Personal Protective Equipment (PPE).

- 9.1.1e Indicate the "DECOMMISSIONING" status on the pump with a specific signal.
- 9.1.1f If the pump must be stored or returned to the manufacturer, it is necessary to disassemble and empty it as described in *Section 7.3.1 PUMP DISASSEMBLY*.

9.1.2 PUMP DISASSEMBLY FROM THE WORKING POSITION

Proceed as follows to disassemble the pump from the working position.

Safety requirements before starting the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, sanitised, rinsed and drained;
- Closed product shut-off valves (suction and delivery);
- Pump and suction and delivery circuits at ambient temperature.

- 9.1.2a Disconnect the compressed air supply pipe from the pump.
- 9.1.2b Disconnect the suction and delivery pipes of the pump fluid.
- 9.1.2c Disassemble and remove the pump from the place of installation using suitable lifting equipment and adequately drain the product circuit.



CAUTION: risk of leakage of the washing and/or contaminated liquid.

The pump is not self-draining, pay attention during handling and disassembly.

9.1.3 PUMP STORAGE

The pump must be stored in suitable protective packaging, in a closed and protected environment, at temperatures between 5°C and 45°C, with a humidity level not exceeding 90%.

AISIBOXER and SANIBOXER series pumps are not self-draining; turn the pump upside down to drain the residual washing liquids from inside.

To store, proceed as described in [Section 4.1 STORAGE AND PRESERVATION](#).



CAUTION: risk of injuries or harm to health.

Should the pump be stored or returned to the Manufacturer or an Authorised Assistance Centre, it must first be emptied of the product and/or any detergents and/or sanitisers.

The pump decommissioning is completed.

9.1.4 PUMP WASHING FORM

Before returning the pump to the Manufacturer for any maintenance or as returned goods, it is always necessary to thoroughly wash the product circuit to remove any residual contaminants and chemical agents and then empty it.

The AISIBOXER and SANIBOXER series pumps are not self-draining; turn the pump upside down to drain the washing liquids from the inside.

The delivery of the washed and emptied pump to the manufacturer must always be accompanied by the [“Pump Washing Form”](#) (see the following pages) duly filled in and signed by the person in charge who certifies it was washed, sanitised, and emptied from the fluid it came into contact with.



CAUTION: risk of injuries or harm to health.

Failure to submit the [“Pump Washing Form”](#) duly completed and signed will not allow for adequate treatment in compliance with current safety regulations and does not authorise the Manufacturer to accept the goods even on consignment.



**Documento accompagnatorio a DDT in c.to riparazione
(Obbligatorio*)**

Azienda	
Persona di riferimento	
Telef.	
Email.	
D.D.T. di riferimento	
Dati Pompa	
Modello	
Codice	
N° Matricola/seriale	
Interventi precedenti effettuati da:	in data:
Problematica riscontrata	
Tipologia dei fluidi interessati al trasferimento con la pompa (se acidi specificare la %) campi obbligatori (*) (**)	
1:	5:
2:	6:
3:	7:
4:	8:
Temperatura di esercizio : °C =	
Pressione di azionamento : min./max.	
ATTENZIONE	
<p>** Si dichiara che la pompa in oggetto è stata accuratamente pulita e lavata da ogni traccia dei prodotti per cui è stata utilizzata ed è quindi priva di inquinanti e/o prodotti dannosi per l'ambiente le cui caratteristiche sono specificatamente sopra descritte.</p> <p>* La mancanza della compilazione di questo format comporterà l'impossibilità ad effettuare il preventivo di riparazione con la conseguente resa della merce a carico del mittente.</p> <p>DEBEM si riserva diritto di non effettuare riparazioni su pompe dedicate al trasferimento di fluidi potenzialmente pericolosi per la salute dell'operatore e dell'ambiente.</p> <p>DEBEM si attiene scrupolosamente alle normative vigenti in merito allo smaltimento rifiuti e non è autorizzata smaltire fluidi di alcun genere e/o tipologia.</p>	
Le date di consegna verranno concordate e comunicate di volta in volta con il nostro personale.	
I tempi necessari per le riparazioni saranno concordati con il nostro personale	
Data _/_/___	
Timbro e firma _____	



9.2 DISPOSAL



This operation is reserved for trained and qualified Mechanical Maintenance Technicians equipped with suitable Personal Protective Equipment (PPE); see the *Technical and Safety Data Sheets* of the treated liquid.



CAUTION : danger of contact with toxic or corrosive fluids.

The identification plate of your AISIBOXER and SANIBOXER pump indicates the construction materials of the components as described in *Section 2.2 PUMP CONFIGURATION CODE* so that you can carry out the separation and disposal by type of homogenous materials.

The AISIBOXER and SANIBOXER series pumps do not contain dangerous parts or parts that require conditioning treatments; however, they may be contaminated due to the environment of use or the type of fluid used. In any case, when they are worn out, they must be disposed of and dismantled in the following manner:



CAUTION: risk of injuries or harm to health.

Do not dispose of the pump with residues of dangerous fluids or with surfaces contaminated by irritating and/or health-damaging fluids.

- 9.2.1 Wash, remove or decontaminate appropriately any residues of product or contaminant dangerous to human contact and/or the environment, working according to the indications given in the relevant *Technical Data Sheet or Safety Data Sheet* for the product used.
- 9.2.2 Carry out the internal washing of the pump's product circuit (sanitising and rinsing the fluid used).
- 9.2.2a Close the air supply using the 3-way valve and discharge the residual pressure from the pneumatic circuit inside the pump and then disconnect the air supply on the network node.
- 9.2.3 Disconnect the compressed air supply pipe from the pump.
- 9.2.4 Close the product suction and delivery on/off valves of the pump.

9.2.5 PUMP DISASSEMBLY

To disassemble the pump, proceed as follows.

Safety requirements before starting the operation:

- Pump shut down with air supply disconnected and interlocked and residual pressure discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, sanitised, rinsed, and drained;
- Closed product shut-off valves (suction and delivery);
- Pump and suction and delivery circuits cooled.

1. Disconnect the compressed air supply pipe from the pump.
2. Disconnect the suction and delivery pipes of the pump fluid.
3. Disassemble and remove the pump from the place of installation using suitable lifting equipment.



ATTENTION: danger of liquid leakage and damage to health.

The pump is not self-draining, pay attention during handling and disassembly. If toxic, noxious, or other health-endangering products have been used, the pump must be suitably treated and washed before storage or shipment.

- 9.2.6 Separate the pump components by type and homogeneous materials (*see Section 2.2*).



CAUTION: risk of internal back-pressures and projection of components during disassembly.

Under abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not relieved, may be generated inside the pump. Before opening and disassembling the pump, it is necessary to secure the pump bodies with a suitable ratchet strap and wear suitable Personal Protective Equipment (PPE).

- 9.2.7 For disposal, contact authorised waste collection companies.



CAUTION: danger of pollution and/or accidents.

Make sure no small or large components, which may cause pollution, accidents, or damage, either direct or indirect, are released in the environment.

Demolition and disposal of the pump is complete.





SPARE PARTS

TRANSLATION OF ORIGINAL INSTRUCTIONS AISIBOXER - SANIBOXER rev. 2023

CHAPTER 10

Below are the Spare Parts Tables for the AISIBOXER and SANIBOXER series pumps.

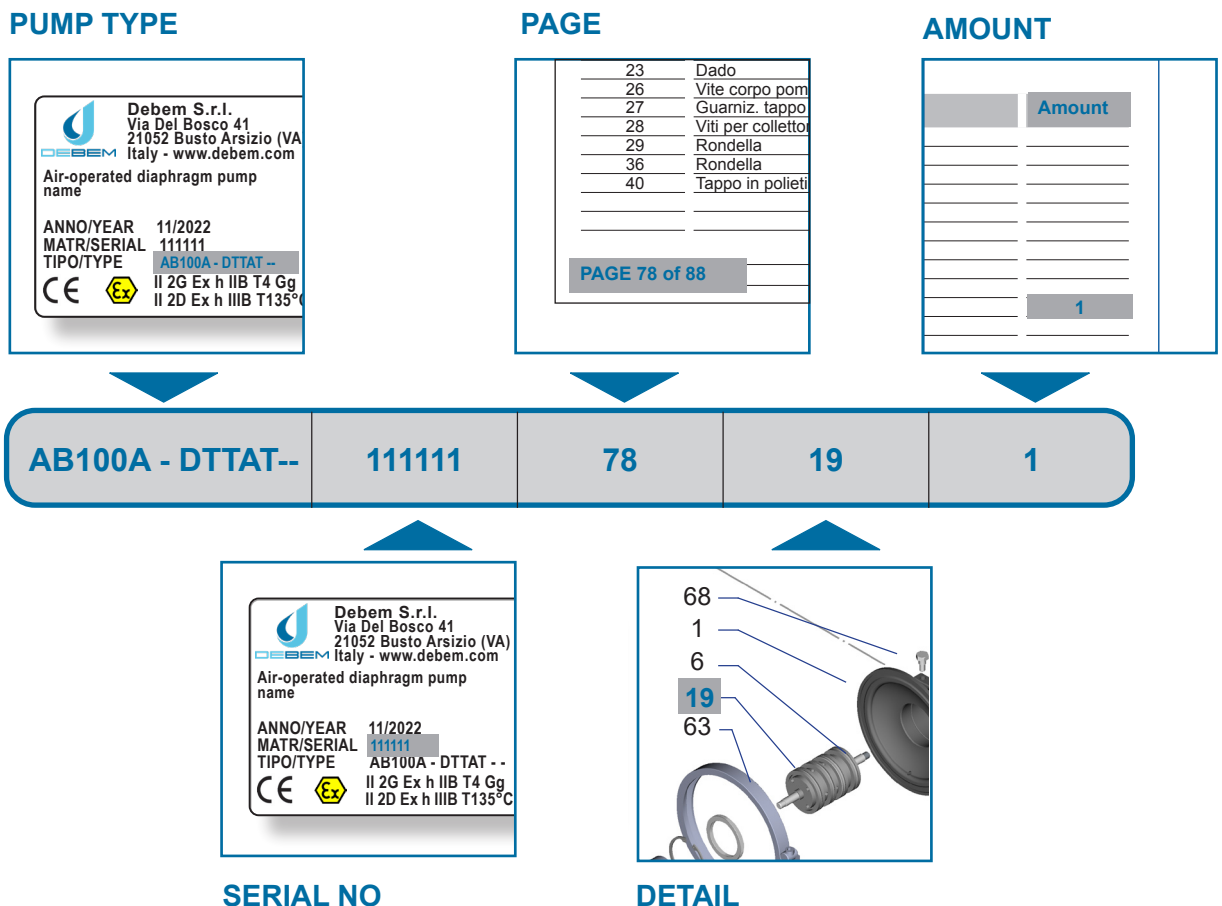
In addition to fulfilling their primary function, the components of the AISIBOXER and SANIBOXER series pumps are designed and manufactured to ensure important general and food safety functions that directly affect the organoleptic and food safety of the processed fluid. **When replacing worn parts, only use original spare parts suitable for the pump model and markings.**



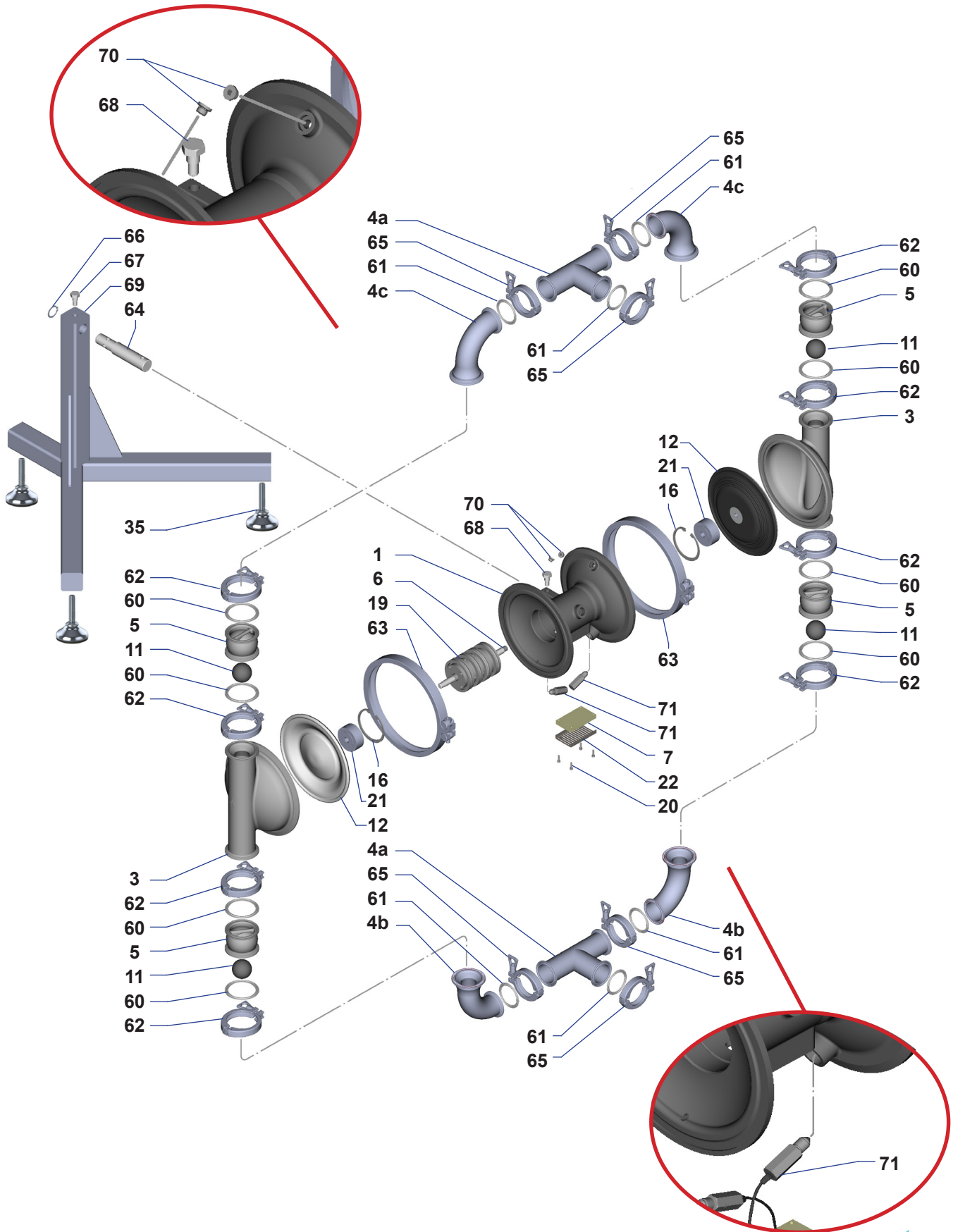
CAUTION: danger of lack of safety

Failure to comply with the above may result in dangers for the Operator, Technicians, people, the pump and/or the installation environment, for which the Manufacturer is not responsible. Furthermore, failure to comply with the safety warnings exposes the pump to dangerous contamination and, more generally, can lead to the food safety requirements of the pump itself and the processed foodstuff being compromised for reasons **not attributable to the manufacturer.**

When ordering spare parts it is always necessary to include all the items shown in the example below:



SANIBOXER - 01 - 02 - 03 - 04



AIR-OPERATED

P U M P S

s e r i e s

SANIBOXER - AISIBOXER rev. 2024



Authorised RESELLERS:

Authorised ASSISTANCE CENTRES:

RESELLER STAMP:



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SANITARY AND FOOD PUMPS

PHARMACEUTICAL / FOOD / COSMETICS / TRICHOLOGICAL / BEVERAGE

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