

TRANSLATION OF
ORIGINAL INSTRUCTIONS

SCUBIC - SBOXER rev. 2021

PUMPS
PNEUMATICS
series

SCUBIC
SBOXER



compliant

DEBEM s.r.l. - Via Del Bosco, 41 - Busto Arsizio (VA) ITALY
Tel. (+39) 0331/074034 - fax (+39) 0331/074036 - info@debem.it - www.debem.com

INDUSTRIAL PUMPS

CHEMICAL / PAINTING / PRINTING / WATER TREATMENT / GALVANIC / TEXTILE / CERAMIC / AUTOMOTIVE / MECHANICAL / OIL & GAS

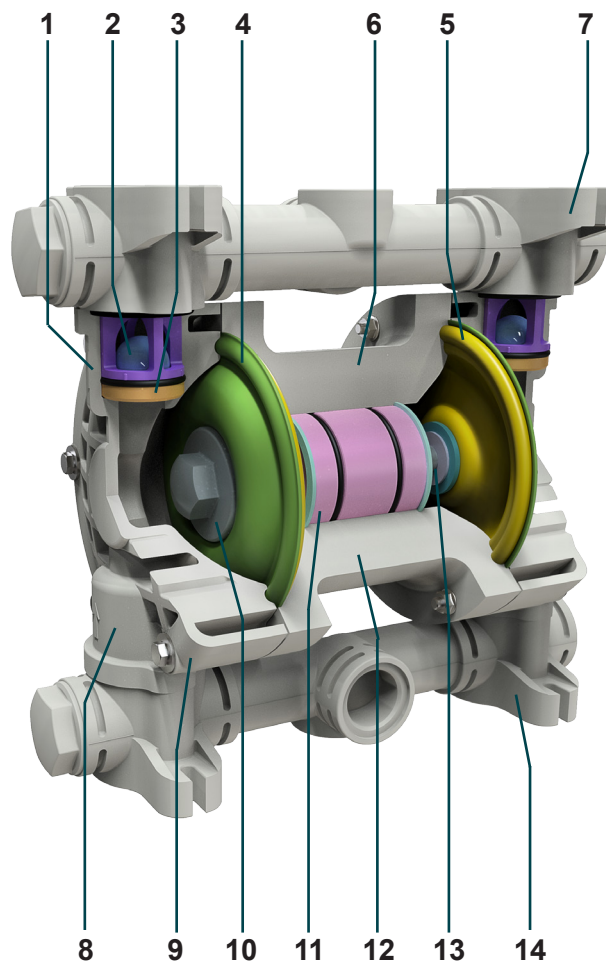
info@debem.it - www.debem.com



DEBEM

MADE IN ITALY

IDENTIFICATION AND NOMENCLATURE OF PARTS



POS.	NOMENCLATURE	POS.	NOMENCLATURE
1	PRODUCT DELIVERY VALVES	8	PRODUCT SUCTION VALVES
2	BALL VALVE	9	PUMP CASING
3	BALL VALVE SEAT	10	CAP
4	OUTER DIAPHRAGM (PRODUCT SIDE)	11	INTERNAL INSERT
5	INNER DIAPHRAGM (AIR SIDE)	12	AIR SUPPLY/DISCHARGE CONNECTIONS
6	CENTRAL	13	SHAFT
7	DELIVERY MANIFOLD	14	SUCTION MANIFOLD

All rights of total or partial reproduction, translation and adaptation by any means are reserved in all countries.
Layout and creation of contents: Infographic sas



CONTENTS

CHAPTER 1	GUIDANCE DOCUMENTS	4 - 12
1.1	DECLARATION OF CONFORMITY	5
1.2	LIST OF RESIDUAL RISKS	6
1.3	INTRODUCTION TO THE MANUAL	7 - 10
1.4	DELIVERY NOTE	11
1.5	GENERAL NOTES ON DELIVERY	11
1.6	WARRANTY	12
CHAPTER 2	INTRODUCTORY INFORMATION	13 - 22
2.1	PUMP IDENTIFICATION	14
2.2	PUMP CONFIGURATION CODE	15
2.3	ATEX MARKING AND DEFINITION	16 - 17
2.4	PUMP DESCRIPTION	18
2.5	INTENDED USE AND IMPROPER USES	18 - 19
2.6	TECHNICAL FEATURES	20 - 21
CHAPTER 3	WARNINGS AND REQUIREMENTS	23 - 27
3.1	SAFETY RULES	24 - 27
CHAPTER 4	TRANSPORT AND INSTALLATION	28 - 37
4.1	STORAGE AND PRESERVATION	29
4.2	TRANSPORT AND HANDLING	30
4.3	POSITIONING AND INSTALLATION	31 - 34
4.4	PNEUMATIC CONNECTION	35 - 37
4.5	CHECKS PRIOR TO COMMISSIONING	37
CHAPTER 5	COMMISSIONING AND SHUTDOWN	38 - 42
5.1	COMMISSIONING AND OPERATION	39 - 40
5.2	NORMAL SHUTDOWN OF THE PUMP	41
5.3	EMERGENCY STOP OF THE PUMP	42
CHAPTER 6	ROUTINE MAINTENANCE	43 - 57
6.1	SCHEDULED MAINTENANCE TABLE	44
6.2	EXTERNAL CLEANING AND TIGHTNESS CHECK	45 - 46
6.3	CHECKING TIGHTNESS	47 - 48
6.4	PRODUCT CIRCUIT MAINTENANCE	49 - 53
6.5	AIR CIRCUIT MAINTENANCE	54 - 56
6.6	SPARE PARTS - INSERT	57
CHAPTER 7	PROBLEMS AND SOLUTIONS	58 - 59
CHAPTER 8	DECOMMISSIONING AND DISPOSAL	60 - 68
8.1	DECOMMISSIONING AND WASHING FORM	61 - 63
8.2	DISPOSAL	64
	NOTES	65 - 67

CHAPTER 1

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

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
1.1	DECLARATION OF CONFORMITY	5
1.2	LIST OF RESIDUAL RISKS	6
1.3	INTRODUCTION TO THE MANUAL	7 - 10
1.4	DELIVERY NOTE	11
1.5	GENERAL NOTES ON DELIVERY	11
1.6	WARRANTY	12

Below is a detailed description of each topic mentioned.

1.1 DICHIARAZIONE DI CONFORMITÀ - DECLARATION OF CONFORMITY



SBOXER STANDARD

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 3G Ex h IIB T4 Gc

⊕ II 3D Ex h IIIB T135°C Dc X

MODELLO:

MODEL

N° DEPOSITO:

DEPOSIT NUMBER

CODICE:

CODE

MATRICOLA:

SERIAL NUMBER

L'oggetto della dichiarazione di cui sopra è conforme alle pertinenti normative di armonizzazione dell'Unione:
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 a 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 - 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 non elettrici destinati a 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 - Non-electrical type of protection constructional safety "c", control of ignition sources "b" liquid immersion "k".

EN ISO 80079-38:2016 - Atmosfere esplosive - Parte 38: Apparecchiature e componenti in atmosfere esplosive in miniere sotterranee.

EN ISO 80079-38:2016 - Explosive atmospheres - Part 38: Equipment and components in explosive atmospheres in underground mines.

LA SEGUENTE CONFORMITÀ È RIFERITA AI MODELLI BOXER E SBOXER IMPIEGATE IN MINIERA IN ZONA A BASSO RISCHIO DI URTO "Zona M2" ⊕ I M2 Ex h I Mb X

THIS COMPLIANCE REFERS TO BOXER AND SBOXER MODELS USED IN MINING IN AREAS WITH LOW RISK OF IMPACT "Area M2" ⊕ I M2 Ex h I Mb X

LA SEGUENTE CONFORMITÀ È RIFERITA AL PROTOTIPO DELLA BOXER 150, MATRICOLA NR. B21872 DEL 03.04.2001.

THIS COMPLIANCE REFERS TO BOXER 150 PROTOTYPE, SERIAL NUMBER B21872 OF 03.04.2001.

ESTENSIONI: la presente dichiarazione si estende anche ai modelli BOXER 7, BOXER 15, MICROBOXER, BOXER 35, MINIBOXER, BOXER 50, BOXER 80, BOXER 81, BOXER 90, BOXER 100, FPC100, BOXER 250, BOXER 251, BOXER 252, BOXER 502, BOXER 522 e BOXER 503 IN METALLO O PLASTICA e ai relativi modelli SBOXER.

EXTENSION: This declaration is also valid for the following versions BOXER 7, BOXER 15, MICROBOXER, BOXER 35, MINIBOXER, BOXER 50, BOXER 80, BOXER 81, BOXER 90, BOXER 100, FPC100, BOXER 250, BOXER 251, BOXER 252, BOXER 502, BOXER 522 and BOXER 503 MADE OF METAL OR PLASTIC and related SBOXER models.

⚠ 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



INDUSTRIAL PUMPS

1.2 LIST OF RESIDUAL RISKS



After careful analysis and assessment of the hazards present during the operational phases affected by the SCUBIC and SBOXER series Pneumatic Pumps, the necessary measures were taken to eliminate or reduce the associated risks, and 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

- Hazards related to toxic and/or corrosive liquids to be pumped;
- Danger of chemical incompatibility with the fluids to be pumped;
- Danger of produced leakage with dangerous fluids; (provide flow and collection containment protections);
- Danger of chemical reaction with fluids reacting to tap water for testing; (open and dry the internal parts of the pump before installing it);
- Crushing hazard.

OPERATION - CONSULT PROCEDURES IN THE ORIGINAL INSTRUCTIONS

- Hazards related to toxic and/or corrosive liquids to be pumped;
- 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.
- Fire hazard due to the deposit of flammable dust or use with temperatures higher than those shown on the product Identification Plate.

CLEANING AND MAINTENANCE - CONSULT PROCEDURES IN THE ORIGINAL INSTRUCTIONS

- Hazards related to toxic and/or corrosive liquids to be pumped;
- 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 in the absence of Scheduled Maintenance.

Those designing the machine/system in which the SCUBIC and SBOXER series Pneumatic 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 a trained person and aware that there may still be "residual risks" (related to the type of fluid used and the chemical compatibility) that it was not possible to eliminate.

Those in charge of these operations must always take into account (consult and understand) all the information contained in the Manufacturer's Manual (*Original Instructions or Translation of Original Instructions*) and obtain the necessary Personal Protective Equipment (PPE) provided, before servicing.

The Customer, the Installation and Maintenance Technicians, 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 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.

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, 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 INTRODUCTION TO THE MANUAL



The Original Instructions have been drawn up taking into account all sizes and the different supply configurations of the SCUBIC and SBOXER series Pneumatic Pumps, and the steps necessary for correct installation and safe use.

This manual is an integral part of the pump and represents a safety device with which the Manufacturer intends to provide important information so that the Purchaser and his/her personnel can install, use and maintain it constantly efficient and safe.

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

CONSULTATION AND PRESERVATION

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

On the contrary, the Manufacturer is relieved of any liability with regard to:

- Incorrect installation;
- Incorrect or missing assessments of chemical compatibility with the fluid to be pumped;
- Incorrect or missing assessments of classification of the potentially explosive environment and of suitability for pump use according to the affixed Certification marking and the Declaration of Conformity;
- Improper use of the pump and/or other or higher performance than stated;
- Use with higher temperatures than those declared by the Manufacturer;
- Servicing and/or using the pump 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;
- Total or partial non-compliance with the Manufacturer's Original Instructions.

RECIPIENTS OF THE ORIGINAL INSTRUCTIONS

This Original Instructions manual is intended for all Operators and Technicians qualified to transport, handle, install and service 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 people 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 and technique at the time of marketing the pump and cannot be considered inadequate only because it is not updated on the basis of any and future technical achievements.

The Manufacturer reserves the rights 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 in order to allow a classification of the information and the professional address to which they are addressed, 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 structure and contents:

- A bar has been created at the beginning of each section which, through symbols, indicates the personnel authorised to perform the operation, the prohibitions to be observed, the obligations 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.

Personal Authorised

Sequences Operative

Title SECTION

CAUTIONS WARNINGS and NOTES

Title CHAPTER

Contents Graphs

Numbers PAGE

Chapter 2 - Introductory Information Translation of original instructions SCUBIC - SBOXER rev. 2021

2.5 PUMP DESCRIPTION

2.5.1 FUNCTIONING PRINCIPLES
 The pneumatic pumps of the SCUBIC and SBOXER series consist of an internal insert that directs air to the diaphragms of the two pumping bodies by moving them via a central pin. The diaphragms integrate with the central driving pin and operate with alternating motion in two stages (suction-delivery) and constitute the pumping elements.
 The respective fluid retaining ball valves are housed between the two pumping chambers and the pump delivery and suction ducts.
 The two-stage operating principle operates simultaneously while one chamber is in the suction phase, the second chamber is in the discharge phase), guaranteeing negative suction, high head and the pumping of fluids with high viscosity and solid parts in suspension (see 2.6 TECHNICAL FEATURES, TECHNICAL DATA).

2.5.2 INSTALLATION REQUIREMENTS AND FEATURES
 SCUBIC and SBOXER air pumps are self-priming and can run dry and allow varying the operating speed even during service.
 They can be used for the recirculation and pumping of liquids with high viscosity and solid parts in suspension (see 2.6 TECHNICAL FEATURES). Their operation is envisaged for horizontal installations, above and below head, with procedures compliant with the features of each model (see 2.6 TECHNICAL FEATURES).

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

2.6 INTENDED USE AND IMPROPER USES

2.6.1 INTENDED USE
 The air-driven SCUBIC and SBOXER pumps have been designed and constructed to pump liquids and aggressive liquids (acid or alkaline) with chemical composition and temperature compatible with the pump materials and apparent viscosity of between 1 and 20,000 Cps at 20°C (see the Technical Data Sheet of the Pump model); viscosities higher than 20,000 Cps at 20°C result in physical factors that require correct evaluation, therefore, it is always necessary to contact the Manufacturer's Technical Department in advance.
 The maximum temperature allowed for process fluid depends on and/or is downgraded by the construction material of the pump and system.

CAUTION
 The maximum temperature limits are based on two factors, mechanical and corrosive. Some of the fluids may additionally reduce the maximum safety temperature due to the high corrosive content. Conformity with the ATEX marking indicates the maximum temperature due to the high corrosive content. Conformity with the ATEX marking indicates the maximum temperature when the maximum temperature is exceeded.

2.6.2 CALCULATION OF MAXIMUM FLUID TEMPERATURE (for Zone 1 - Zone 21)
 Below (with formula) for determining the maximum permissible fluid process temperature for SCUBIC or SBOXER pumps in CONDUCT version: I 2D Ex II Hb T4 Cb and II 2D Ex II Hb T135°C Db) for installation in Zone 1 - Zone 21.

Temperature Class	Calculation Factor (only for Zone 1 - Zone 21)	Maximum temperature of Fluid process
ATEX IECEx	-	Tx 55°C = T1 80°C
ATEX T4	-	Tx 55°C = T1 80°C
IECEX T135°C	-	55°C = 80°C

Page 18 of 18

TRANSLATION OF ORIGINAL INSTRUCTIONS - SCUBIC - SBOXER rev. 2021 CHAPTER 4 - TRANSPORT AND POSITIONING

4.3.4 PRODUCT CIRCUIT CONNECTION

After positioning, it is possible to connect the pump to the product circuit as follows:

CAUTION: risk of chemical reactions to 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.

Product system piping requirements

- The connection fittings must be made of the same material as the pump with cylindrical threads (do not use conical threads).
- The connection to the pump must be made with a piece of flexible hose with a metal core (direct connection to the pump with a rigid hose is prohibited).
- All existing hoses must be reinforced with a metal core.
- Piping must be self-supported and must not burden on the pump.
- Correct sizing of the suction and discharge ducts for the correct suction speed.
- Product on/off valves (suction and delivery), that do not cause pressure drops.
- With particulate matter in suspension, install a properly sized suction strainer on the suction side (surface area 2.5 / 3 times the suction section of the pump with maximum permitted slot).
- With products that crystallize, provide a warning or shipping consult with compatible products).
- Product ducts clean inside and without solid processing residues (shavings, particulates, etc.).

4.3.4a Diaphragm pumps with negative suction are affected by the following factors:
 - Fluid viscosity - specific fluid weight - diameter - length and/or bends on the suction.
 Position the pump as close as possible to the sampling point (within 2.5 m) and in all cases never more than 5 m. The diameter of the suction pipe should never be smaller than that of the pump connection; it should be increased as the distance or viscosity of the fluid increases.

CAUTION: risk of premature wear and/or diaphragm breakage.
 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.
 Higher viscosities result in physical factors that require correct evaluation, therefore, it is always necessary to contact the Manufacturer's Technical Department in advance.

4.3.4b SCUBIC and SBOXER series pumps are supplied with product connection seats with cylindrical Gas threads. For connections to the pump manifolds, use only fittings with cylindrical gas threads (not conical) of the same material as the pump.
 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 for fluids with high viscosity.
 If necessary, load two turns of PTFE tape on the thread and tighten the valves onto the pump manifolds (with moderate clamping pressure) until the seal is ensured.

Page 32 of 68

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 precautions, 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.

Tel. +39 / 0331 074034
 Fax +39 / 0331 074036
 e-mail: info@debem.it
 website: www.debem.com



SYMBOLS AND DEFINITIONS



MACHINE OPERATOR

Identifies the type of Operator for whom the mentioned operation is reserved. This qualification requires having obtained the necessary training and specific skills in the field of use of the pump, in addition to full knowledge and understanding of the information contained in the Manufacturer's user manual.



HANDLING OPERATOR

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



INSTALLER/MECHANICAL SERVICEMAN

Identifies the type of Technician to whom the mentioned operation is reserved. This qualification requires having obtained the necessary training and specific skills to carry out installation and 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.



Danger of toxic and/or corrosive fluids.



Explosion hazard.



Danger of crushing and sectioning.

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 component parts when it is powered, running or hot.



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



Prohibition to lubricate.

SYMBOLS AND DEFINITIONS

MANDATORY SYMBOLS

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



Obligation to disconnect the power supply before servicing.



Obligation to wear gloves with toxic and corrosive fluids.



Obligation to wear protective and anti-slip shoes.



Obligation to wear aprons with toxic and corrosive fluids.



Obligation to wear a face mask with toxic and corrosive fluids.



Obligation to wear a respirator when working with toxic and corrosive fluids.



CAUTION

It informs the personnel concerned that the described operation involves a residual risk of exposure to dangers with possible harm to health, personal injuries and/or environmental damage, 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 for 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 of a technical/legal nature.

1.4 DELIVERY NOTE



SCUBIC and SBOXER pumps are manufactured in accordance with Directive 2006/42/EC and 2014/34/EU as well as with harmonised European standards EN ISO 80079-36:2016, EN ISO 80079-37:2016 and EN ISO 80079-38:2016.

By drawing up this manual, the Manufacturer hopes that you will be able to take full advantage of the performance of the SCUBIC and SBOXER pumps in complete safety; the SCUBIC and SBOXER pumps do not pose any danger to the operator if used in accordance 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 SCUBIC and SBOXER "standard" pumps (see 2.7 TECHNICAL FEATURES); please note that due to constant research into technological innovation and quality, the technical characteristics of the products shown may change without prior notice; **the version of the Original Instructions supplied with the pump must always be followed.**

It is forbidden to commission the pump before the machine in which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC, as well as with 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 making them available to third parties without their written approval.

1.5 GENERAL NOTES ON DELIVERY

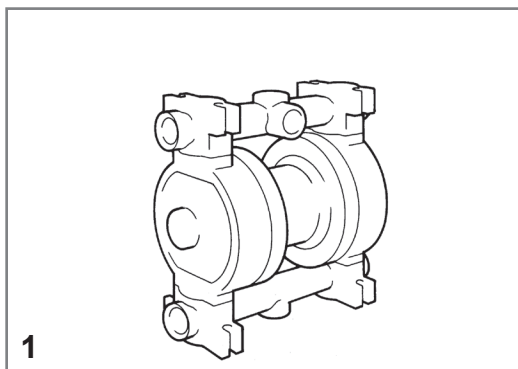


Upon delivery, check that:

1. the packaging is intact
2. the supplied items match the order specifications (see accompanying document)
3. the pump has not been damaged.

DESCRIPTION OF THE SUPPLY	POS.
Pump	1
Official Manual (Original Instructions)	2

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



1.6 WARRANTY



The SCUBIC and SBOXER pumps are a quality product that is recognised by the satisfaction of our customers. 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. Full address;
- B. Pump identification;
- C. Explosion risk protection class;
- D. Description of the detected anomaly.

All SCUBIC and SBOXER 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*) for all the mechanical parts found to be defective, except for those subject to normal wear due to operation. The warranty provides for the free repair of the pump or the supply of parts to be replaced with defective ones, provided that the Manufacturer acknowledges the manufacturing defects. The repair or replacement of defective parts constitutes full satisfaction of the warranty obligations.

2. SERVICE NOTIFICATION

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

3. SERVICE METHODS

Any warranty service will be carried out at the Manufacturer's workshop only after shipment or sending of the defective pump at the Purchaser's expense.

4. EVALUATION RESERVE

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

5. EVALUATION RESERVE

Defective parts remain the property of the manufacturer when they are replaced under warranty. They must be returned to the manufacturer, who reserves the right to inspect them in its workshop in order to detect the real defect or, on the contrary, to identify the external reasons that may have caused the damage. If the parts are found not to be defective, the Manufacturer reserves the right to invoice the full cost of the parts that have been 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 custom 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 as a consequence of incorrect installation, carelessness, neglect, improper maintenance, or damage due to transportation or any other reason or event that is not directly linked to operation or manufacturing defects.

Warranty and liability exclusion for chemical 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, 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 chemical incompatibility between the pump materials and the fluids 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.



This chapter of the manual deals with topics of a preliminary nature but 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	14
2.2	PUMP CONFIGURATION CODE	15
2.3	ATEX MARKING AND DEFINITION	16 - 17
2.4	PUMP DESCRIPTION	18
2.5	PROPOSED USE AND IMPROPER USES	18 - 19
2.6	TECHNICAL FEATURES	20 - 21

Below is a detailed description of each topic mentioned.

2.1 PUMP IDENTIFICATION

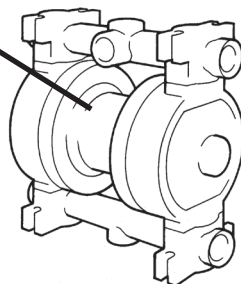
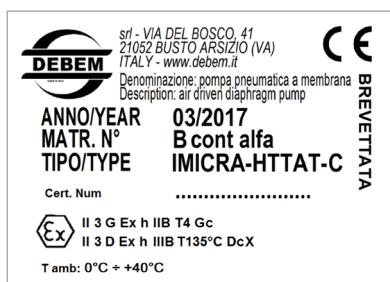


2.1.1 For any communication with the Manufacturer or authorised After-Sales Centres, always specify the data shown on the identification plate of the pump.

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. **ATEX Marking;**
6. Identification code (serial number);
7. Year of manufacture:

ATEX: STANDARD - CONDUCT version



CAUTION

The identification plate and the Declaration of Conformity contain critical data for the materials of which the pump is made to be recognised (**4. Type and Composition Code of the pump**) essential to properly assess the chemical compatibility with the fluid to be used. **The data shown indicate the ATEX execution class (see ATEX 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, in case of loss, you can request a new copy.



2.2 PUMP CONFIGURATION CODE



SCUBIC and SBOXER series Air Pumps have been designed and manufactured in different sizes and configurations (composition materials).

The identification plate of the pump contains the product model which also specifies the composition materials of the pump, which is reported and explained below in order to determine the suitability and compatibility of the pump with the fluid to be pumped and the surrounding environment.

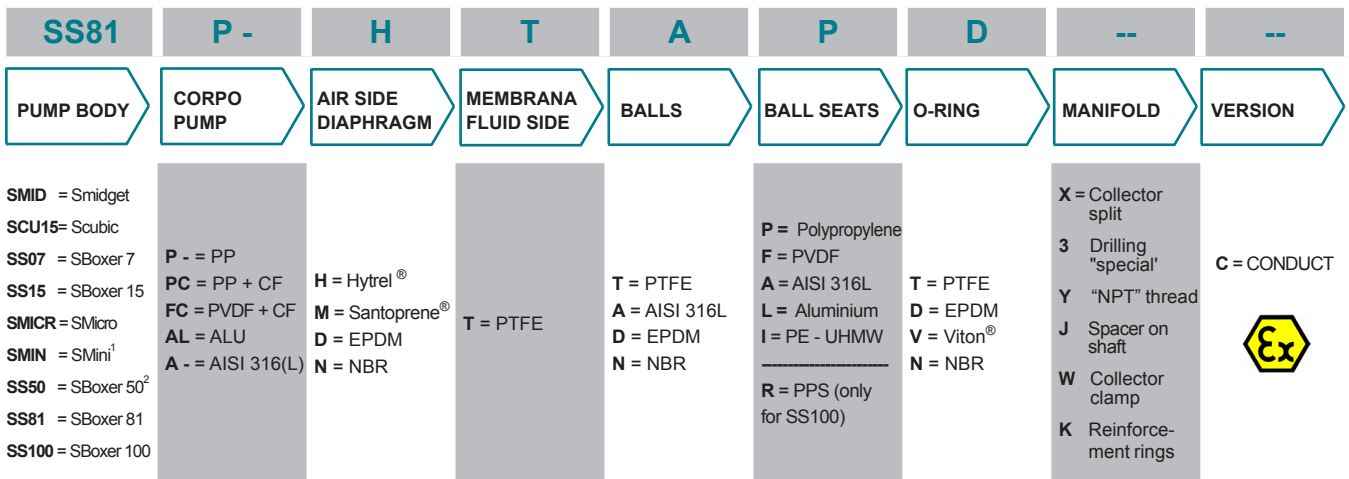


CAUTION: risk of damage and product leakage.

Please note that the pump must always be installed in accordance with the characteristics of the pump's composition materials shown on the Identification plate (see sections 2.2 CONFIGURATION CODE and 2.6 TECHNICAL FEATURES).

It is always necessary to check the fluid to be pumped for suitable chemical compatibility and temperature (if necessary, by subjecting it to extended tests) before installing and using the pump.

Example of Pump Configuration Code:



1 : SMINI only Pump body in AISI 316L;

2 : SBOXER 50 only Pump body in PP - PP + CF - PVDF - ALU;

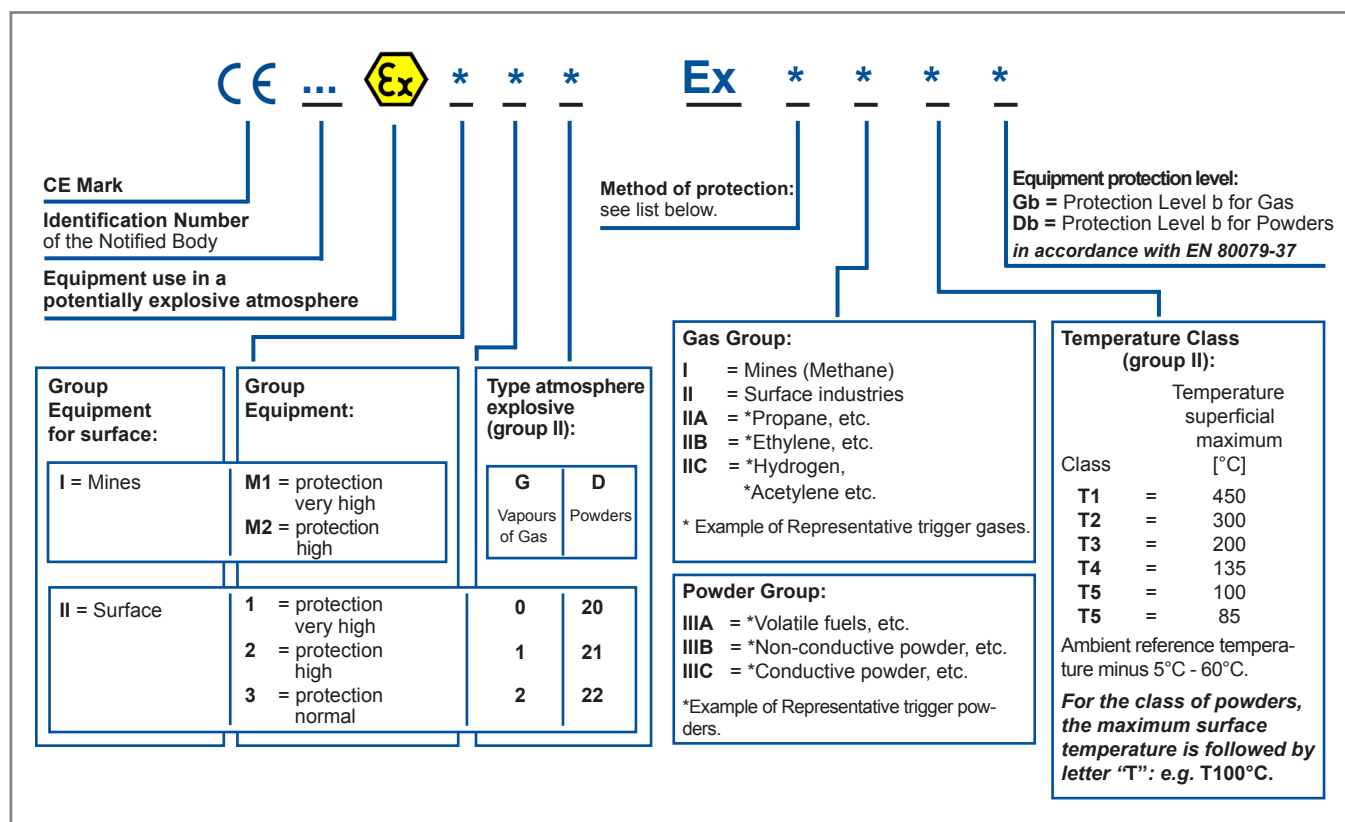
2.3 ATEX MARKING AND DEFINITION



All SCUBIC e SBOXER Air 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 the STANDARD version, ATEX execution **III 3G Ex h IIB T4 Gc** and **II 3D Ex h IIIB T135°C DcX**, for use in "Zone 2- Zone 22" (in the presence of flammable gas and dust) as well as ATEX execution **I M2 Ex h I Mb X** for use in mines in the low shock zone "Zone M2" (in the presence of a potentially explosive atmosphere consisting of firedamp and coal dust).

Upon specific request when ordering, pumps can be supplied in the CONDUCT version, ATEX execution **II 2G Ex h IIB T4 Gb** and **II 2D Ex h IIIB T135°C Db**, 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.

III 3G/II 3D: Surface equipment for use in areas where the presence of gases, vapours or mists in addition to clouds of combustible powder in the air is unlikely during normal operation, both in external and internal areas and, if it does occur, it will only persist for a short period (Zone 2 - Zone 22).

II 2G/II 2D: Surface equipment for use in areas with the presence of gases, vapours or mists in addition to clouds of combustible dust in the air that occur occasionally during normal operation (EN 1127-1 par. 6.3), both in external and internal areas (Zone 1 - Zone 21).


I M2: M2 category equipment that can be installed in mines in "hazardous condition 2", i.e. in a potentially explosive atmosphere consisting of firedamp and coal dust.



- Ex h** : Protection equipment «c», or «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.
- I** : Product suitable for installation in mines (in a low impact risk area).
- MB** : EPL Mb protection level in accordance with EN 80079-36:16.
- X** : The internal area of the pump is not ATEX, i.e. it cannot process explosive fluids when installed in a mine.
- 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. Furthermore, the user must take into account the ignition points of the gases, vapours and mists in addition to clouds of combustible powder in the air existing in the area of use.

The Technical File is deposited with TÜV NORD CERT of Hannover.



Upon specific Order request, pumps can be supplied in STANDARD version in ATEX  **I M2 Ex h I Mb X** execution for use in mines in a low impact risk area "hazardous condition 2" in the presence of flammable gas and powders (firedamp and coal dust).



CAUTION

The internal part of ATEX M2 pumps (see marking) is not ATEX, therefore, it cannot be used for pumping explosive fluids.

Below is the definition of the ATEX marking for M2 execution.



- Ex** : Safety symbol in accordance with DIN 40012 attachment A.
- IM2** : M2 category equipment that can be installed in mines in "hazardous condition 2", i.e. in a potentially explosive atmosphere consisting of firedamp and coal dust.
- Ex h** : Protection equipment «c», in accordance with EN 80079-37.
- I** : Product suitable for installation in mines (in a low impact risk area).
- MB** : EPL Mb protection level in accordance with EN 80079-36:16.
- X** : The internal area of the pump is not ATEX, i.e. it cannot process explosive fluids when installed in a mine.

The Technical File is deposited with TÜV NORD CERT of Hannover.

2.4 PUMP DESCRIPTION



2.4.1 FUNCTIONING PRINCIPLES

The pneumatic pumps of the SCUBIC and SBOXER series consist of an internal insert that directs air to the diaphragms of the two pumping bodies by moving them via a central pin. The diaphragms integral with the central driving pin are operated with alternating motion in two stages (suction-delivery) and constitute the pumping elements.

The respective fluid retaining ball valves are housed between the two pumping chambers and the pump delivery and suction ducts.

The two-stage operating principle operates simultaneously (while one chamber is in the suction phase, the second chamber is in the discharge phase), guaranteeing negative suction, high head and the pumping of fluids with high viscosity and solid parts in suspension (see 2.6 CHARACTERISTICS TECHNICAL DATA).

2.4.2 INSTALLATION REQUIREMENTS AND FEATURES

SCUBIC and SBOXER air pumps are self-priming and can run dry and allow varying the operating speed even during service.

They can be used for the recirculation and pumping of liquids with high viscosity and solid parts in suspension (see 2.6 TECHNICAL FEATURES). Their operation is envisioned for horizontal installations, above and below head, with precautions compliant with the features of each model (see 2.6 TECHNICAL FEATURES).

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

2.5 INTENDED USE AND IMPROPER USES



2.5.1 INTENDED USE

The air-driven SCUBIC and SBOXER pumps have been designed and constructed to pump liquids and aggressive liquids (acid or alkaline) with chemical composition and temperatures compatible with the pump materials and apparent viscosity of between 1 and 20,000 Cps at 20°C (see the Technical Data Sheet of the Pump model); **viscosities higher than 20,000 Cps at 20°C result in physical factors that require correct evaluation, therefore, it is always necessary to contact the Manufacturer's Technical Department in advance.**

The maximum temperature allowed for process fluid depends on and/or is downgraded by the construction material of the pump and system.



CAUTION

The maximum temperature limits are based on two factors, mechanical and corrosive. Some of the fluids used may significantly reduce the maximum safety temperatures due to the high corrosive content. **Conformity with the ATEX marking affixed on the pump is no longer ensured when the maximum temperature is exceeded.**

2.5.2 CALCULATION OF MAXIMUM FLUID TEMPERATURE (for Zone 1 - Zone 21)

Below is the formula for determining the maximum permissible fluid process temperature for SCUBIC e SBOXER pumps in CONDUCT version: II 2G Ex h IIB T4 Gb and II 2D Ex h IIB T135°C Db) for installation 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



2.5.3 TEMPERATURE CLASSES FOR PUMPS TO BE INSTALLED IN AN EXPLOSIVE ENVIRONMENT (Zone 1 and Zone M2):

The temperature class corresponding to the protection against the risk of explosion of the pumps designed for use in Zone M2 with the presence of explosive atmospheres is T150°C.

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 and Zone M2, fluid service temperature values higher than those indicated above will not permit compliance with 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.

2.5.4 IMPROPER USES

Any use of an SCUBIC and SBOXER pump other than that previously described and specified in *Section 2.7 TECHNICAL FEATURES*, is to be considered improper and is therefore forbidden by DEBEM.

In particular, it is FORBIDDEN to use SCUBIC and SBOXER pumps for:

- production of vacuum;
- operation as a shut-off valve, as a check valve (non-return valve) or as a metering valve;
- pump operation for pumping powders of all types and kinds (flammable and non);
- operation with fluids that are chemically incompatible with the materials of construction;
- use with suspended products with a specific weight greater than that of the liquid (e.g. water with sand) or with solid particles larger than that indicated for each Model;
- operation with air pressures, process temperatures 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 pump use (incorrect choice of materials and installations) to operate in the presence of stress corrosion cracking phenomena;
- operation with alimentary or pharmaceutical fluids.



CAUTION

The risks associated with use of the pumps under the exact conditions set forth 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.

Use of the pump that does not comply with the Manufacturer's Original Instructions is prohibited and invalidates the Warranty, the safety and explosion protection requirements.

2.6 TECHNICAL FEATURES



The performance technical data of the SCUBIC and SBOXER series pumps refer to standard versions. The “MAX Delivery” values refer to pumping of 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 membrane depend on the following factors:

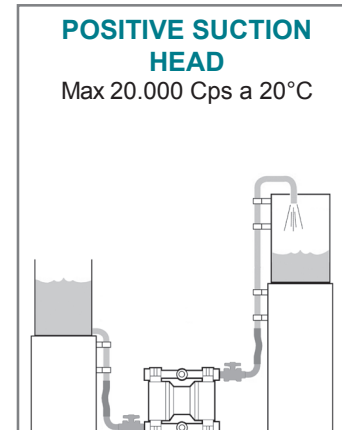
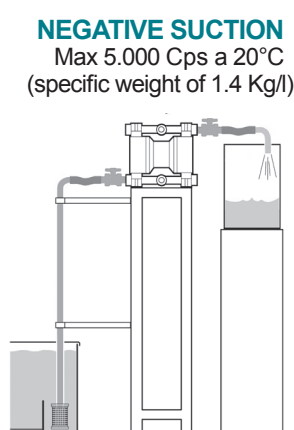
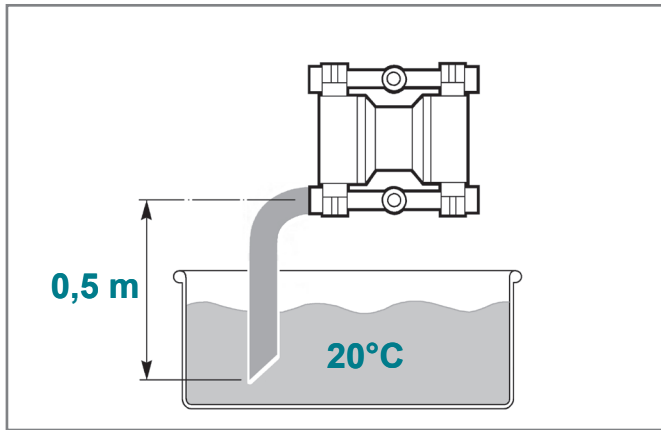
- The fluid’s viscosity and specific weight;
- The length and diameter of the suction pipe and/or presence of suction bends on the product circuit;
- Presence of abrasive solid particles.

NEGATIVE SUCTION: with fluids max up to 5.000 Cps at 20°C and a maximum specific weight of 1.4 Kg/l.

BELOW HEAD 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.

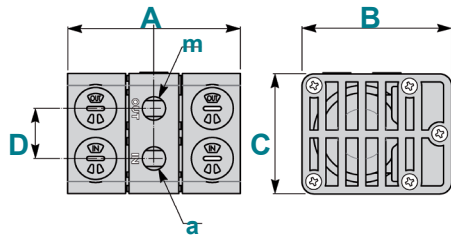
The following tables show the Technical Data, the maximum overall dimensions, the clamping points and the weights; **for the dimensional values and the specific technical data of the supply, see the Technical Data Sheets of the specific model.**



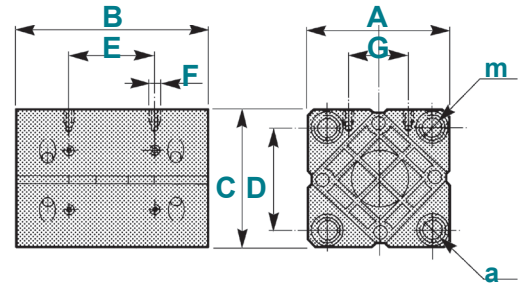
TECHNICAL DATA	unit of measurement	SMIDGET	SCUBIC	SBOXER 7	SBOXER 15	SMICRO	SBOXER 50	SMINI	SBOXER 81	SBOXER 90	SBOXER 100	
Suction/delivery fittings	inches	1/4" f	3/8" f	1/4" f	3/8" f	1/2" f	1/2" f	1/2" f	1" f	1" f	1" f	
Air fitting	inches	1/8" f	3/8" f	1/8" f	3/8" f	1/4" f	3/8" f	3/8" f	3/8" f	3/8" f	3/8" f	
Air pressure (MIN-MAX)	bar	8	8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	2 - 8	
Solids passing MAX	Ø mm	0	0.5	0.5	0.5	2	4	4	4	4	4	
Dry suction capacity ⁽¹⁾ (PTFE membrane)	m	3	3	3	3	5	4	5	4	4	4	
Max head (water 20°C)	m	80	80	80	80	80	80	80	80	80	80	
MAX flow rate ⁽²⁾ water 20°C (immersed suction manifold)	l/min	6	17	9	17	30	50	50	100	110	150	
MAX fluid temperature (zone 1 - 21) (zone 2 - 22)	PP+CF	°C	65	65	65°	65°	65°	65°	--	65°	--	65°
	PVDF+CF (ECTFE)	°C	--	80	80°	80°	80°	80°	--	80°	--	80°
	ALU - AISI 316	°C	--	--	--	--	80°	80°	80°	80°	80°	80°
MAX fluid temperature	PP	°C	65	65	65°	65°	65°	65°	--	65°	--	65°
	PVDF (ECTFE)	°C	--	95	95°	95°	95°	95°	--	95°	--	95°
	ALU - AISI 316	°C	--	--	--	--	95°	95°	95°	95°	95°	95°
Weight (empty)	PP and PP+CF	Kg	0.52	1.4	1.1	1.6	--	5	3.6	7.5	--	7.6
	PVDF (ECTFE)	Kg	--	1.4	1.4	1.9	--	6.5	4.2	8.5	--	9.6
	ALU	Kg	--	--	--	2	--	6.5	4	8.2	--	8.5
	INOX	Kg	--	--	--	3.8	6.5	10.5	--	11	7	11.7
Noise (5 bar rubber balls)	dB (A)	60	65	60	65	65	70	70	70	70	75	



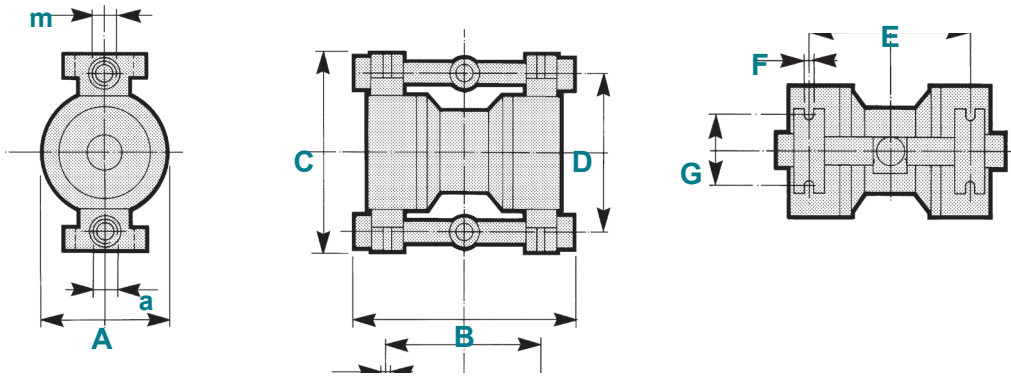
SMIDGET pump



SCUBIC pump



SBOXER pumps



PUMP	MATERIAL	WEIGHT kg	DIMENSIONS (mm)								
			a	m	A	B	C	D	E	Ø F	G
SMIDGET	PP and CF	0.4	1/4"	1/4"	86.5	75	60	25	--	--	--
SCUBIC	PP and PP+CF	0.3	3/8"	3/8"	107	168	107	80	60	5	49
SCUBIC	ECTFE	0.5	3/8"	3/8"	107	168	107	80	60	5	49
SBOXER 7	PP and PP+CF	0.7	1/4"	1/4"	70	138	120	98	101	5	64
SBOXER 7	PVDF	0.9	1/4"	1/4"	70	138	120	98	101	5	64
SBOXER 15	PP and PP+CF	1.1	3/8"	3/8"	80	147	149	113	103	5	64
SBOXER 15	PVDF	1.4	3/8"	3/8"	80	147	149	113	103	5	64
SBOXER 15	Aluminium	1.9	3/8"	3/8"	80	147	149	113	103	5	64
SBOXER 15	AISI stainless steel 316L	2.4	3/8"	3/8"	80	153	141	109	103	6	70
SMICRO	PP and PP+CF	1.6	1/2"	1/2"	120	168	168	136	120	6	70
SMICRO	PVDF	1.9	1/2"	1/2"	120	168	168	136	120	6	70
SMICRO	Aluminium	2	1/2"	1/2"	120	164	172	140	120	6	70
SMICRO	AISI stainless steel 316L	3.8	1/2"	1/2"	120	168	168	136	120	6	70
SBOXER 50	PP and PP+CF	3.6	1/2"	1/2"	153	246	240	201	168	6.5	85
SBOXER 50	PVDF	4.2	1/2"	1/2"	153	246	240	201	168	6.5	85
SBOXER 50	Aluminium	4	1/2"	1/2"	152	241	234	198	168	6.5	85
SMINI	AISI stainless steel 316L	6.5	1/2"	1/2"	152	232	232	196	166	9	79
SBOXER 81	PP and PP+CF	5	1"	1"	170	308	274	219	213	6.5	92
SBOXER 81	PVDF	6.5	1"	1"	170	308	274	219	213	6.5	92
SBOXER 81	AISI stainless steel 316	6.5	1"	1"	170	305	275	221	214	8	93
SBOXER 90	Aluminium	6.5	1"	1"	170	293	291	237	213	8	103
SBOXER 100	PP and PP+CF	7.5	1"	1"	202	329	325	263	228	8	110
SBOXER 100	PVDF	8.5	1"	1"	202	329	325	263	228	8	110
SBOXER 100	Aluminium	8.2	1"	1"	202	329	324	263	228	8	110
SBOXER 100	AISI stainless steel 316	11	1"	1"	200	308	323	273	213.5	8	110





WARNINGS AND REQUIREMENTS



TRANSLATION OF ORIGINAL INSTRUCTIONS SCUBIC - SBOXER - rev. 2021

CHAPTER 3

This chapter deals with particularly important topics on safety and how to safely install, use or service the SCUBIC and SBOXER 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	24 - 27

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 practice 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 All pumps undergo functional tests and are tested with water at 20°C before being shipped to the Customer, therefore, tap water residues can be found inside them.



CAUTION: risk of chemical reactions to 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.

- 3.1.2 The personnel in charge of installing, inspecting and maintaining the pump must have suitable technical preparation and knowledge of the product to be pumped and also have specialist knowledge on potentially explosive atmosphere and related risk for uses in ATEX areas.



CAUTION

These instructions are essential for the compliance of the pump with the requirements of Directive 2014/34/EU so they must be: available, known, understood and used by all Operators.

- 3.1.3 Use of the pumps in a manner that does not comply with the instructions indicated in the Manufacturer's use and maintenance manual will cancel all the requirements for safety and protection against of explosions.



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.**

- 3.1.4 The air supply to the pump must always include the installation of a suitable non-return valve and the pressure must never be lower than 2 bar or higher than 8 bar. SCUBIC and SBOXER pumps are self-lubricating (no further lubrication required); supply the pump with dry filtered air and DO NOT lubricate. 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.

It is forbidden to install the pump without a non-return valve on the air supply line to prevent the pumped fluid from entering the pneumatic circuit in the event of a rupture of the diaphragms. Even in battery installations, the non-return valve must be installed on each pump.

- 3.1.5 The air in the pneumatic circuit must always be discharged in a free atmosphere, free of dust and saturated vapours which could damage the internal circuit.



CAUTION: danger of damage to the internal pneumatic circuit.

For installations with the pump submerged, or operation in environments with a harsh atmosphere (dust, vapours or saturated vapours), provision must be made for the installation of air fittings and hoses (of suitable materials), to take the air outlet point outside the working environment/liquid.

- 3.1.6 In pump installations with high delivery heads, very dense fluids with high specific weight and/or high counter-pressures, freezing of the pneumatic circuit outlets may occur.



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

Provide for the installation of a glycol adder on the air supply line, upstream of the pump.

- 3.1.7 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.



ATTENTION: danger of loss of conformity with the affixed ATEX marking.

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.**



- 3.1.8 The internal part of the ATEX M2 pumps (*see marking*) is not ATEX, therefore, it cannot be used for pumping explosive fluids. The pumps in ATEX M2 execution are intended for operation in mines in a low-risk, "hazardous condition 2" shock zone in the presence of flammable gases and dust (firedamp and coal dust) with a maximum temperature of 150° and no dust deposits.



CAUTION: danger of explosion.

The use of pumps in ATEX M2 execution for pumping explosive media and/or media with uncontrolled temperatures higher than those permitted by the certification marking is prohibited. It is also forbidden to use the pumps with explosive dust deposits on the surfaces (external **and/or** internal) and to install them in environments with a high risk of impact.

- 3.1.9 It is always necessary to carefully check the suitability of the chemical compatibility and temperature of the fluid to be pumped (if necessary by subjecting it to prolonged tests) before installing and using the pump.



CAUTION: danger of chemical reactions and possible breakage or product leakage.

It is forbidden to use the pump with fluids that are not compatible with the component materials or in an environment where non-compatible fluids are present.

- 3.1.10 Loads that burden on the pump, together with fluids or uses in corrosive environments in contact with some materials, can cause stress corrosion cracking (material deterioration due to the combined action of corrosion and application of a constant load). This often leads to sudden and unexpected breakage (not attributable to construction defects) of the components subjected to stress in corrosive environments, especially with high temperatures.



CAUTION: danger of stress corrosion cracking and sudden breakage with product leakage.

In the presence of stress corrosion cracking, the user must check complete compatibility (over time) with the construction materials of the pump or, if necessary, make a more suitable choice of construction material and follow the Manufacturer's instructions during the installation to eliminate the loads.

- 3.1.11 Pumps with Aluminium components or parts cannot be used for pumping III-trichloroethane, methylene chloride or solvents based on other halogenated hydrocarbons.



CAUTION: danger of explosion.

Aluminium in contact with III-trichloroethane, methylene chloride or solvents based on other halogenated hydrocarbons generates dangerous chemical reactions.

- 3.1.12 The SCUBIC and SBOXER pumps are not self-draining, so if they are used with crystallising fluids, they must always be flushed or stripped internally with suitable clean flushing fluid after being stopped.



CAUTION: danger of pump shutdown.

Prolonged shutdown of the pump in the presence of crystallising fluids can cause valves to become stuck and fail to function.

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



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

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









- 3.1.14 Installation requires suitable valves (with 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.

- 3.1.15 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 high delivery head and/or with fluid of a 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 high delivery head and/or with fluid of a high specific weight, can generate strong back-pressures that prematurely wear the diaphragms and/or cause a possible breakage.
- 3.1.16 In installations where the presence of solid particulate suspended in the product is foreseen, 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 damaging the pump**
Installing the pump without a suitable strainer or with an insufficient and undersigned fluid flow rate and/or passage larger than the particulate allowed by the pump model is forbidden.
- 3.1.17 In general, all fittings, ducts and 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.
-  **WARNING: danger of rupture of membranes and product leakage.**
The presence of points of flow below the pump's nominal values along the air and product circuit lines upstream and downstream of the pump, in addition to causing poor efficiency and performance, can lead to premature diaphragm wear and/or possible rupture.
- 3.1.18 To install the pump, use fittings with cylindrical gas threads, made of the same construction material as the pump. In general, all pump threads for connecting the fluid suction and discharge lines are not intended to ensure hydraulic tightness; use suitable seals to ensure hydraulic tightness.
-  **CAUTION: risk of thread breakage and product leakage.**
The use of fittings with conical threads or made of a different material than the pump is prohibited. The tightening of the suction and delivery fittings must ensure the mechanical seal of the ducts while to ensure the hydraulic seal, use suitable seals.
- 3.1.19 Using the pump in a potentially explosive environment must always provide for an efficient earthing of the same, regardless of any organ connected to it. When pumping flammable liquids (allowed by the marking), it is essential to use suitable "CONDUCT" pumps with the ATEX marking, with appropriate 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. It is forbidden to use pumps made of non-conductive material (which is electrostatically charged) for flammable liquids, and/or without adequate earthing.
- 3.1.20 The presence of vortices at the suction point creates cavitation and malfunctions. During operation, check for any abnormal noise and that 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 leaving the pump indicates an abnormal condition for which the cause must always be determined before continuing use.
- 3.1.21 Depending on the configuration, place of installation of the pump and duration of exposure 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 caps or headphones).
- 3.1.22 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. Tests carried out on thousands of installed pumps (with a head of 0.5 m at 20°C) have shown that they last more than 100,000,000 (one hundred million) cycles.
-  **CAUTION: risk of diaphragms breaking.**
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.**
- 3.1.23 Pump operation can only be adjusted by shuttering the compressed air supply, by adjusting the network pressure, or according to the piloting system installed (by shuttering the oscillator's flow regulators or, with a remote 2/3-way valve, by adjusting the speed from the PLC).

**CAUTION: risk of premature wear and/or diaphragm breakage.**

It is forbidden to close or choke the sectioning 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.

- 3.1.24 The components of the internal pneumatic circuit (including the shaft) are made of materials which are not specifically resistant to chemicals and corrosive products; in the event of a rupture of the membranes, the fluid may enter the internal pneumatic circuits and the environment and damage the components.

**WARNING: damage to the central insert.**

If the diaphragms are ruptured and come into contact with corrosive fluids, the central insert and shaft must be completely replaced.

- 3.1.25 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. The pumps must not be installed and/or exposed to sand and/or pressurised abrasive material that could damage the external plastic parts.

**CAUTION risk of overheating and/or fire**

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 with a damp cloth. It is forbidden to use the pump for pumping powders and dehydrated and/or solid materials of any kind (flammable or not).

- 3.1.26 Disassembly of the compressed air supply/discharge pipes and fittings must be carried out in a dust-free manner. Before disassembling, clean the outside of the pump to prevent deposits and impurities from entering the air circuit.

**CAUTION: risk of damage to the central insert.**

Before refitting the compressed air supply/discharge fittings and hoses to the pump, make sure that there are no deposits of dirt or dust that could enter the pump's internal circuit.

- 3.1.27 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 suitable marking to signal the residual risk.

**CAUTION: risk of high temperatures and/or burns.**

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

- 3.1.28 Before disassembling the pump, always relieve the residual pressure in the internal pneumatic circuit as described in *Section "5.2 PUMP SHUTDOWN"*.

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

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

- 3.1.29 Aggressive, toxic or dangerous fluids can cause serious physical injuries and/or dangerous harm to health. Always flush 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 injuries or harm to health.**

It is forbidden to disassemble, store, and / or return the pump with residues of aggressive, toxic or dangerous product, or not properly washed and decontaminated to the Manufacturer or a Service Centre. Always complete and affix the flushing form (*see 5.1.4 PUMP FLUSHING 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.

In addition to their primary function, the components of SCUBIC and SBOXER pumps are designed and manufactured to fulfil important functions that affect the overall safety of the pump; **only use original spare parts when replacing worn parts.**

Failure to comply with the above may result in dangers for the Operator, Technicians, people, the pump and/or the environment in which it is installed, for which the Manufacturer is not responsible.

CHAPTER 4

SCUBIC and SBOXER pumps are normally shipped in cardboard box packaging or, at the request of the customer and the shipping location, can be supplied on pallets with a wooden crate or in packaging for shipment by sea.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
4.1	STORAGE AND PRESERVATION	29
4.2	TRANSPORT AND HANDLING	30
4.3	POSITIONING AND INSTALLATION	31 - 34
4.4	PNEUMATIC CONNECTION	35 - 37
4.5	CHECKS PRIOR TO COMMISSIONING	37

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

4.1 STORAGE AND PRESERVATION



The SCUBIC and SBOXER series pumps are normally shipped with packaging in a closed cardboard box and internal cardboard impact protection.

At the specific request of the customer, depending on the quantities and country of destination, they can be shipped on pallets and in a wooden crate or with packaging for shipments by sea.

The packaged pump can be store 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

In the future, the pump must always be stored with the pump empty, without liquids and after having suitably washed it.

4.1.1a Drain the pump of any liquid residues.

4.1.1b Wash the internal and external surfaces of the pump and provide for its decontamination if dangerous or toxic liquids have been used.



CAUTION: risk of pump damage.

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

4.1.2 OPERATIONS AFTER STORAGE/PROLONGED STOPS, BEFORE OPERATION

After a 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 screws as described in *Section 6.3 CHECKING TIGHTENING*.



CAUTION: risk of damage and breakages.

Excessive tightening (especially on plastic pumps), can cause dangerous tensions on some components and/or sudden breakages that cannot be attributed to construction 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.

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

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.

Upon delivery, check that the packaging and the pump are intact and undamaged:

4.2.1 Raise the supplied items using hoists of adequate capacity for the weight, respecting the instructions on the packaging.

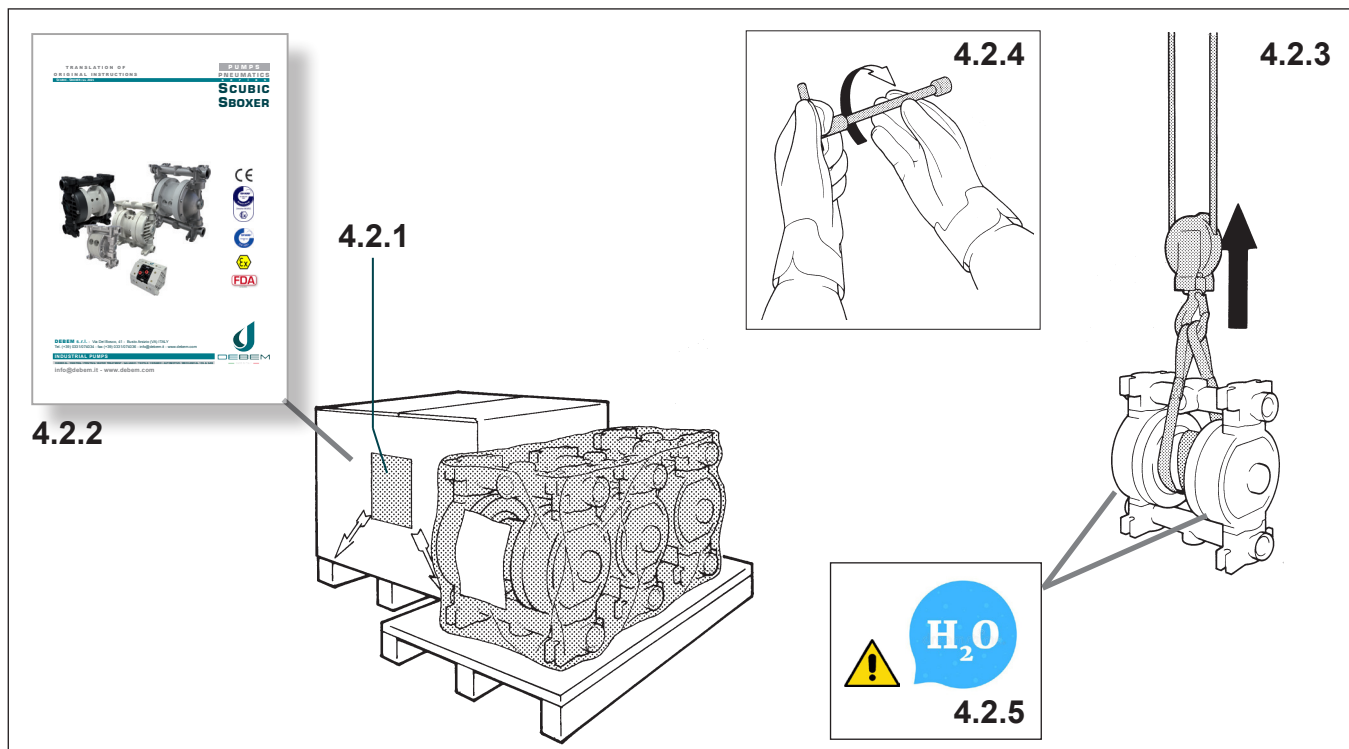
Handle the supplied items with slow movements, keeping them at a minimum height from the ground and place them at the place of installation (dry and covered). Remove the hoist.

4.2.2 Open the packaging and take the use and maintenance manual and work as described.



CAUTION: danger of pollution.

Do not disperse the packaging into the environment but contact specific authorised disposal companies.



4.2.3 Raise the pump using suitable loading equipment depending on the indicated weight.

4.2.4 Check that all the pump screws are tight, respecting the tightening torques shown in *Section 6.3 TIGHTNESS CHECK*.



CAUTION: risk of stress corrosion cracking phenomena and breakages.

Excessive tightening (especially on plastic pumps), can cause dangerous tensions on some components and sudden breakages that cannot be attributed to construction defects.

4.2.5 SCUBIC and SBOXER pumps are tested with mains water and residual water may remain in them.



CAUTION: risk of chemical reactions to 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.

4.2.6 Raise the pump and move it to the place of installation.

Pump handling has thus been completed.



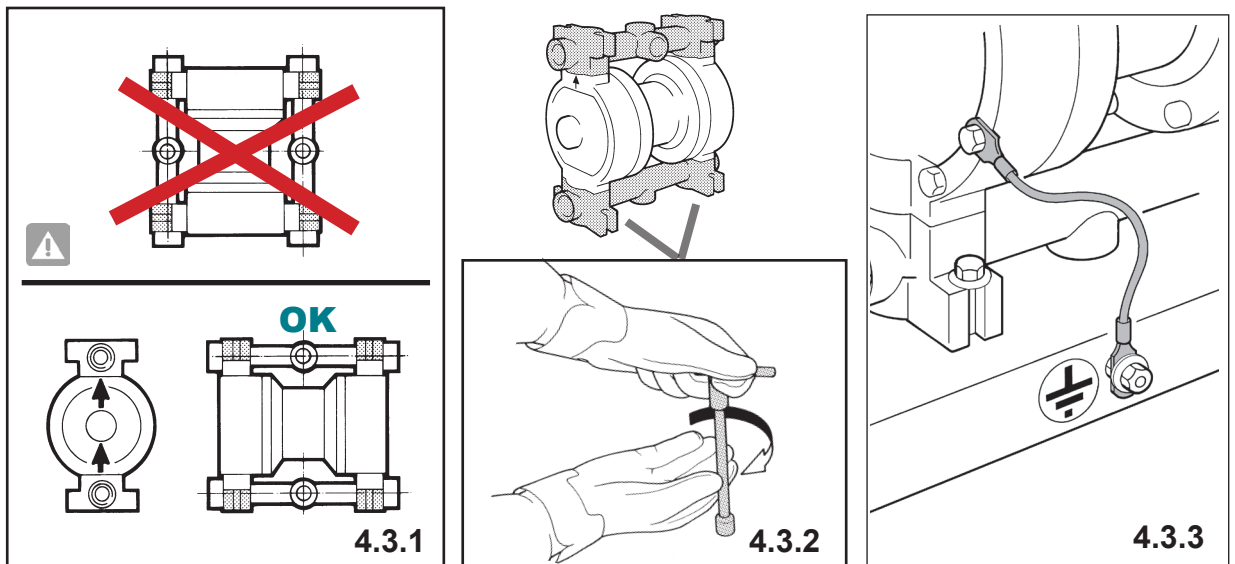
4.3 POSITIONING AND INSTALLATION



Installation operations are reserved for qualified and authorised Installation Technicians, equipped with suitable Personal Protective Equipment (PPE), who are acquainted and comply with the contents of this Manual. Since an endless variety of products and chemical compositions exists, the user is presumed to have the best knowledge of their compatibility and reaction with the pump's construction 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 horizontal axis;
- Mounting on rigid supports (ceiling or floor) with flatness (0.1 mm);
- 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;
- Earthing the pump for installations in a potentially explosive environment;
- Pneumatic circuit supply with dried, unlubricated air;
- Installation of shut-off valve, 3-way valve and non-return valve on the air supply.



- 4.3.1 Position the pump with the axis horizontal at the place of installation, 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 casing must always be facing up.**

- 4.3.2 Provide for the tightening on rigid supports (to ceiling or floor with suitable flatness 0.1 mm) on feet with appropriate washers and bolts. If necessary, provide suitable anti-vibration feet (*DEBEM catalogue*).



CAUTION: danger of explosion

ATEX M2 pumps must be installed in a low-impact risk environment.

- 4.3.3 If the pump is made of conductive material (CONDUCT design), and suitable for pumping permissible flammable fluids, a suitable earthing cable must be installed on each pump body; **danger of explosion and/or fire due to electrostatic currents.**



CAUTION: danger of explosion

The pump must always be earthed, independently of other parts connected to it. Failure to earth or incorrect earthing will invalidate the safety and explosion protection requirements.



Pump positioning is thus completed.

4.3.4 PRODUCT CIRCUIT CONNECTION

After positioning, it is possible to connect the pump to the product circuit as follows:

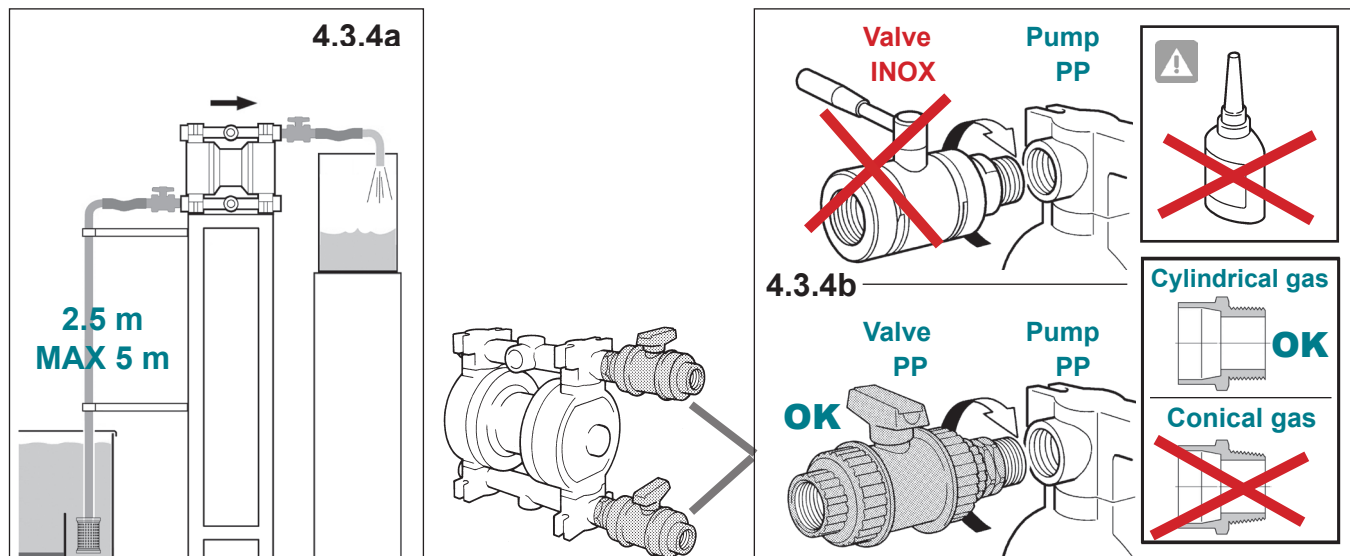


CAUTION: risk of chemical reactions to water

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.

Product system piping requirements

- The connection fittings must be made of the same material as the pump with cylindrical threads (do not use conical threads);
- The connection to the pump must be made with a piece of flexible hose with a metal core (direct connection to the pump with a rigid hose is prohibited);
- All existing hoses must be reinforced with a metal core;
- Piping must be self-supported and must not burden on the pump;
- Correct sizing of the (suction and discharge) ducts for the correct suction speed;
- Product on/off valves (suction and delivery, that do not cause pressure drops);
- With particulate matter in suspension, install a properly sized suction strainer on the suction side (surface area 2.5 / 3 times the suction section of the pump with maximum permitted slot);
- With products that crystallise, provide a washing or stripping circuit (with compatible products);
- Product ducts clean inside and without solid processing residues (shavings, particulates, etc.).



4.3.4a Diaphragm pumps with negative suction are affected by the following factors:

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

Position the pump as close as possible to the sampling point (within 2.5 m) and in all cases never more than 5 m. The diameter of the suction pipe should never be smaller than that of the pump connection; it should be increased as the distance or viscosity of the fluid increases.



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

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.

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

4.3.4b SCUBIC and SBOXER series pumps are supplied with product connection seats with cylindrical Gas threads. For connections to the pump manifolds, use only fittings with cylindrical gas threads (not conical) of the same material as the pump.

Example: (PP pump = PP fittings) or (INOX pump = INOX fittings).

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 for fluids with high viscosity.

If necessary, load two turns of PTFE tape on the thread and tighten the valves onto the pump manifolds (with moderate clamping pressure) until the seal is ensured.





CAUTION: risk of breakage and/or yielding of the threads.

Do not use thread lockers and/or Teflon paste and conical threads. Excess PTFE tape and/or excessive clamping pressure can cause cracks on the manifolds and/or yielding of the threads.

4.3.4c In the event 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 burdening inside the pump.

4.3.4d Install the sleeves to secure the flexible hoses on both valves.



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

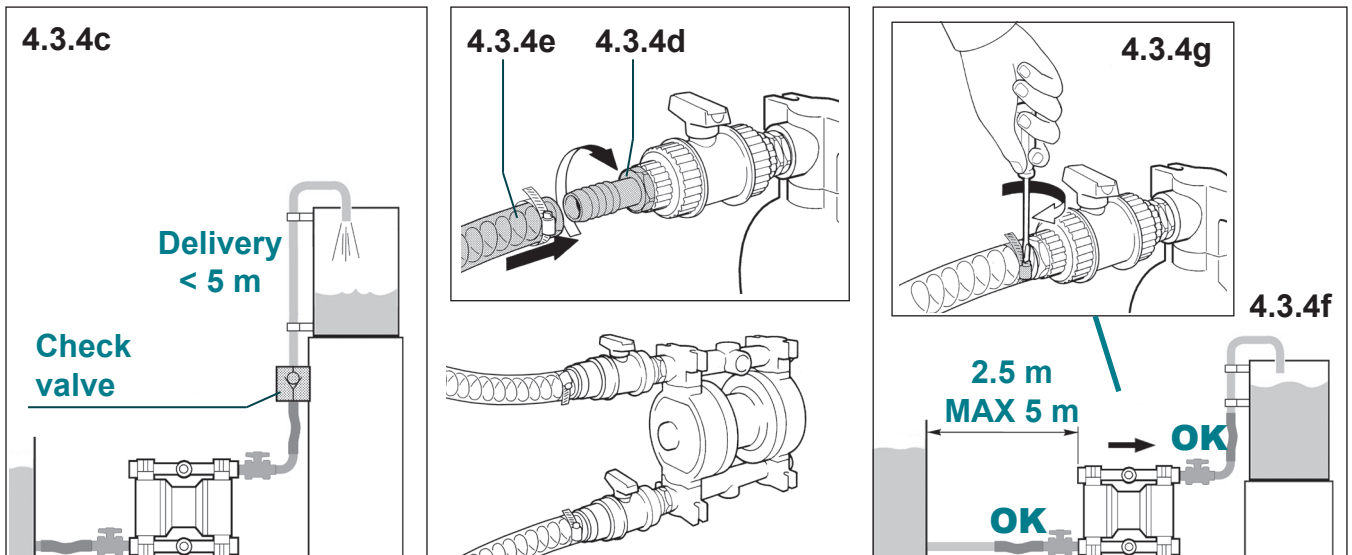
For negative installations and/or fluids with high viscosity, use hoses with an OVERSIZE DIAMETER, especially on the intake side. The filters or other equipment installed at the intake side must be suitably dimensioned in order to avoid pressure drops.

4.3.4e Connect the flexible metal core hose to the suction and discharge connections, observing the arrows on the pump body, which must point upwards.



CAUTION

Check that the pipes connecting to the pump are clean inside and do not contain any solid or processing residues.



4.3.4f Connect the hoses to the rigid pipes (suction and discharge) of the system.



CAUTION: danger of stress corrosion cracking.

Ensure that the system piping is secured and self-supporting and that no loads are placed on the pump. Pay particular attention to stress corrosion cracking phenomena. The pump material may deteriorate due to the combined action of corrosion and application of a load, which may cause parts subjected to stress to break suddenly and unexpectedly, especially at low temperatures.

The pipes must be strong enough so as not to deform under suction and must never burden on the pump and vice versa.

4.3.4g Fix flexible hoses on the pump and on the system with appropriate hose clamps.



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

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 34*) which could compromise the pump suction performance and cause the 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.

4.3.4h If used for drum suction (not below head), the submersed end of the intake hose must be provided with a diagonally cut fixing to prevent it from adhering to the drum bottom.

4.3.4i In installations where the presence of solid particulate is foreseen, 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.

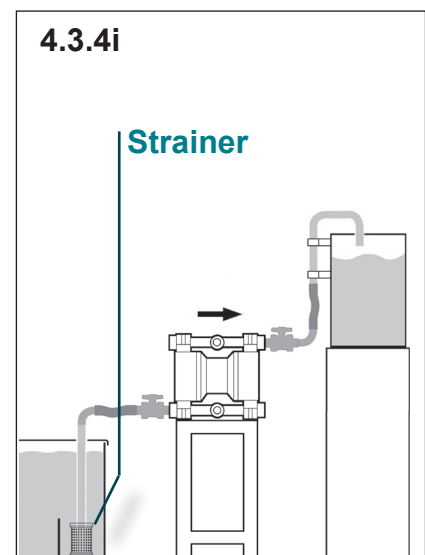
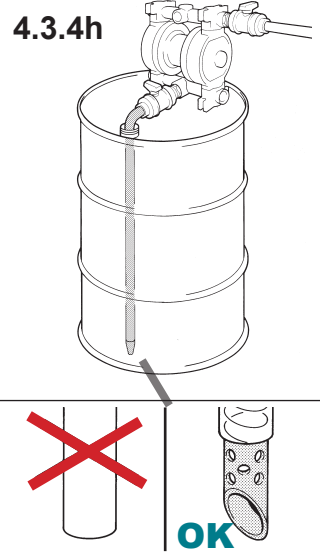
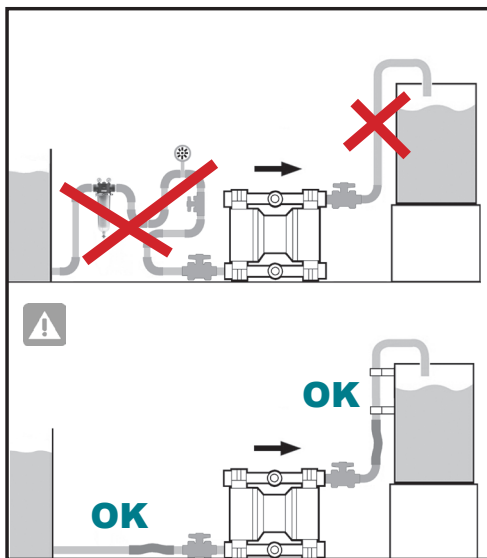


CAUTION: risk of pump damage.

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

Check that there are or can be no solid parts of large size or harmful form in the treated fluid and that there are no restrictions in the pump inlet or outlet to avoid cavitation and membrane stress respectively.

4.3.4j In installations in a potentially explosive environment with the possible presence of suspended solid parts in the fluid, it is essential to install a correctly sized suction strainer to ensure that the pump operates in accordance with the safety requirements set out in the marking.



WARNING: risk of damage to the pump and loss of marking requirements

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

Provide for periodic checks and maintenance of the installed strainer and of the suction and delivery ducts in order to maintain and ensure the correct operation of the pump required by the marking for operation in a potentially explosive environment.

The product circuit connection is thus completed.

4.4 PNEUMATIC CONNECTION



Connection operations to the pneumatic system are reserved for qualified Installation Technicians and, equipped with suitable Personal Protection Equipment, who know and comply with the contents of this Manual. After completing the installation operations, the pump can be connected 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 adder for installations with strong delivery heads and/or back-pressures;
- Installation of a shut-off valve, 3-way valve and check valve on the air supply;
- Installation of air discharge pipe (with collection) outside of harsh and potentially explosive atmospheres and for pumping flammable or toxic fluids.

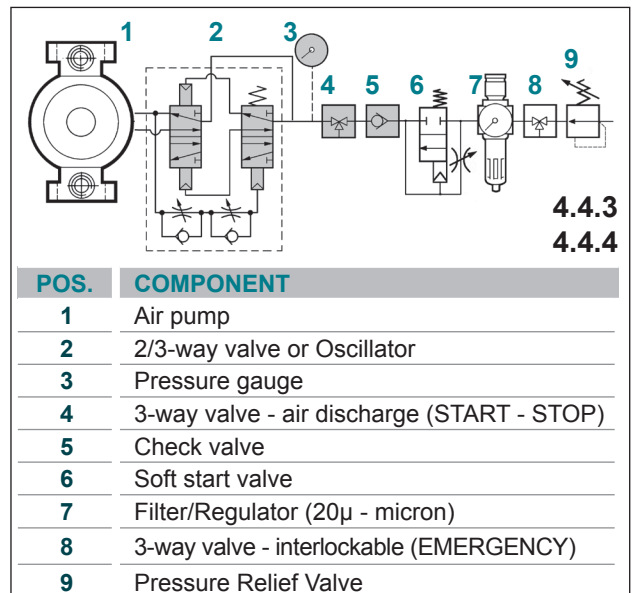
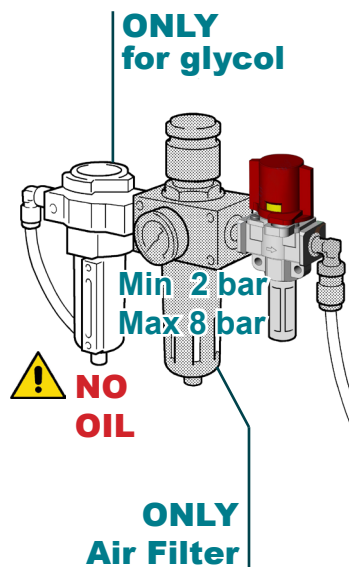
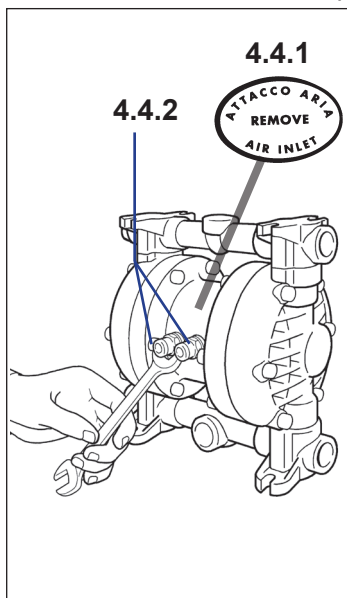
4.4.1 Remove the adhesive from the pump air connections.



CAUTION: danger of pump blocking.

The pneumatic supply of the SCUBIC and SBOXER pumps must be carried out with UNLUBRICATED, FILTERED, AND DRY compressed air with a pressure of not less than 2 bar and not more than 8 bar.

4.4.2 Screw two fittings of suitable diameter onto the pneumatic circuit connections of the pump, for the supply connection to the piloting valve.



4.4.3 Set up a pneumatic oscillator, or a 2/3-way pneumatic valve (for remote control from PLC) and a valve (START - STOP with air exhaust), according to the diagram in the figure.

To check the actual pressure of the supply air, a pressure gauge must be installed on the compressed air line near the pump itself and the value checked when the pump is running.



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

It is forbidden to install the pump without a 3-way valve (START - STOP) and/or a non-return valve to prevent the pumped fluid from entering the pneumatic circuit in the event of a rupture of the diaphragms.

Even in battery installations, the check valve must always be installed on each pump.

4.4.4 Install a 3-way valve for the emergency stop control (disconnecting switch with interlock) in a protected and easily accessible position, upstream of the pneumatic circuit supplying the pump.

4.4.5 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

The installation of the soft start pneumatic valve, in addition to allowing a more uniform and fluid pumping of the product during the start-up phase, allows the protection of the diaphragms and preserves the operating life of the pump.



- 4.4.6 For pump installations with high delivery heads and/or with strong back-pressures, the pneumatic circuit discharges may freeze.



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

With high heads and/or high viscosity, a glycol dispenser should be installed on the air supply line upstream of the pump.

- 4.4.7 Air discharges from the pneumatic circuit must always take place in a free atmosphere, free of dust and saturated vapours which could damage the internal circuit. In the event of a total rupture of the diaphragms, fluid can enter the pneumatic circuit, damage it and escape through the drains.



CAUTION: danger of damage to the internal pneumatic circuit.

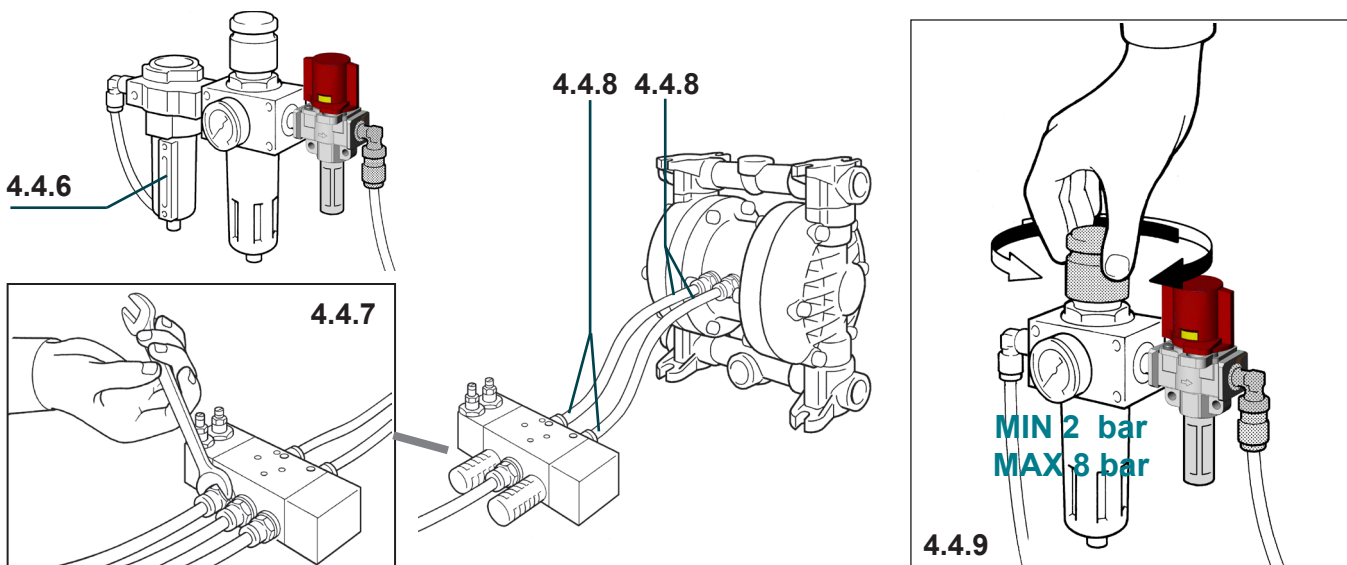
For installations with the pump submerged, or for operation in environments with a harsh atmosphere (dust, vapours or saturated vapours), provision must be made for the installation of fittings and pipes (made of suitable materials) and for venting the air to the atmosphere outside the working environment.



CAUTION: risk of fluid leaking in case of breakage of the diaphragms.

In installations for pumping flammable (permitted by marking), corrosive, toxic or dangerous fluids, compressed air must be discharged into suitable pipes in a safe area for collection.

- 4.4.8 Connect the compressed air supply pipes to the two pump connections and to the upstream piloting valve (pneumatic oscillator, or 2/3-way valve for remote control from PLC).



CAUTION: risk of pneumatic pressure drop.

Use pipes, accessories and control and 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.**

- 4.4.9 Adjust the compressed air mains pressure so that when the pump is running the pressure is not less than 2 bar and not more than 8 bar. **For SCUBIC and SBOXER pumps with rubber balls, do not exceed the MAX pressure of 5 bar.**



CAUTION: risk of standstill and/or diaphragm breakage.

To feed more than one pump with the same air control device, please contact the DEBEM Technicians. Lower or higher pressures may cause malfunctions or breakage of the pump, resulting in product spillage and damage to persons and/or property.

4.4.10 FOR INSTALLATIONS IN ZONE 1 - ZONE 21 - ZONE M2 (only for M2 marked pumps)

If the user foresees the possible risk of exceeding the temperature limits specified in the marking on the pump for use in an area classified as potentially explosive, a protective device must be installed on the system to prevent the overall temperature (fluid and environment) from being reached as indicated in *Section "2.6 TECHNICAL CHARACTERISTICS"*.



ATTENTION: Danger of decay to the affixed ATEX marking.

It is forbidden to use the pump at temperatures higher than those permitted and specified in the manual; if the **maximum temperature is exceeded, the conformity of the affixed ATEX marking is invalidated.**

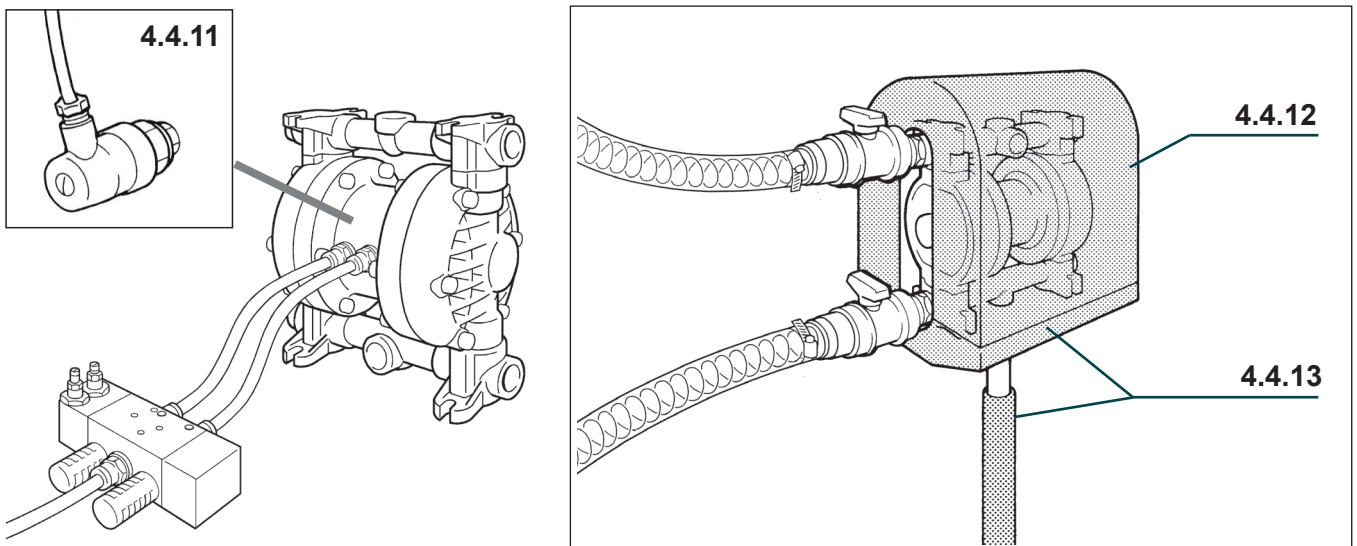
- 4.4.11 In case the pump is equipped with the COUNTER device (to detect and/or display the number of cycles of the pump) provide the electrical connection.
- 4.4.12 Always protect the pump from possible accidental blows and from contact with incompatible fluids that can damage it and/or react upon contact with it.
- 4.4.13 If used for pumping flammable, aggressive, toxic or harmful fluids for health and/or in installations in zone 1 - zone 21 - zone M2 and for pumping flammable fluids (allowed by the marking), it is necessary to install an adequate protection on the pump (for containment, collection and outflow of the product in a safe area), and a buzzer in case of spillage.



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

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 represent a health hazard.

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



4.5 VERIFICATIONS PRIOR TO COMMISSIONING



Depending on the type of application, the type of fluid used and the installation/working environment, it is necessary to affix appropriate markings, and to indicate the residual risk present in the vicinity of the pump.



Before commissioning the pump in order to check that the installation actually meets the intended operating conditions, it is essential to carry out the following checks while the pump is running:

- 4.5.1 With a pressure gauge positioned directly on the air inlet of the pump (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.
- 4.5.2 With a pressure gauge directly on the delivery manifold of the pump, 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	39 - 40
5.2	NORMAL SHUTDOWN OF THE PUMP	41
5.3	EMERGENCY STOP OF THE PUMP	42

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 is reserved for trained and authorised Installers, who know and follow the Original Instructions.

The user must always use fluids that are compatible with the original design conditions of the pump itself and the ATEX marking affixed.



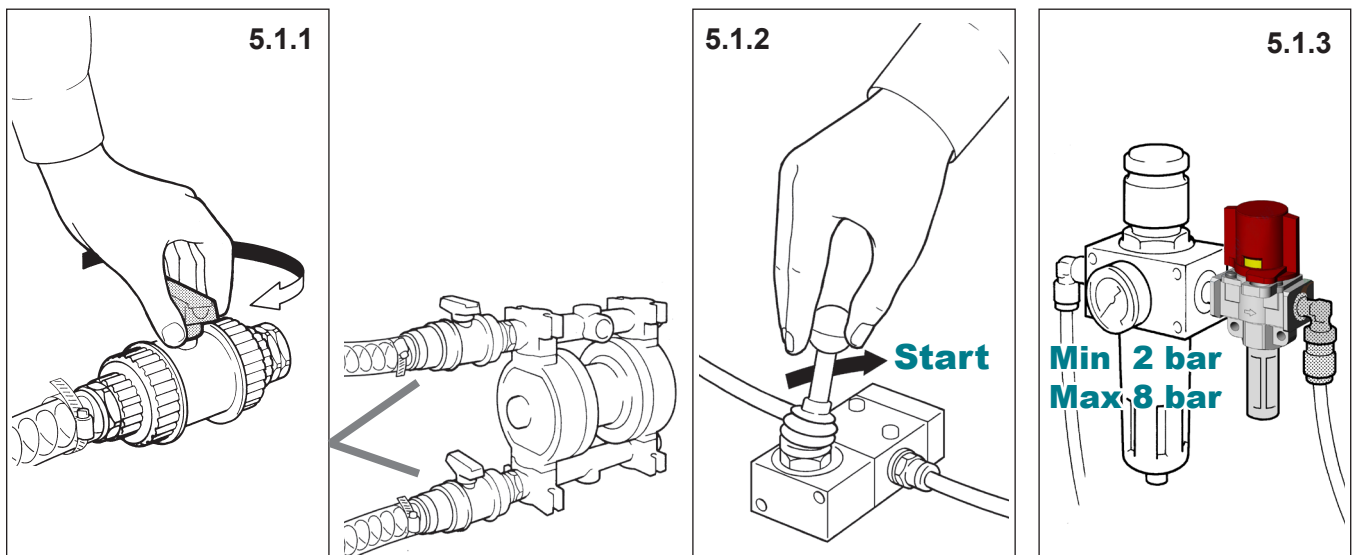
CAUTION: risk of damaging the pump and product leakage and/or explosion.

it is forbidden to use the pump with fluids that are not compatible with the construction materials of the components or in an environment where there are incompatible fluids and atmospheres.

Proceed as follows to commission the pump:

Pump start-up requirements

- Sampling tank with constant fluid level;
- Pump fluid compatible with chemical and temperature characteristics of the pump materials and the affixed ATEX marking;
- Suction and discharge circuit in serviceable condition and maintenance-free system;



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



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

It is forbidden to start pump operation with the product valves (suction and discharge) closed or shuttered.

- 5.1.2 Open the 3-way pneumatic valve to supply the installed pilot valve; the pilot valve installed upstream of the pump (pneumatic oscillator, or 2/3-way valve for remote piloting from PLC), will start to supply the pump and begin to operate.

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




CAUTION risk of standstill and/or early wear and/or diaphragm breakage.

With pressures below 2 bar (when the pump is running) the pump may come to a STANDSTILL, with pressures above the MAXIMUM threshold (Max 8 bar) there may be failures and leakage of the pressurised product and/or breakage of the pump.


5.1.4 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:

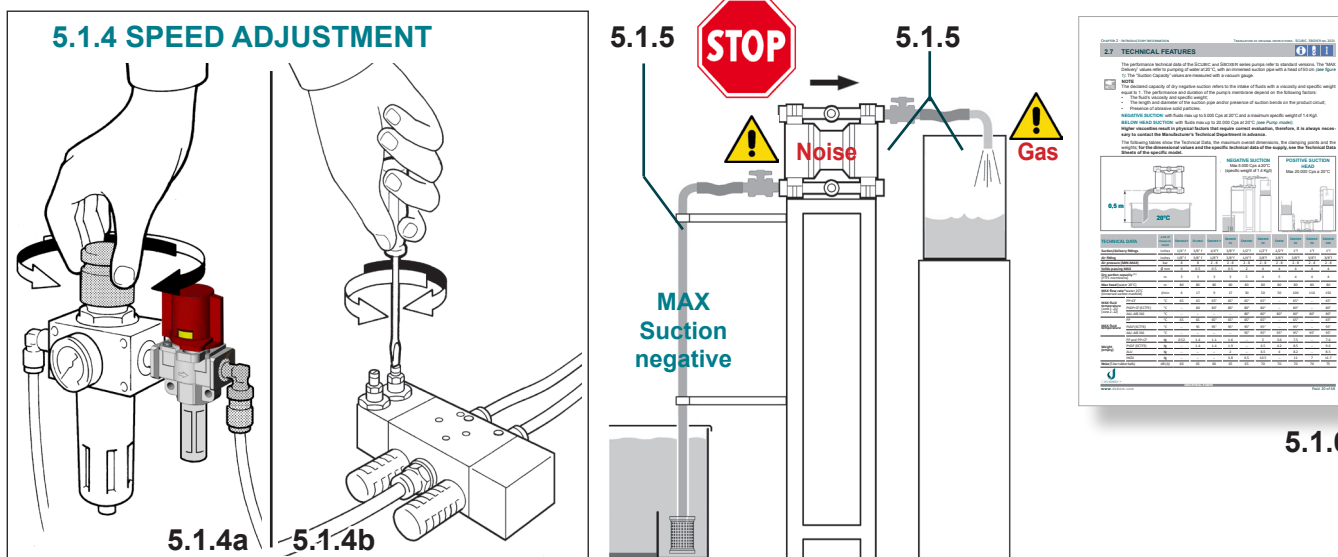
5.1.4a Adjust the network air supply pressure;

5.1.4b Depending on the pilot valve installed, shutter the volume of air (flow rate) by means of the needle valves on the oscillator or by adjusting the operating speed remotely from the PLC.


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

5.1.5 During operation, check that there is no abnormal noise and that there is no "gas" in the outlet fluid ; the presence of vortices at the suction point creates cavitation and malfunctions. Cavitation, besides being a harmful phenomenon for the pump, can be particularly dangerous in potentially explosive atmospheres: it is necessary to check that the pump has been correctly sized; in case of **doubt, do not hesitate to contact DEBEM technicians.**


 **CAUTION: risk of damaging the pump and/or premature wear/diaphragm breakage.**
An 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 condition before continuing.**



5.1.6 If the mounted pump has negative suction or is used with a very viscous fluid, reduce the pump speed **as described in 5.1.5**. Non-primed pumps have a negative suction capacity that varies depending on the type of diaphragm and seals fitted; **FOR FURTHER INFORMATION CONTACT THE MANUFACTURER'S SERVICE.**

 **CAUTION**
For pumps with split manifolds, do not use fluids with different viscosities; **standstill, early diaphragm and pneumatic circuit wear/breakage may occur.**

5.1.7 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. 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, in environments with a potentially explosive atmosphere, and when pumping flammable fluids (permitted by marking), the pump diaphragms must be dismantled and checked every 10,000,000 (ten million) cycles, and replaced every 20,000,000 (twenty million) cycles.
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 fluid and pump must always be shut down with the air disconnected.

Requirements after the normal shutdown of the pump

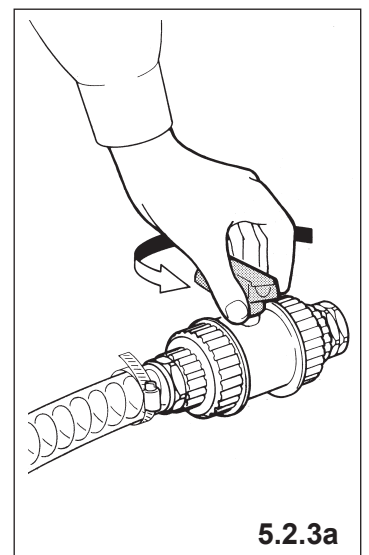
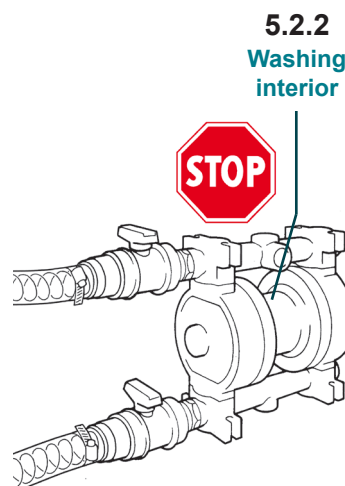
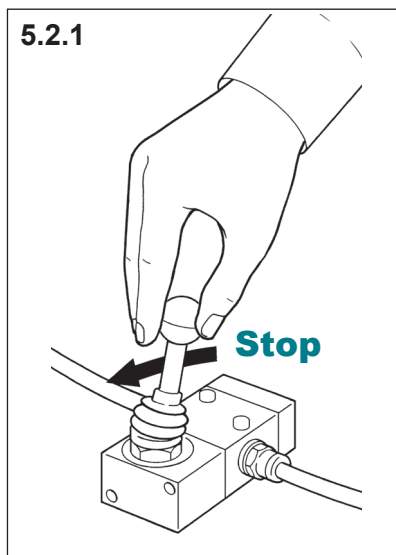
- After the normal shutdown of the pump, crystallising liquids must be drained and the pump immediately flushed and stripped internally;
- If the liquid to be processed is changed after the pump has stopped, it is necessary to perform draining and internal washing;
- After the pump has stopped, it is necessary to drain the toxic or harmful liquids and perform internal washing before any repairs or maintenance work.

- 5.2.1 To normally shut down the pump, act on the air supply only: close the 3-way supply/close valve (upstream of the installed pilot valve) **and relieve the residual pressure.**



CAUTION risk of standstill, early wear/breakage of the diaphragms.

It is forbidden to stop the pump (in operation and/or with the pneumatic circuit under pressure) by closing the suction valves of the product circuit in order to avoid premature wear and/or rupture of the diaphragms and residual pressure in the pneumatic circuit.



- 5.2.2 The SCUBIC e SBOXER pumps are not self-draining so, if they are used with crystallising fluids, they must be always flushed or stripped internally with a suitable liquid immediately after shutdown.



CAUTION: risk of damaging the pump.

Prolonged shutdown of the pump in the presence of crystallising fluids can cause sticking of valves and subsequent malfunction.

- 5.2.3 If shutdown is permanent and prolonged, proceed as follows:

- 5.2.3a If necessary, the product valves can be closed only after having stopped the pump pneumatically.

- 5.2.4 After the first two hours of operation and after stopping the pump correctly, check that all of the pump bolts are tight.



CAUTION: Danger of internal back pressure and ejection of components during disassembly.

In abnormal conditions (incorrect installation and/or shutdown and/or standstill conditions), residual pressure, which is not discharged, 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.

Pump shutdown has thus been completed.



5.3 EMERGENCY STOP OF THE PUMP

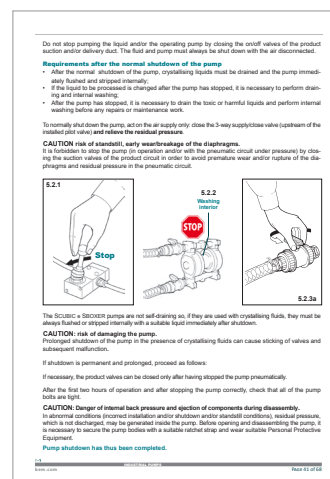
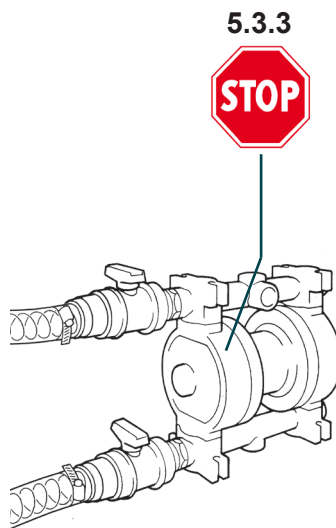
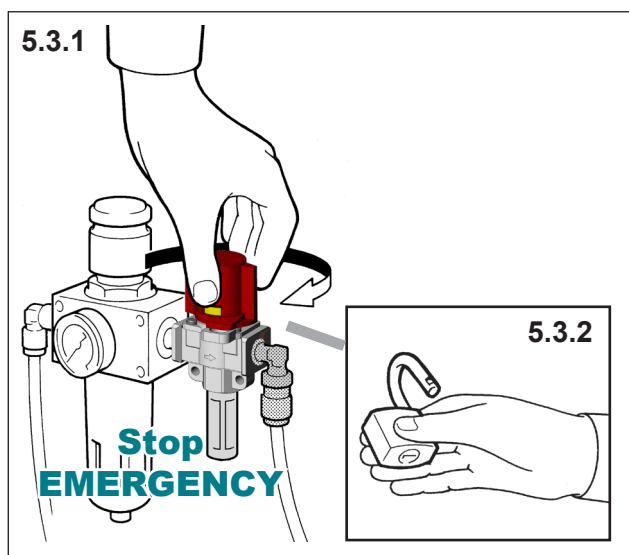


In conditions of detected danger and/or malfunction of the pump, it is necessary to promptly stop it in emergency conditions proceeding as follows.

Requirements after stopping the pump

- After emergency stop, definitively resolve the dangerous situation before restarting the pump;
- After the shutdown of the pump, crystallising liquids must be drained and the pump immediately flushed internally;
- If the liquid to be processed is changed after the pump has stopped, it is necessary to perform draining and internal washing;
- After the pump has stopped, it is necessary to drain the toxic or harmful liquids and perform internal washing before any repairs or maintenance work.

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



CAUTION risk of standstill, early wear/breakage 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 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 Definitively resolve the dangerous condition 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 STOP OF THE PUMP*.

Pump emergency stop has thus completed.





ROUTINE MAINTENANCE

TRANSLATION OF ORIGINAL INSTRUCTIONS SCUBIC - SBOXER - rev. 2021

CHAPTER 6

This chapter contains the maintenance schedule, i.e. the work planned by the manufacturer for the safe and long-term maintenance of SCUBIC and SBOXER pumps.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
6.1	SCHEDULED MAINTENANCE TABLE	44
6.2	EXTERNAL CLEANING AND TIGHTNESS CHECK	45 - 46
6.3	TIGHTNESS CHECK	47 - 48
6.4	PRODUCT CIRCUIT MAINTENANCE	49 - 53
6.5	AIR CIRCUIT MAINTENANCE	54 - 56
6.5	SPARE PARTS - INSERT	57

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

6.1 SCHEDULED MAINTENANCE TABLE



The scheduled maintenance operations are reserved for qualified and authorised Mechanical Servicemen, 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 timing of the reported operations refers to use under normal conditions; for harsh installations and operating conditions, the indicated ranges must be downgraded accordingly.

SEC.	SCHEDULED MAINTENANCE	every 500 hours	500.000 cycles	10.000.000 cycles	20.000.000 cycles
6.2	EXTERNAL CLEANING AND TIGHTNESS CHECK:		check	check	replacement
6.2.1	• External cleaning of the Pump	✓	--	--	--
6.2.2	• Product Circuit Tightness Check	✓	--	--	--
6.3	TIGHTNESS CHECK		check	check	replacement
6.3.1	• Tightness check	--	✓	--	--
6.3.2	• Tightening torque table	--	--	--	--
6.4	PRODUCT CIRCUIT MAINTENANCE:			check	replacement
6.4.1	• Pump Disassembly	--	--	✓	✓
6.4.2	• Internal cleaning of the product circuit	--	--	✓	✓
6.4.3	• Check and/or replacement of valves	--	--	✓	✓
6.4.4	• Check and/or replacement of diaphragms	--	--	✓	✓
6.4.5	• Pump Re-assembly	--	--	✓	✓
6.5	AIR CIRCUIT MAINTENANCE				
6.5.1	• Pump Disassembly		When necessary		
6.5.2	• Replacing Tyre Inserts and Seals - SCUBIC and SBOXER		When necessary		
6.5.3	• Pump Re-assembly		When necessary		



CAUTION

In the presence of heavy uses (concentrated corrosive liquids or liquids that crystallise), it is necessary to increase the frequency of operations.



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

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



6.2 EXTERNAL CLEANING AND 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*).



CAUTION: risk of contact with toxic or corrosive fluids.

External cleaning and checking the pump's suction and discharge circuits for tightness must be carried out periodically according to the procedures described below.

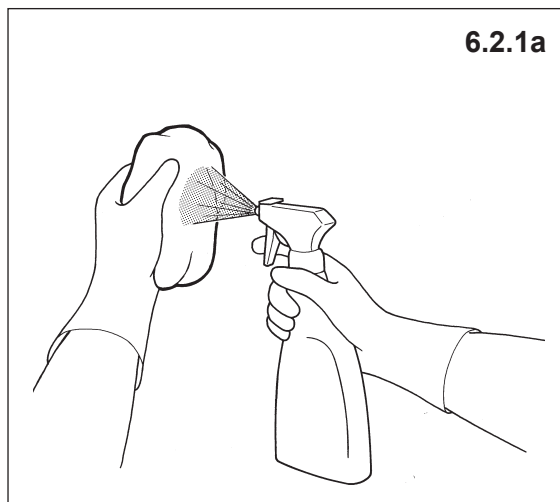
6.2.1 EXTERNAL CLEANING OF THE PUMP

The pump must be cleaned externally periodically every 500 hours of operation to allow visual inspections and safe operations. The presence of dust and/or deposits on the external surfaces of the pump can negatively affect process temperatures. In environments with a potentially explosive atmosphere, it can even compromise the safety envisaged by the marking.

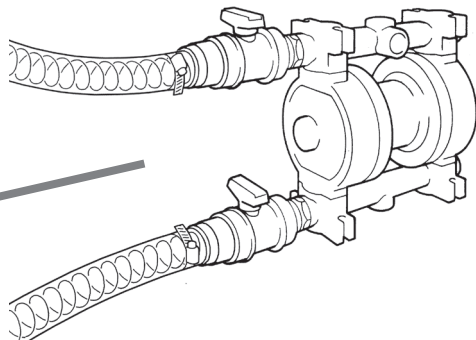


WARNING: danger of overheating and in potentially explosive atmospheres fire/explosion hazard.

In environments with a potentially explosive atmosphere, it can even compromise safety, causing overheating and/or flammability of the dust.



6.2.1c



Safety requirements before starting the operation:

- Pump stopped with air supply disconnected and interlocked and residual pressure discharged;
- Closed suction and delivery valves;
- Suction and delivery pump and circuits cooled.

Proceed as follows to clean the outside of the pump:

- 6.2.1a Remove dust deposits from the external surfaces of the pump using a disposable cloth dampened with a suitable neutral detergent.



CAUTION: risk of damage and/or fire.

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

- 6.2.1b Remove dust deposits from the external surfaces of the suction and delivery pipes near the pump using disposable cloths dampened with a suitable detergent (compatible with the construction materials of the pump).

- 6.2.1c Check that the residual risk warning labels are clearly visible and legible; otherwise, replace them. Remove any tools and cloths used from the pump.



The external cleaning of the pump is complete.

6.2.2 PRODUCT CIRCUIT TIGHTNESS CHECK

The seal of the product circuit of the pump must be checked after the first 2 hours of operation and then periodically every 500 hours, working as follows:



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

Before working in the vicinity of the pump, it is necessary to wear suitable Personal Protective Equipment (PPE) (see *Technical and Safety Data Sheets for the liquid being treated*).

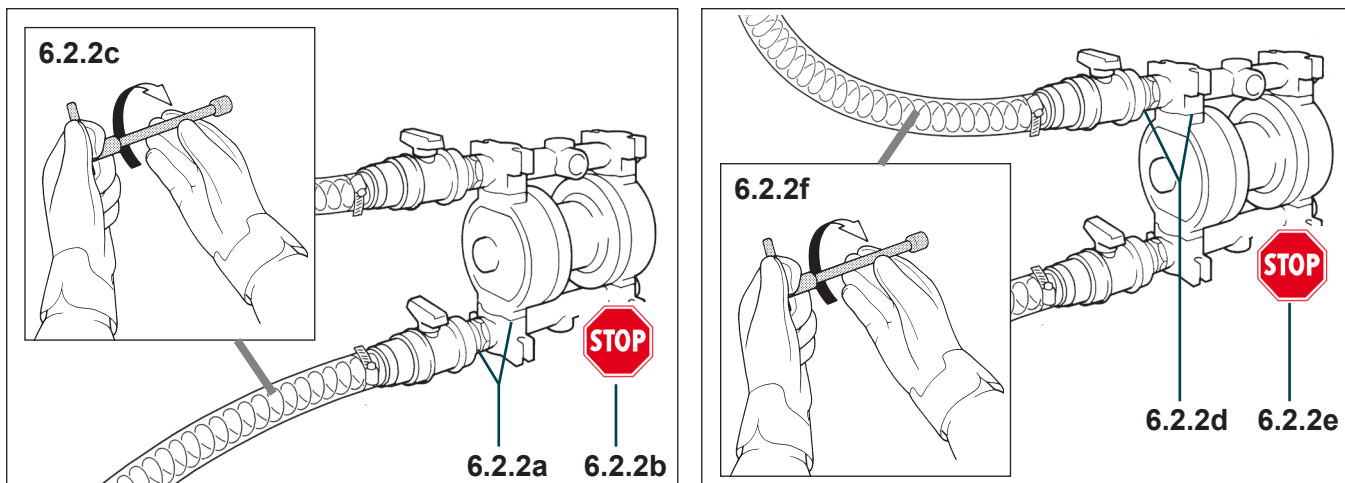
Safety requirements for the tightness check:

- Pump stopped with air supply disconnected and interlocked and residual pressure discharged;
- Pump with the external surfaces clean;
- Product isolation valves (suction and discharge) open;
- Overflown pump.

CHECKING FOR SUCTION TIGHTNESS:

The pump suction tightness must be checked when the pump is running:

- 6.2.2a Visually check for leaks on the suction circuit and on the pump;
- 6.2.2b If leaks are detected, immediately stop the pump, disconnect the air supply and discharge the residual pressure from the internal pneumatic circuit.
- 6.2.2c 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 screws of the pump casing and manifold.



CAUTION: risk of product leakage.

The tightness check ensures a correct seal of the product circuit; in the event of leaks or product 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 seal of the product suction circuit is completed.

CHECKING FOR DELIVERY TIGHTNESS:

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

- 6.2.2d Visually check for leaks on the delivery circuit and on the pump.
- 6.2.2e If leaks are detected, immediately stop the pump, disconnect the air supply and discharge the residual pressure from the internal pneumatic circuit.
- 6.2.2f Tighten the parts concerned on the delivery line (pipe connection, clamps, fittings) and/or the screws of the pump body and manifold as described in *Section 6.3 CHECKING TIGHTENING*.



CAUTION: risk of product leakage.

The tightness check ensures a correct seal of the product circuit; in the event of leaks or product 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 seal of the product delivery circuit is completed.



6.3 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*).

6.3.1 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 of operation.

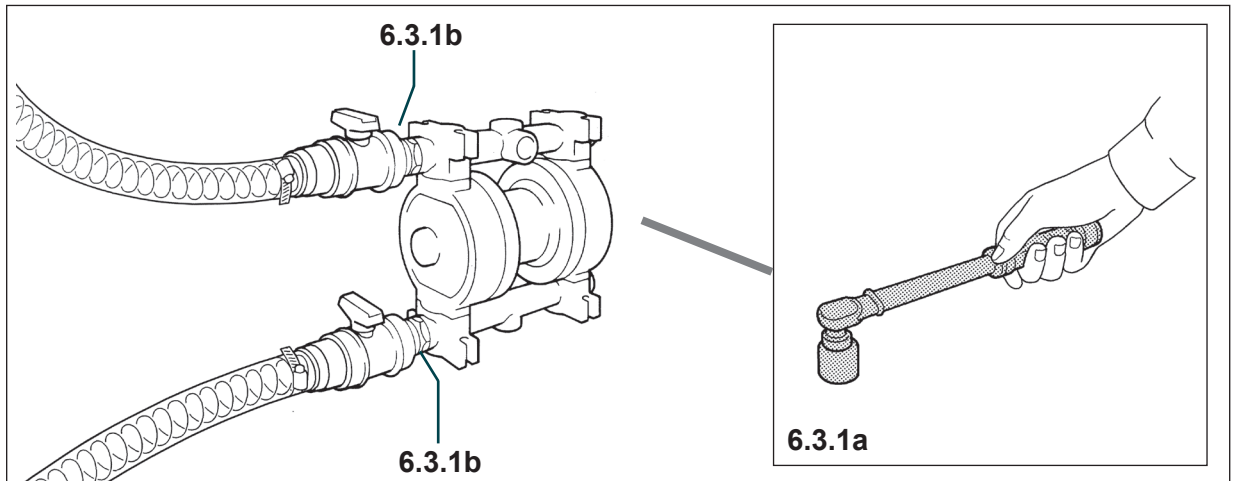


CAUTION: danger due to product spillage, danger due to contact with toxic or corrosive fluids.
The tightness check ensures a correct seal of the product circuit; in the event of leaks or product leaks, it is always necessary to carefully check that the pump and the internal sealing components are intact before commissioning.

Safety requirements for the operation:

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

Proceed as follows to check the tightness of the pump:



- 6.3.1a Using a suitable torque spanner, check the tightening of the pump screws in accordance with the torques indicated in the *TIGHTENING TABLE on page 48*.



CAUTION: risk of stress corrosion cracking phenomena and sudden breakages.

Excessive tightening (especially on plastic pumps), can cause dangerous tensions on some components and sudden breakages that cannot be attributed to construction defects.

- 6.3.1b Check the tightness of the connection fittings to the pump and the tightness of the hose clamps of the product ducts.
- 6.3.1c Remove the tools used from the pump.

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

6.3.2 TIGHTENING TORQUE TABLE

The following table shows the tightening torques referred to the construction components and their materials.

Tightening must be carried out in compliance with the tightening torques indicated by the Manufacturer and expressed in Nm (Newton metre) referred to each model and construction material.



CAUTION: risk of stress corrosion cracking phenomena and sudden breakages.

Excessive tightening (especially on plastic pumps), can cause dangerous tensions on some components and sudden breakages that cannot be attributed to construction defects.

PUMP	Material	CENTRAL	CORPO PUMP	MANIFOLD		CAP		PLUG	
				OR-PTFE	OR-RUBBER	1 M	2 M	OR-PTFE	OR-RUBBER
SMIDGET	PP	--	4 Nm	--	--	15 Nm		--	
SCUBIC	PP	--	4 Nm	4 Nm	--	15 Nm		8 Nm	
	ECTFE	--	4 Nm	4 Nm	--	15 Nm		8 Nm	
SBOXER 7	PP	--	4 Nm	4 Nm	--	15 Nm		--	
	PVDF	--	4 Nm	4 Nm	--	15 Nm		--	
SBOXER 15	PP	--	5 Nm	5 Nm	--	15 Nm		--	
	PVDF	--	5 Nm	5 Nm	--	15 Nm		--	
	AL	--	5 Nm	5 Nm	--	15 Nm		--	
	AISI	--	5 Nm	4 Nm	--	15 Nm		--	
SMICRO	PP	--	4 Nm	6 Nm	4 Nm	17 Nm		--	
	PVDF	--	4 Nm	6 Nm	4 Nm	17 Nm		--	
	AL	--	4 Nm	8 Nm	--	17 Nm		--	
	AISI	--	4 Nm	10 Nm	--	17 Nm		20 Nm	
SBOXER 50	PP	--	5 Nm	6 Nm	8 Nm	27 Nm	30 Nm	18 Nm	
	PVDF	--	5 Nm	6 Nm	8 Nm	27 Nm	30 Nm	18 Nm	
	AL	--	6 Nm	7 Nm	--	27 Nm	30 Nm	20 Nm	
SMINI	AISI	--	4 Nm	5 Nm	--	27 Nm	30 Nm	20 Nm	
	PP	--	8 Nm	8 Nm	--	30 Nm	33 Nm	30 Nm	
SBOXER 81	PVDF	--	8 Nm	8 Nm	--	30 Nm	33 Nm	30 Nm	
	AISI	--	8 Nm	8 Nm	--	30 Nm	33 Nm	30 Nm	
SBOXER 90	AL	--	8 Nm	8 Nm	--	30 Nm	33 Nm	--	
SBOXER 100	PP	--	8 Nm	10 Nm	8 Nm	33 Nm		33 Nm	
	PVDF	--	8 Nm	10 Nm	8 Nm	33 Nm		33 Nm	
	AL	--	5 Nm	7 Nm	--	33 Nm		33 Nm	
	AISI	--	6 Nm	10 Nm	--	33 Nm		33 Nm	

6.4 MAINTENANCE PRODUCT CIRCUIT



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: Danger of contact with toxic or corrosive fluids.

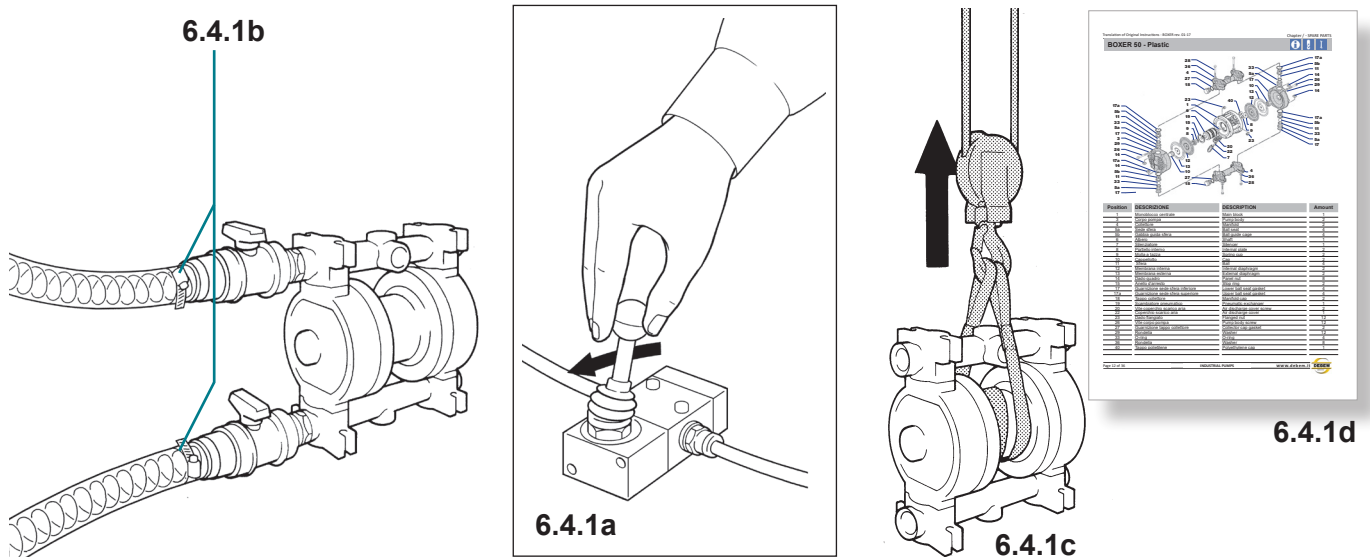
Maintenance of the pump's product circuit must be carried out periodically to ensure optimum performance and the necessary safety conditions, as described below:

6.4.1 PUMP DISASSEMBLY:

To carry out the product circuit maintenance, it is necessary to disassemble the pump as follows:

Safety requirements for the operation:

- Pump stopped with air supply disconnected and interlocked and residual pressure discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped);
- Pump with product circuit drained of the contaminated washing liquid.
- Closed product sectioning valves (suction and delivery);
- Suction and delivery pump and circuits at ambient temperature.



- 6.4.1a To stop the pump, only act on the air supply: close the ball valve and the 3-way valve. Close the upstream 3-way safety valve, **discharge the residual pressure of the pump's pneumatic system and fit the safety interlock.**



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

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

- 6.4.1b Disconnect the suction and delivery pipes of the pump fluid.
- 6.4.1c Disassemble and remove the pump from the place of installation using suitable lifting equipment and adequately drain the product circuit according to the treated product.



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

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

- 6.4.1d Use the relevant Spare Parts table for the pump disassembly and reassembly sequence to access the internal parts of the treated operations.



6.4.2 INTERNAL CLEANING OF THE PRODUCT CIRCUIT

The internal cleaning of the pump must be carried out periodically every 10,000,000 operating cycles to allow visual inspection and safe use of the pump. The presence of dust and/or deposits on the external surfaces of the pump can negatively affect process temperatures. In environments with a potentially explosive atmosphere, it can even compromise the safety.



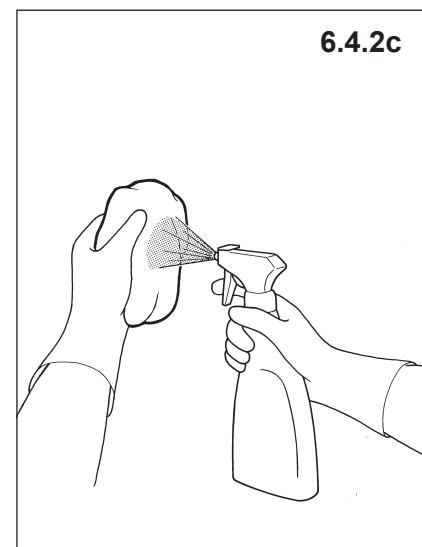
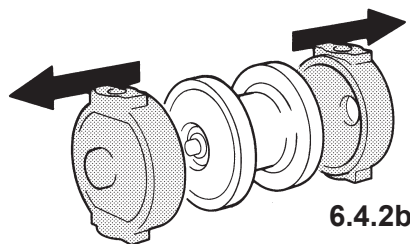
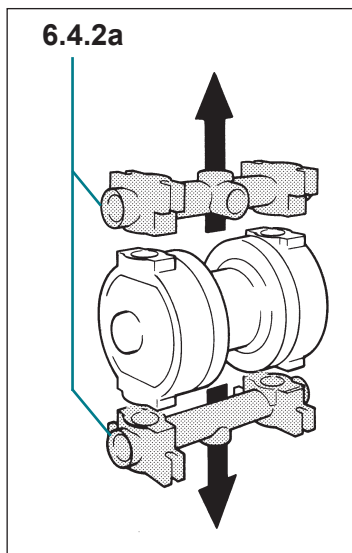
CAUTION: risk of overheating and, in environments with a potentially explosive atmosphere, risk of fire. In environments with a potentially explosive atmosphere, the presence of dust can even compromise the safety.

Safety requirements for the operation:

- Disassembled pump;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped).
- Pump with product circuit drained of the contaminated washing liquid.

Proceed as follows to clean the inside of the product circuit of the pump:

6.4.2a Disassemble the suction and delivery manifolds by removing the fastening elements.



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

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

6.4.2b Disassemble the fixing screws and remove the pump casings.

6.4.2c Check for solid deposits inside the pump and, if present, remove them and clean the internal surfaces of the pump using a disposable cloth dampened with detergent (suitable for the treated product) and compatible with the construction materials of the pump and with the work environment.



CAUTION: risk of damage and/or fire.

The use of cleaning agents that are incompatible with the pump materials, solvents or flammable substances is prohibited.

6.4.2d Visually inspect the internal surfaces in contact with the product and make sure that there are no abrasions, corrosion, cracks and/or damage to the components.

The internal cleaning of the product circuit of the pump is completed.



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

The suction and delivery valves (ball and ball seats) are components subject to wear. Their duration is strongly affected by the conditions of use and by the chemical and physical stresses. The suction and delivery valves must be periodically checked every 10,000,000 cycles of operation, to ensure correct operation of the product seals and the best performance of the pump.

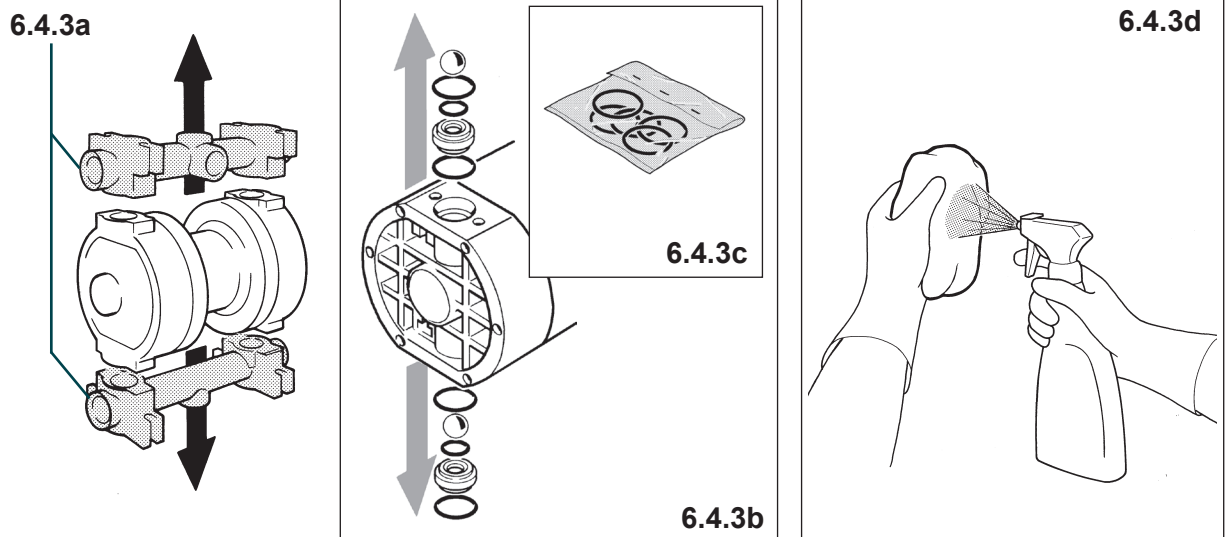
Safety requirements before starting the operation:

- Pump removed from the workstation and residual pressure inside the air circuit discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped).
- Pump with product circuit drained of the contaminated washing liquid.

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

6.4.3a Disassemble the suction and delivery manifolds by removing the fastening elements.

6.4.3b Remove the seats and balls of the suction and discharge valves and clean them with a cloth dampened with a suitable detergent, and/or replace them with Original Spare Parts of the same type and material (see *Spare Parts Manual - BOXER and CUBIC*).



CAUTION: risk of damage and/or fire.

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

6.4.3c Check the condition of the gaskets and, if necessary, replace them with Original Spare Parts of the same type and material (see *Spare Parts Manual - BOXER and CUBIC*).

6.4.3d Check that there are no solid deposits inside the valves, otherwise remove them with a disposable clean cloth dampened with detergent (suitable for the treated product).

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

6.4.4 CHECK AND/OR REPLACEMENT OF DIAPHRAGMS (End of Life)

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. Tests carried out on thousands of installed pumps (with a head of 0.5 m at 20°C) have shown that normal life exceeds 100,000,000 (one hundred million) cycles.

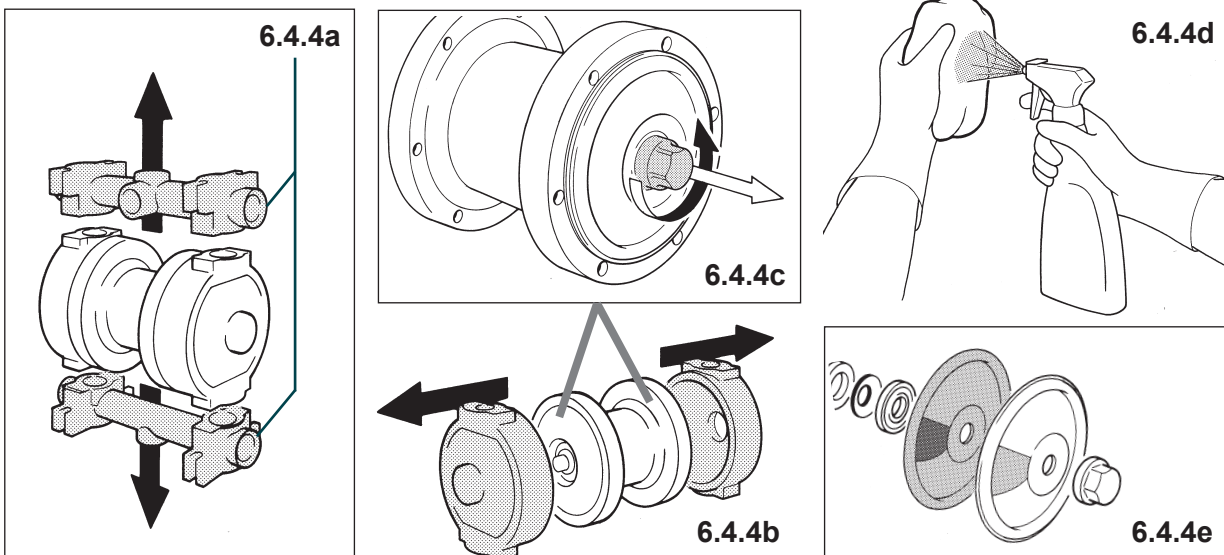


CAUTION: For safety reasons, in environments with a potentially explosive atmosphere, the pump diaphragms must be disassembled and checked **every 10,000,000 (ten million) cycles** and **preventively replaced every 20,000,000 (twenty million) cycles**.

MANDATORY OPERATIONS	SCHEDULING OF OPERATIONS		
	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 workstation and residual pressure inside the air circuit discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped).
- Pump with product circuit drained of the contaminated washing liquid.



6.4.4a Disassemble the suction and delivery manifolds by removing the fastening elements.



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

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

6.4.4b Disassemble the fixing screws and remove the pump casings.

6.4.4c Remove the diaphragm locking cap of both circuits.

6.4.4d Check that there are no solid deposits, otherwise remove them with a disposable clean cloth dampened with a detergent suitable for the treated product, clean the diaphragms.



CAUTION: risk of damage and/or fire.

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

6.4.4e Remove the diaphragms from both sides of the pump.



- 6.4.4f 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 Spare Parts Manual).



CAUTION: risk of fluid leakage.

Do not use the pump with the diaphragms 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” as indicated by the Manufacturer.

The replacement of the pump diaphragms is completed.

6.4.5 PUMP RE-ASSEMBLY

To reassemble the pump after internally cleaning and checking and/or replacing the valves and diaphragms proceed as follows:

- 6.4.5a Check the condition of the O-ring static pressure seals of the pump (they must not be dry, deformed or crushed); if not, replace them with an Original Spare Part (see Spare Parts Manual - BOXER and CUBIC).



NOTE

The PTFE static seal O-rings must be mandatorily replaced after every disassembly.

- 6.4.5b Reassemble the pump in the reverse order to that described above and tighten the fixing bolts progressively and uniformly, observing the tightening torques indicated by the Manufacturer (see 6.3.2 TIGHTENING TABLE page 48).



CAUTION: risk of stress corrosion cracking phenomena and sudden breakages.

Excessive tightening (especially on plastic pumps) can cause dangerous tensions on some components and sudden breakages that cannot be attributed to construction defects.

- 6.4.5c Reposition and connect the pump to the system and pneumatic supply circuit as described in Sections 4.3 and 4.4.

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



6.5 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 handled*).

Maintenance of the air circuit involves replacing the pneumatic insert, the seals and all internal parts that come into contact with corrosive fluid. It is necessary in exceptional cases due to incorrect installation in very dusty environments, in the presence of saturated vapours which can damage the internal circuit, or if corrosive fluid has entered the pneumatic circuit following a rupture of the membranes

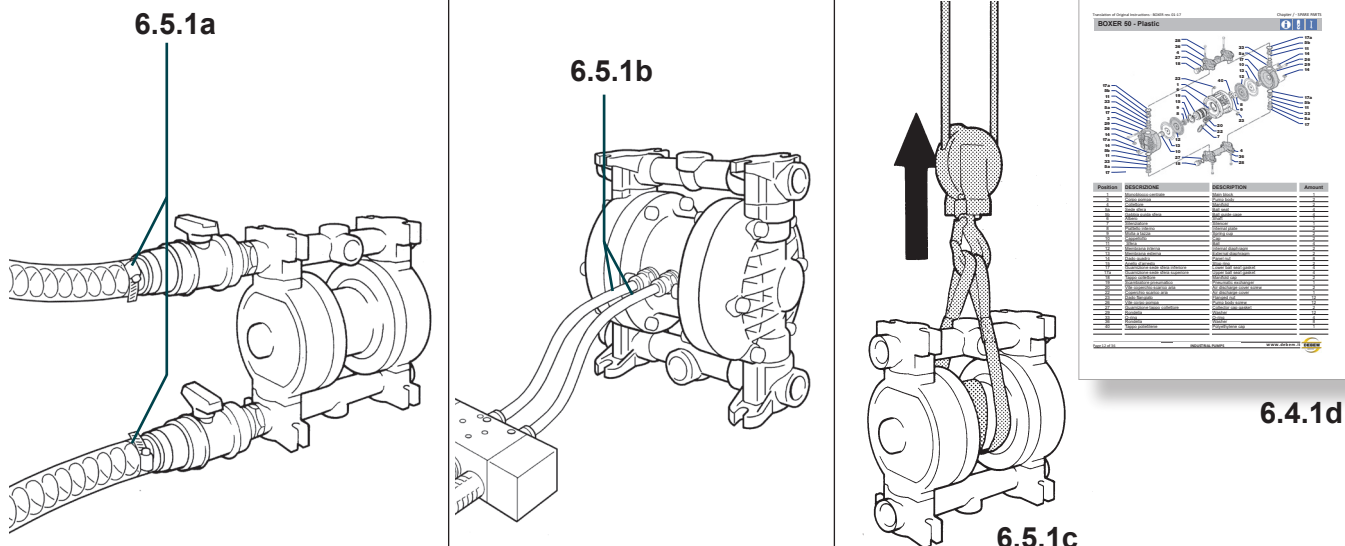


CAUTION: danger of damage to the internal pneumatic circuit, danger of contact with toxic or corrosive fluids.

For installations with the pump in environments with a heavy atmosphere (dusts, 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.

Safety requirements before starting the operation:

- Pump stopped with air supply disconnected and interlocked and residual pressure discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped);
- Pump with product circuit drained of the contaminated washing liquid.
- Closed product sectioning valves (suction and delivery);
- Suction and delivery pump and circuits cooled.



6.5.1 PUMP DISASSEMBLY:

To replace the pneumatic insert of the air circuit, it is necessary to disassemble the pump as follows:

- 6.5.1a Disconnect the suction and delivery pipes of the pump fluid.
- 6.5.1b Disconnect the compressed air supply pipes to the pump.
- 6.5.1c Dismantle and remove the pump from the installation site with suitable lifting equipment.



CAUTION: risk of contaminated liquid leaking; risk of injuries and/or harm to health.

The pump is not self-draining, pay attention during disassembly and handling. If the pump has to be returned to the manufacturer or to an authorised service centre, it must first be emptied of any product or cleaning agents. If toxic, noxious or other types of health harming products have been used, the pump must be suitably treated and washed before it is sent.

- 6.5.1d Use the relevant Spare Parts table for the pump disassembly and reassembly sequence to access the internal parts of the treated operations.



6.5.2 REPLACEMENT OF THE COAXIAL PNEUMATIC INSERT for SCUBIC and SBOXER

All SCUBIC and SBOXER pumps accommodate a coaxial pneumatic insert; the pneumatic insert must be replaced:



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

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

If toxic, noxious or other types of health harming products have been used, the pump must be suitably treated and washed before it is sent.

Safety requirements for the operation:

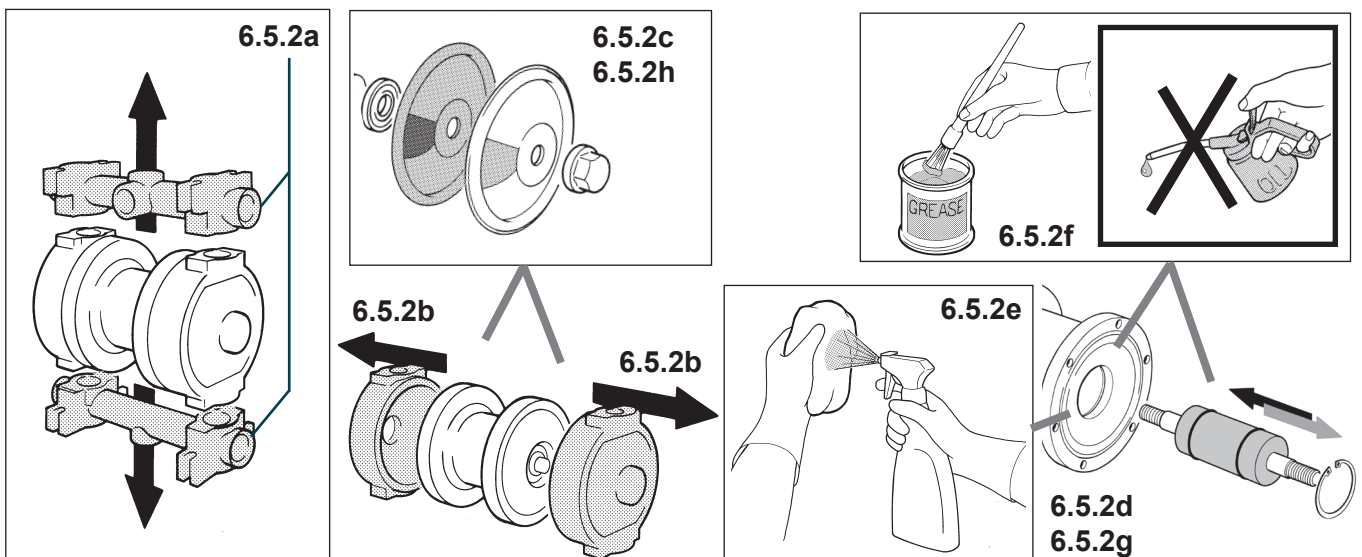
- Pump removed from the workstation and residual pressure inside the air circuit discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped).
- Pump with product circuit drained of the contaminated washing liquid.

6.5.2a Disassemble the suction and delivery manifolds by removing the fastening elements.

6.5.2b Disassemble the fixing screws and remove the pump casings.

6.5.2c Remove the diaphragm locking cap of both circuits and remove the pump diaphragms.

6.5.2d Disassemble the pneumatic insert by removing the fasteners.



6.5.2e Clean the central and the diaphragms using a disposable clean cloth dampened with a suitable detergent (for the construction material of the pump and the treated product).



CAUTION: risk of damage and/or fire.

The use of cleaning agents that are incompatible with the pump materials, solvents or flammable substances and/or pumping fluids is prohibited.

6.5.2f Spread a layer of suitable grease (MOLYKOTE® PG21) on the housing holes of the pneumatic insert.



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.

6.5.2g Replace the pneumatic insert and connection shaft with an Original Spare Part with the same characteristics as the original (component materials).

6.5.2h Reassemble the diaphragms and tighten the relative fixing cap.

Replacing the pneumatic insert for SCUBIC and SBOXER has been completed.

6.5.3 PUMP RE-ASSEMBLY

When the replacement of the pneumatic insert has been completed, the following steps are required to reassemble the pump :

6.5.3a Check the condition of the static pressure O-ring seals of the pump (that they are not dry, deformed or crushed); if not, replace them with an Original Spare Part (see Spare Parts Manual - BOXER and CUBIC).



NOTE

The PTFE static seal O-rings must be mandatorily replaced after every disassembly.



ATTENTION:

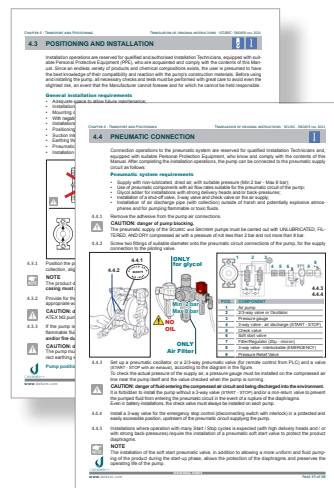
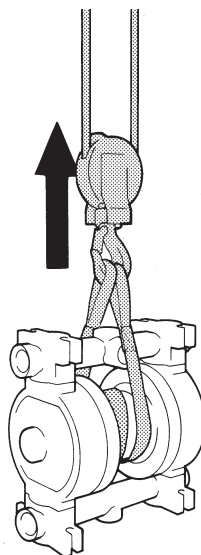
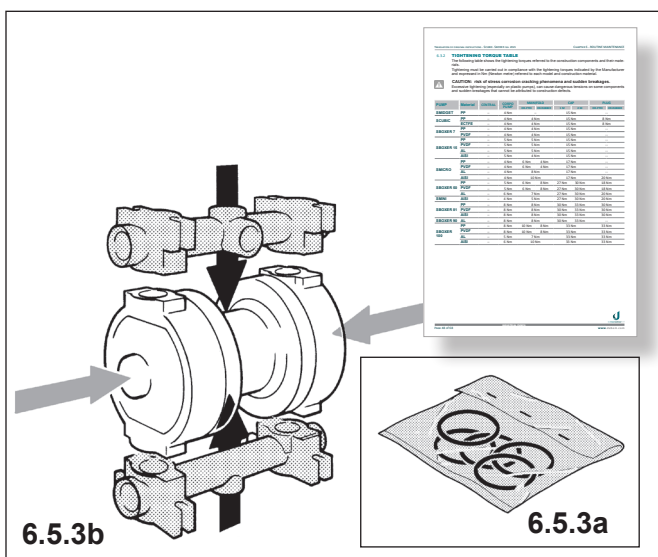
Check the condition of the plates and disc springs, and if they are corroded or damaged, replace them with Original Spare Parts (see Spare Parts Manual - BOXER and CUBIC).

6.5.3b Reassemble the pump in the reverse order to that described above and tighten the fixing bolts progressively and uniformly, observing the tightening torques indicated by the manufacturer (see 6.3.2 TIGHTENING TABLE page 48).



CAUTION: risk of stress corrosion cracking phenomena and sudden breakages.

Excessive tightening (especially on plastic pumps) can cause dangerous tensions on some components and sudden breakages that cannot be attributed to construction defects.



6.5.3c

6.5.3c Carry out the repositioning and connections of the pump to the system and the pneumatic supply circuit, working as described in Section 4.4 and 4.5.

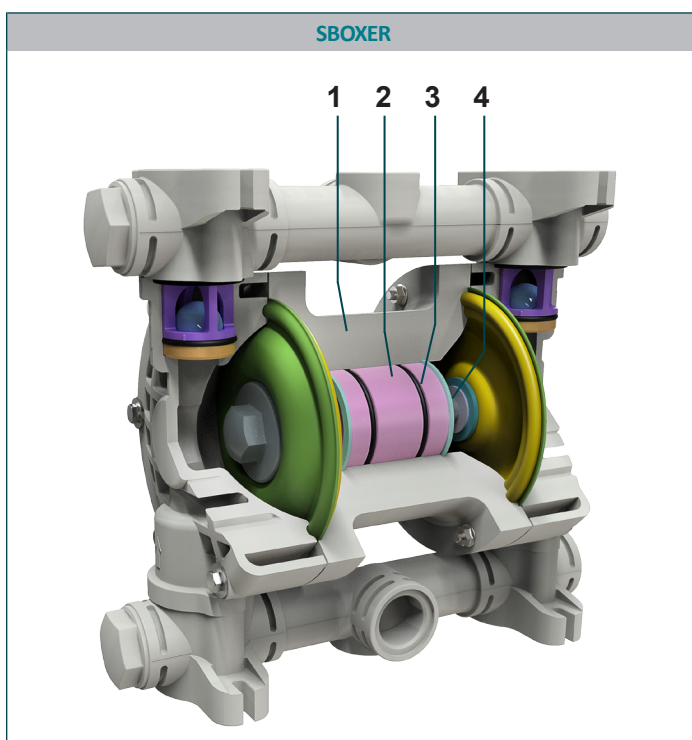
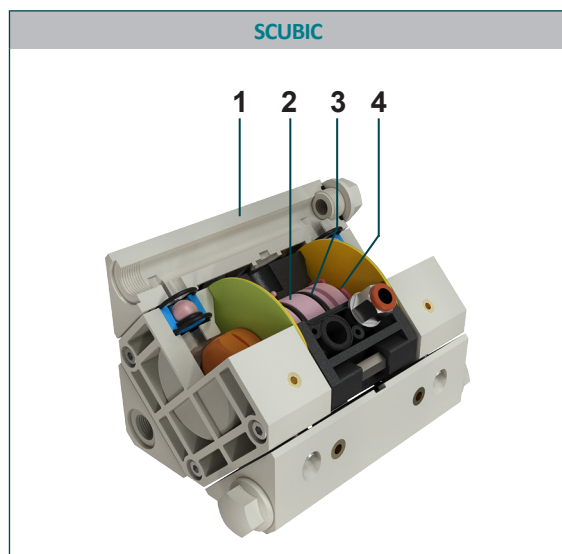
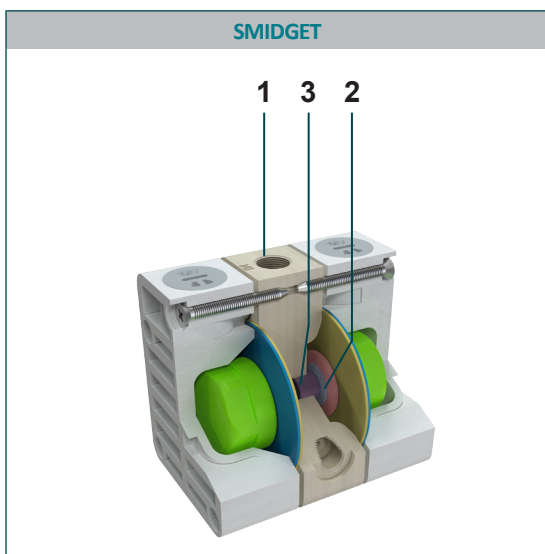
Replacement of the pneumatic insert and reassembly of the pump is complete.



6.6 SPARE PARTS - INSERT



All SMIDGET, SCUBIC and SBOXER Series pumps have a coaxial insert with pneumatic seals inside the central body. For all other spare parts, please refer to the *BOXER and CUBIC manual*.



POS.	NAME	AMOUNT									
		SMIDGET	SCUBIC	SBOXER 7	SBOXER 15	SMICRO	SBOXER 50	SMINI	SBOXER 81	SBOXER 90	SBOXER 100
1*	Central Body	1	1	1	1	1	1	1	1	1	1
2*	Internal insert	1	1	1	1	1	1	1	1	1	1
3*	O-ring	2	2	2	2	--	2	2	2	2	2
4*	Seeger	--	1	1	2	--	2	2	2	2	2

* Note: For all other components, please refer to the specific spare parts manuals.



CHAPTER 7

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 that you contact the DEBEM SERVICE DEPARTMENT or an Authorised Assistance Centre; our Engineers will provide you with assistance as quickly as possible.



CAUTION

Before carrying out any work and gaining access to the pump, you must:

- Disconnect and interlock the compressed air supply and relieve residual pressure from the pump's internal pneumatic circuit;
- Section the product shut-off valves (suction and discharge);
- Clean the outside of the pump if necessary;
- If necessary, flush (decontaminate) the product circuit inside the pump.



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

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

ANOMALY	POSSIBLE SOURCE	ADVICE
1 The pump does not start.	1.1 No air in the circuit.	1.1a Check circuit, valves and connections.
	1.2 Insufficient air pressure.	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 insert damaged pump.	1.6a Replace the pneumatic insert; check whether there is ice on the air outlet. If so, clear it (see air supply paragraph).
	1.7 Broken diaphragm.	1.7a if any air comes out from the product delivery pipe; if so, replace diaphragm.
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 Intake too high.	2.2a Reduce intake height.
	2.3 Fluid is too viscous.	2.3a Install oversized pipes, especially in the intake and decrease pump cycles.
	2.4 Intake side is obstructed.	2.4a Check and clean.

Continues on the next page

Continued from the previous page

ANOMALY	POSSIBLE SOURCE	ADVICE
<p>2. The pump exchanges but does not move the fluid.</p>	<p>2.5 Internal pneumatic insert worn or defective. 2.6 Worn shaft. 2.7 Ice on the drain. 2.8 Lack of air volume. 2.9 Dirty pneumatic insert.</p>	<p>2.5a Replace the pneumatic insert. 2.6a Replace the shaft. 2.7a Dehumidify and filter the air. 2.8a Check all air control accessories, especially the quick-release couplings. 2.9a Clean or replace the pneumatic insert.</p>
<p>3. The pump works with slow cycles.</p>	<p>3.1 Fluid too viscous. 3.2 Supply pipe clogged. 3.3 Suction clogged. 3.4 Needle valves are too closed.</p>	<p>3.1a No remedy. 3.2a Check and clean. 3.3a Check and clean. 3.4a Check the setting of the needle valves of the pneumatic oscillator for speed regulation.</p>
<p>4. The pump does not exchange.</p>	<p>4.1 Intake obstructs during operation. 4.2 Dirty air, full of condensate or oil. 4.3 Insufficient air flow or pressure 4.4 Shutdown procedure not complied with.</p>	<p>4.1a Replace the suction hose. 4.2a Check the air line. 4.3a Check the pressure with a pressure gauge installed on the pump and when the pump is running <i>see fig. 4.4.3 page 35</i>. If the pressure at that point is too low in relation to the at mains pressure, check all connections air, especially those with quick-release couplings. Check that all air control devices have sufficient capacity. ATTENTION: 90% of cases depends on quick couplings. 4.4a Comply with the shutdown procedure see <i>Section 5.2 page 41</i>.</p>
<p>5. The pump does not deliver the table scope.</p>	<p>5.1 Product intake hose is badly connected. 5.2 Clogged pipes. 5.3 Fluid too viscous. 5.4 The balls do not close. 5.5 Insufficient air volume. 5.6 Possible pressure losses on the supply line air to the pump. 5.7 Probable back pressure or head higher than those allowed by the model of the pump used, in relation to the flow rate delivered.</p>	<p>5.1a Check and reconnect. 5.2a Check and clean. 5.3a Install oversized pipes, especially in the suction and decrease pump cycles. 5.4a Dismantle the manifolds and clean the seats or replace the balls and seats. 5.5a Check the pressure with a pressure gauge installed on and with the pump running: <i>see fig. 4.4.3 page 35</i>. If the pressure at that point is too low in relation to the at mains pressure, check all connections air, especially those with quick-release couplings. Check that all air control devices have sufficient capacity. CAUTION: in 90% of cases, stall occurrences are caused by snap-on fittings. 5.6a Check the pressure at the entry point of the pump. Eliminate pressure losses on the line supplying compressed air to the pump. 5.7a Check the actual pressure of the product delivered by the pump at the outlet of the delivery manifold. Eliminate backpressures on the product delivery line or use the pump model suitable for the desired flow rate.</p>

CHAPTER 8

This chapter deals with the manufacturer's plans for the decommissioning and end-of-life disposal of SCUBIC and SBOXER pumps.

THIS PART INCLUDES THE FOLLOWING TITLES		PAGE
8.1	DECOMMISSIONING AND WASHING FORM	60 - 63
8.2	DISPOSAL	64

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

8.1 DECOMMISSIONING AND WASHING FORM



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 handled*).

In the event of long periods of inactivity or if leakages or operating anomalies are detected which could affect the safety of the pump or the system on which it is installed, or at the "End of Life" of the membranes, the pump must be taken out of service until the necessary safety conditions and optimum operation of the pump are restored.



WARNING : danger of contact with toxic or corrosive fluids.

It is forbidden to use the pump in compromised conditions or with membranes that have reached the "End of Life" as indicated by the Manufacturer; **danger of fluid leakage, danger of fire.**

8.1.1 DECOMMISSIONING DUE TO INACTIVITY

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

- 8.1.1a Clean the external part of the pump using cloths dampened with suitable detergent (compatible with the construction materials of the pump).
- 8.1.1b Flush the inside of the pump (washing, decontamination or stripping depending on the fluid used) with a suitable cleaning agent (compatible with the construction materials).
- 8.1.1c Close the product suction and delivery on/off valves mounted on the pump.
- 8.1.1d Close the air supply with the 3-way valve and relieve the residual pressure from the internal pneumatic circuit of the pump after which the air supply at the network node should be disconnected.



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

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

- 8.1.1e Indicate the "DECOMMISSIONING" status on the pump with a specific signal.
- 8.1.1f If the pump is to be stored or returned to the manufacturer, it must be dismantled and emptied *as described in section 8.1.2.*

8.1.2 DISASSEMBLING THE PUMP FROM THE WORKSTATION

To dismantle the pump from the workstation, proceed as follows:

Safety requirements before starting the operation:

- Pump stopped with air supply disconnected and interlocked and residual pressure discharged;
- Pump with the external parts cleaned/washed;
- Pump with internal product circuit washed, decontaminated and/or stripped (depending on the liquid being pumped);
- Pump with product circuit drained of the contaminated washing liquid.
- Closed product sectioning valves (suction and delivery);
- Suction and delivery pump and circuits at ambient temperature.

- 8.1.2a Disconnect the suction and delivery pipes of the pump fluid.
- 8.1.2b Disconnect the compressed air supply pipes to the pump.
- 8.1.2c Disassemble and remove the pump from the place of installation using suitable lifting equipment and adequately drain the product circuit according to the treated product.



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

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



8.1.3 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%.

SCUBIC and SBOXER pumps are not self-draining; turn the pump upside down to empty residual washing liquids completely from the inside.

To store, proceed as described in *Section 4.1 STORAGE AND PRESERVATION*.



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

Should the pump be stored or returned to the Manufacturer or to an Authorised Assistance Centre, it must first be emptied of the product and/or any detergents. If toxic, noxious or other types of health harming products have been used, the pump must be suitably treated and washed and then emptied before it is stored or sent.

The pump decommissioning is completed.

8.1.4 PUMP FLUSHING MODULE

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.

SCUBIC and SBOXER pumps are not self-draining; turn the pump upside down to completely empty the internal cleaning fluids.

The delivery of the washed and emptied pump to the Manufacturer must always be accompanied by the "Pump Washing Form" (*see pages below*), duly completed and signed by the person in charge, who certifies that the pump has been effectively decontaminated from all toxic, irritating and polluting agents with which it has come into contact.



CAUTION: risk of contamination, injuries and/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.



**Accompanying document to DDT in repair
(Mandatory*)**

Company	
Reference person	
Tel.	
Email.	
Reference Delivery Note	
Pump data	
Model	
Code	
Serial no.	
Previous operations carried out by	in date:
Encountered problem	
Types of fluid transferred by the pump (specify % if acid) mandatory fields {*} (**)	
1:	5:
2:	6:
3:	7:
4:	8:
Operating temperatures : °C =	
Activation pressure : min./max.	
CAUTION	
<p>** We declare that the pump in question was thoroughly cleaned and washed from all traces of products for which it was used and is therefore free from pollutants and/or products damaging for the environment, their features are described above in detail.</p> <p>* Not filling this format will make it impossible to perform a repair quote with the consequent return of the goods to the sender.</p> <p>DEBEM reserves the right to not perform repair on pumps dedicated to the transfer of substances which are potentially dangerous to the health of the operator and the environment.</p> <p>DEBEM strictly adheres to the applicable waste disposal regulations and is not allowed to dispose of fluids of any kind and/or type.</p>	
The delivery dates will be decided and agreed on a case to case basis with our personnel.	
The time required for repairs will be decided with our personnel	
Date _/_/_____	
Stamp and signature _____	

8.2 DISPOSAL



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*).

The identification plate of your SCUBIC and SBOXER pump shows the component materials as dealt with in *Section 2.2 PUMP CONFIGURATION CODE* so that you can carry out any separation and disposal by homogeneous material types.

SCUBIC and SBOXER pumps do not contain any dangerous parts or parts requiring conditioning, however they may present contamination due to the environment in which they are used or the type of fluid used; in all cases, at the end of their life, disposal and demolition must always be carried out as follows:



WARNING: danger of serious injury, damage to health, danger of contact with toxic or corrosive fluids.

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

- 8.2.1 Wash, remove or decontaminate in an appropriate manner 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.
- 8.2.2 Carry out internal flushing of the pump product circuit (flushing, decontamination or stripping depending on the fluid used) with a suitable detergent or decontaminant.
- 8.2.3 Close the suction and discharge product shut-off valves on the pump.
- 8.2.3a Close the air supply with the 3-way valve and relieve the residual pressure from the internal pneumatic circuit of the pump after which the air supply at the network node should be disconnected.
- 8.2.4 Disconnect the compressed air supply pipe from the pump.

8.2.5 PUMP DISASSEMBLY

To disassemble the pump, proceed as follows:

Safety requirements before starting the operation:

- Pump stopped with air supply disconnected and interlocked and residual pressure discharged;
 - Pump with the external parts cleaned/washed;
 - Pump with flushed and/or decontaminated internal product circuit (depending on the liquid being pumped);
 - Closed product sectioning valves (suction and delivery);
 - Suction and delivery pump and circuits cooled.
- a. Disconnect and the suction and discharge hoses of the pump fluid.
 - b. Disconnect the compressed air supply pipe from the pump.
 - c. Disassemble and remove the pump from the place of installation using suitable lifting equipment.



CAUTION: danger of spillage of the washing fluid and/or contaminated, danger of injury and/or damage to health.

The pump is not self-draining, care must be taken when handling and dismantling. In the case of toxic, harmful or dangerous products, the pump must be properly washed and treated before storage or shipment.

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



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

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

- 8.2.7 For the disposal, contact Specialised Companies.



CAUTION: danger of pollution and/or accidents.

It is forbidden to abandon or dispose of small or large components in the environment, which may cause pollution, accidents or direct and/or indirect damage.

Demolition and disposal of the pump is complete.



MODELS

P U M P S

s e r i e s

SCUBIC - SBOXER rev. 2021



Authorised **RESELLERS:**

Authorised **ASSISTANCE CENTRES:**

RESELLER STAMP:



DEBEM

MADE IN ITALY

DEBEM s.r.l. - Via Del Bosco, 41 - Busto Arsizio (VA) ITALY
Tel. (+39) 0331/074034 - fax (+39) 0331/074036 - info@debem.it - www.debem.com

INDUSTRIAL PUMPS

CHEMICAL / PAINTING / PRINTING / WATER TREATMENT / GALVANIC / TEXTILE / CERAMIC / AUTOMOTIVE / MECHANICAL / OIL & GAS

info@debem.it - www.debem.com