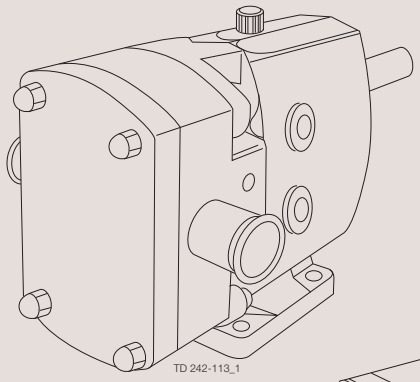
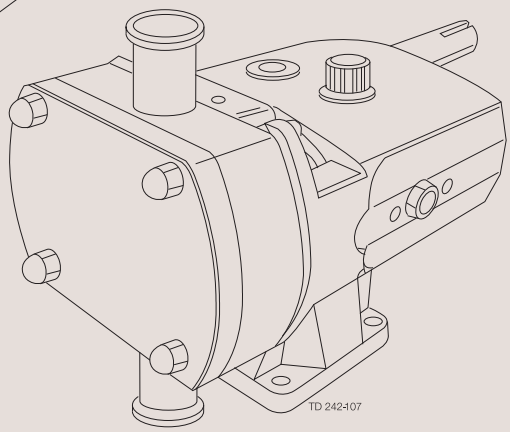
Instruction Manual

ATEX Addendum to SX Instruction Manual - Rotary Lobe Pumps - SX Range





IMPORTANT!
When ordering spare parts please quote Pump Serial No.
Read all of this pump manual and any instructions supplied for ancillary equipment before the unit is installed, operated or maintained.

ESE02203-EN3 2014-11

Original manual

Table of contents

The information herein is correct at the time of issue but may be subject to change without prior notice

1. EC Declaration of Conformity 4
1.1. ATEX Directive 94/9/EC 7
1.2. ATEX marking 7

2. Safety 8
2.1. Special conditions for safe use 8
2.2. General information 8

3. Installation 9
3.1. Installation 9

4. Operation 10
4.1. Operation 10
4.2. Important checks to maintain Safe Operation 11

5. Maintenance 13
5.1. Maintanance 13
5.2. Ordering Spare Parts 13

6. Technical information 14
6.1. Technical data 14
6.2. Seal Operation Data 16

1 EC Declaration of Conformity

Revision of Declaration of Conformity 2009-12-29

The Designated Company

Alfa Laval Eastbourne, Alfa Laval Ltd
Company Name

Birch Road, Eastbourne, East Sussex BN23 6PQ
Address

+44 (0) 1323 412555
Phone No.

Production year

We hereby declare that the following machinery conforms to the provision of directive 94/9/EC group II category 2 & 3 G & D and to the following other relevant directives. The machinery has been designed and manufactured in accordance with the transposed harmonised European standards; European and national standards as listed:

Pump
Designation

Rotary Lobe Pump Unit - Motorised - SX ATEX addendum
Type

From serial number 10.000 to 1.000.000

Technical file 9612-9602, filled with Baseefa (2001) Ltd.

Other Applicable Directives: Electrical Equipment Low Voltage 73/23/EEC

This machinery has been designed and manufactured in accordance with the following transposed harmonised European Standards:

EN809:	1998 Pumps and pump unit for liquids - common safety requirements.
ESE13463-1 2001:	Non-electrical equipment for potentially explosive atmospheres
EN13463-5 2003:	Non-electrical equipment for potentially explosive atmospheres-Part 5: Proaction by constructional safety “c”
prEN13463-6:	Non-electrical equipment for potentially explosive atmospheres-Part 6: Protection by control of ignition source “b”
ESE13463-8: 2003	Non-electrical equipment for potentially explosive atmopheres-Part 8: Protection by liquid immersion “k”
ISO9001:	2008 Quality Management System.

The person authorised to compile the technical file is the signer of this document

QHSE Manager, Quality, Health and safety & Environment
Title

Annie Dahl
Name

Kolding
Place

2013-12-03
Date

Signature

1 EC Declaration of Conformity

Revision of Declaration of Conformity 2009-12-29

The Designated Company

Alfa Laval Eastbourne, Alfa Laval Ltd
Company Name

Birch Road, Eastbourne, East Sussex BN23 6PQ
Address

+44 (0) 1323 412555
Phone No.

Production year

We hereby declare that the following equipment is intended for installation into a machine or to be assembled with other equipment and/or machines into a machine. It must not be put into service until the machinery into which it is incorporated has been declared in conformity with the provisions of the Directive 94/9/EC group II category 2 & 3 G & D and other applicable directives. The machinery has been designed and manufactured in accordance with the transposed harmonised European standards; European and national standards as listed:

Pump
Designation

Rotary Lobe Pump - SX ATEX addendum
Type

From serial number 10.000 to 1.000.000
Technical file 9612-9602, filled with Baseefa (2001) Ltd.

Other Applicable Directives:	Electrical Equipment Low Voltage 73/23/EEC

This machinery has been designed and manufactured in accordance with the following transposed harmonised European Standards:

EN809:	1998 Pumps and pump unit for liquids - common safety requirements.
ESE13463-1 2001:	Non-electrical equipment for potentially explosive atmospheres
EN13463-5 2003:	Non-electrical equipment for potentially explosive atmospheres-Part 5: Proaction by constructional safety “c”
prEN13463-6:	Non-electrical equipment for potentially explosive atmospheres-Part 6: Protection by control of ignition source “b”
ESE13463-8: 2003	Non-electrical equipment for potentially explosive atmopheres-Part 8: Protection by liquid immersion “k”
ISO9001:	2008 Quality Management System.

The person authorised to compile the technical file is the signer of this document

QHSE Manager, Quality, Health and safety & Environment
Title

Annie Dahl
Name

Kolding
Place

2013-12-03
Date

Signature

1.1 ATEX Directive 94/9/EC

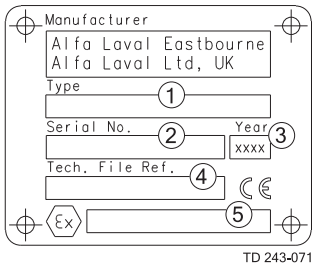
ATEX Directive 94/9/EC

The ATEX Directive 94/9/EC covers equipment and protective systems that will be used in areas endangered by potentially explosive atmospheres created by the presence of flammable gases, vapors and dusts.
Rotary Lobe Pumps supplied with an ATEX symbol are classified for use in potentially explosive atmospheres under ATEX Directive 94/9/EC Group II, Categories 2 and/or 3.

Type of Equipment:		Rotary Lobe Positive Displacement Pumps
Equipment Group:		Group II category 2 G (zone 1) and D (zone 21)
	and/or	Group II category 3 G (zone 2) and D (zone 22)
		Temperature class T4, T3 and T2
Ignition Protection used:		EN13463-1, EN13463-5 (c), EN13463-6 (b), EN13463-8 (k)

1.2 ATEX marking

ATEX marking



TD 243-071

Typical nameplate
1. Pump type
2. Serial no.
3. Production year:
4. Reference of technical file at notified body: 9612-9602
5. ATEX marking

Unsafe practices and other important information are emphasized in this manual.
Warnings are emphasized by means of special signs, see description in Standard Instruction Manual section 2.1 & 2.2.

2 Safety

2.1 Special conditions for safe use

⚠

- **Never** operate pump outside max duty conditions specified in “Seal Operation Data” section 6.2. If the duty conditions change please refer to pump manufacturer.
- **Ensure** checks and running conditions for pump or pump unit during operation to be according to “Operation” section 4 .

2.2 General information

⚠

- **Always** make sure that the Serial Number Stamped on the pump nameplate matches the number shown on the Declaration and on the Seal Operating Data in Section 6.2 .
- **Always** check that the components and equipment supplied is suitable for the area intended and corresponds with the order acknowledgement.
- **Always** read this ATEX addendum thoroughly before using the pump and read the safety instructions in the Standard Instruction Manual prior to handling, installing, operating or maintaining the pump.
- **Always** order genuine spare parts using the serial number of the pump, stated on the pump nameplate, for identification.
- **Always** ensure that intentionally or potentially mixing of fluids do not create hazardous reactions/situations (eg. process media and flush media)

Education:
Operators must have necessary knowledge about the pump supplied including the mechanical seals before doing any installation or maintenance work relating to the pump or pump unit. Necessary knowledge includes the understanding of the:

- function of the pump/pump unit including the mechanical seal.
- maintenance/service procedures of the pump/pump unit including the mechanical seals.
- safety instructions.
- operational limits for the pump/pump unit including the mechanical seals

Installation
- Always read section 3 “Installation”

Operation
- Always read section 4 “Operation”

Maintenance
- Always read section 5 “Maintenance”

3.1 Installation

⚠

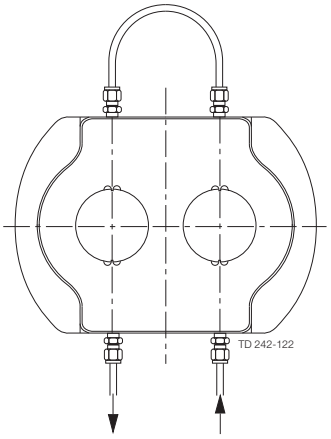
Pumps and motorized pump units

- **Always** follow the Installation instructions in the Standard Instruction Manual in conjunction with this addendum.
- **Always** ensure that instructions for all ATEX compliant equipment and components are followed (motors, couplings, reduction gears etc.)
- **Always** make sure that pump gearbox, base plate and motor are electrically earthed
- **Always** read section 4 “Operation” before pump start up.
- **Never** install the pump or pump unit at an angle of more than 5° from the horizontal plane
- cover up pump gearbox, motor or reduction gearbox in any way that will reduce the cooling effects intended
- **Ensure** correct alignment of pump and drive unit
- **Ensure** that all control and monitoring equipment complies with the requirements in appropriate ATEX standards e.g. EN 13463-6

Flush system

- **Always** measure flush media parameters at the flush outlet on the pump rotorcase eg. temperature, flow and/or pressure (see Technical data, section 6.1, for more information)

For information on required flows, pressures etc. (see Technical data, section 6.1)



4 Operation

4.1 Operation

⚠

Pumps and pump units

- **Always** read the operations instructions in the Standard Instruction Manual
- **Always** read “Technical information” for shaft seals in section 6.1
- **Always** vent and purge the pump head and seal cavities of air/gas prior to start-up to avoid dry-run
- **Always** make a visual inspection of the pump unit at startup to ensure there are no malfunctions e.g. leaks, abnormal noises or vibrations etc.
- **Always** remove the rotorcase cover to drain the pump head. The rotor case is not self-draining.
- **Never** use the single seal options in applications where dry-running is predictable and/or where leakage from the shaft seal can cause a hazardous situation (double mechanical seal recommended).
- **Never** run pump with suction side and/or pressure side blocked. Process systems should be installed/controlled in a way . so this cannot occur
- **Never** operate other equipment/components in pump unit outside limits specified in manufactures instructions manuals eg. motor, reduction gear, coupling etc.
- **Never** use a heating/cooling media in jackets, which can cause a hazardous situation in case of leakage
- **Ensure** that the temperature of the heating jacket, if fitted, does not exceed the Temperature Class rating (eg. T4 is 135°C).
- **Always** take care when choosing flush media such that a hazardous situation does not arise with seal leakage.

4.2 Important checks to maintain Safe Operation

In order to function correctly, mechanical seals are dependent upon lubrication and cooling of the sealing surfaces, using either pumped or barrier/buffer media. When either pumped or barrier/buffer media is not present, the seal will dry-run. Dry-running seal faces must be avoided at all times, as this will cause excessive and uncontrolled heat generation of the seal faces. This in turn could lead to exceeding the specified temperature class and thereby increasing ignition (explosion) risk. If dry-running cannot be avoided, then a flushed mechanical seal must be used. In order to ensure that the mechanical seal faces are lubricated and properly cooled, end users are required to monitor the pump/seal arrangement in such a way that this is achieved.

For pumps fitted with double mechanical seals (high pressure flush), the end user is required to ensure:
- Flush media is present
- Flush media is at a pressure 1.0 bar min. above the pump discharge pressure.
- Seal faces are receiving the required volume of flush media, to cool them and so dissipate any heat build up.

In practice this means the end user must monitor:
- Flush media pressure
- Flush media flow rate
- Temperature - either at outboard seal face or of flush media.

For pumps fitted with double mechanical seals (low pressure flush), the end user is required to ensure:
- Flush media is present
- Seal faces are receiving the required volume of flush media, to cool them and so dissipate any heat build up.

In practice this means the end user must monitor:
- Flush media pressure or flow rate
- Temperature - either at outboard seal face or of flush media.

For pumps fitted with single mechanical seals, the end user is required to ensure:
- Seal face temperature does not exceed temperature class limit.

In practice this means the end user must either monitor:
- Presence of pumped media either by flow rate or pressure indicator.
- Pumped media temperature. or alternatively:
- Seal face temperature.

4 Operation

Daily checks (category 2 only)

Shaft seal, all types
- Ensure there is no unacceptable leakage

Pump Gearbox
- Ensure, via sight glass, oil level to be correct and that there are no signs of oil contamination.
- Ensure there are no signs of overheating
- Ensure there are no abnormal running conditions such as loose components, abnormal noise, vibration or oil leakage

Pump units
- Ensure there are no signs of overheating, abnormal running conditions such as loose components, leaks, abnormal noise or vibration.

Control/monitoring equipment
- Ensure, at least daily, correct function of control and monitoring equipment so as to ensure surface temperatures to stay within the specified temperature class (eg. process media temperature/pressure sensors)
- Ensure, at least daily, correct function of signals and alarms so as to ensure surface temperatures stay within the specified temperature class

Weekly checks (Category 3 only)
The above checkpoints listed under “daily checks..” should be carried out on a weekly basis

Other checks
Pumps and pump units, category 2 and 3
- Ensure that Pump duty conditions never exceed limits specified in “Seal Operation Data” section 6.2.

Pump units, category 2 and 3
- Ensure surface temperatures on motor and reduction gearbox stay within the limits of the appropriate temperature Class e.g. T4. See manufacturers instructions.

Dust applications, category 2D (Zone 21) and category 3D (Zone 22)
- Ensure that the deposit of dust on the equipment never exceeds what is acceptable for the individual type of dust.
- Ensure that the layer of dust on the pump gearbox and between the gearbox & rotor case does not exceed 5 mm and that the surface temperature on the gearbox is monitored and insured to stay within the temperature class stated on the equipment (eg. by means of temperature measurements).

5.1 Maintanance

Maintenance
- **Always** follow the Maintenance instructions in the Standard Instruction Manual
- **Always** read “Technical information” section 6.1 and the “Seal Operation Data” section 6.2
- **Always** ensure that instructions of all ATEX compliant equipment and components are followed (motors, couplings, reduction gears etc.)
- **Always** read section 4 “Operation” before starting up the pump unit after maintenance
- **Always** replace pump gearbox lip seals if they are disturbed i.e. cover removed.

Pump Gearbox

The oil in the acts as a coolant/lubricant for the bearings, lip seals and timing gears. Also the oil acts as ignition prevention and thus it is essential to ensure the oil level to be correct as specified in the standard instruction manual.
Recommended oil as follows:

BP Enersyn SG 150
Castrol Alphasyn PG 150
Mobil Glygoyle 30
Shell Tivela S 150
Texaco Synlybe CLP 220
Mobil Glygoyle 22

Pump Gearbox bearings changing intervals
If the bearings are worn excessively it can cause increased friction and thus increased surface temperature on the gearbox. Gearbox bearings should be renewed before the running hours stated in the table below have been exceeded. Alternatively it should be ensured by other means that the bearings are working satisfactorily eg. bearing frequency analysis. The bearings should be checked/monitored continuously or at least every 1000 running hours when the running hours in the table below are exceeded.

Pump Model	Bearing changing intervals (pump running hours x 1000)		
	Process media differential pressure		
	0 to 7 bar	7 to 10 bar	10 to 15 bar
SX1/005	30	23	13*
SX1/007	19	-	-
SX2/013	30	30	15
SX2/018	30	-	-
SX3/027	30	30	18
SX3/035	30	-	-
SX4/046	30	30	30
SX4/063	30	30	-
SX5/082	30	30	22
SX5/115	30	30	-
SX6/140	30	30	17
SX6/190	30	28	-
SX7/250	30	30	9
SX7/380	30	10	-

* SX1/005 only goes from 0 to 12 bar

5.2 Ordering Spare Parts

When ordering spare parts please quote Pump Serial No.

6 Technical information

6.1 Technical data

Shaft seals
Mechanical seals are dependant upon lubrication and cooling of the sealing surfaces. Therefore dry-running of the seal faces must be avoided since this can cause excessive generation of heat and thus possibility of exceeding the specified temperature class.

During normal operation a mechanical seal will generate a small but controlled leakage. This leakage will increase upon failure.

Due to the working principles of mechanical seals a flush system must be monitored if dry-running of the process media cannot be avoided or if leakage of the product media can cause a hazardous situation (eg. flammable products).

All control and monitoring equipment used to ensure that the seal operating conditions stay within specified limits should comply with appropriate ATEX standards e.g. EN 13463-6.

There are two standard mechanical seal options conforming with ATEX

1 ATEX compliant double flush mechanical seal (Vertically ported pumps only)

These seals provide the user with the highest level of protection against the mechanical seal faces running hot.

Proper function of the flush system is essential. If the flush stops the outboard seal will run dry and thus the seal face temperature will increase and possibly be a potential explosion risk.

Refer to standard Instruction Manual for seal removal and fitting.

There are two basic types of flush:

Double Flushed Mechanical Seal (high pressure flush)

On this seal arrangement the flush is used as a 'Barrier' fluid. The pressure of the barrier fluid should be 1.0 bar min. above the pump discharge pressure. The inboard seal interface film will therefore be flush media. The barrier fluid will act as a coolant and lubricant for both inboard and outboard seals. Leakage of pumped media into the barrier fluid will not occur.

Double Flushed Mechanical Seal (low pressure flush)

On this seal arrangement the flush is used as a 'Buffer' fluid. The pressure of the buffer fluid should be as low as possible, but below the pump discharge pressure. The inboard seal interface film will therefore be pumped media. The buffer fluid will act as a coolant for the inboard seal and carries any leakage of pumped media away to ensure good seal function. The buffer fluid also acts as a coolant and lubricant for the outboard seal.

Ensuring seal face temperature

It must be ensured that the temperature of the seal face does not exceed the temperature class limit. This can be achieved by:

a) ensuring that the temperature of the buffer/barrier fluid does not exceed the value listed on "Seal Operation Data" and that the total flow is at least 30 litres/hour. The temperature and flow must be measured after the flush outlet on the pump rotorcase.

If a recommended flow higher than 30 litres/hour is stated on the "Seal Operation Data" this should be followed.

b) ensuring that the temperature of the buffer/barrier fluid does not exceed the value listed on "Seal Operation Data" and that the total flow is high enough to ensure the flush media to reach the temperature sensor within 10 seconds after leaving the flush outlet on the pump rotorcase. The distance between the flush outlet on the pump rotorcase and the temperature sensor should not exceed 200mm. This applies when the flow of the flush media is lower than 30 litres/hour.

NOTE:

For good seal function and life a general minimum flow of 30 litres/hour is recommended.

However, the flow can be lower from an explosion risk aspect under the circumstances described in b). Preferably the temperature sensor should be mounted as close to the flush outlet on the pump rotorcase as possible. By lowering the flow below 30 litres/hour the seal life and function might be compromised in some applications.

Thermosyphon flush system is not recommended.

2. ATEX compliant single mechanical seal. There is NO monitoring device or protection build into this seal option. It relies on the process fluid to cool and lubricate the seal faces in order to stay within the stated temperature class. The process must be controlled/monitored in a way, which ensures the seal face not to exceed the temperature limit. This can be done by ensuring that there is a reasonable flow of the process fluid and that the process temperature does not exceed the values listed in "Seal Operation Data" section 6.2.

Single mechanical seals are not suitable for applications/duties where leakage of process fluid can cause a hazardous situation.

Single mechanical seals should not be allowed to run dry.

Refer to standard Instruction Manual for removal and fitting.

6 Technical information

6.2 Seal Operation Data

Pump type model ☐ Pump serial No.: ☐ Shaft size ☐ mm

Temp Class ☐ Group and category ☐

Explosion sub division ☐

Application

Primary Process media **Point of selection**

Product * : ☐

Concentration : ☐ Ph ☐

Temperature (°C): ☐ Suction pressure (bar): ☐

Discharge pressure (bar): ☐

Viscosity (cP): ☐

Shaft speed (RPM): ☐

Cleaning / CIP (If through pump)

Product * ☐

Concentration * ☐ Ph ☐

Temperature (°C): ☐

Discharge pressure (bar): ☐

Viscosity (cP): ☐

Shaft speed (RPM): ☐

Seal Selection

Seal type ☐

Thermocouple ☐ yes Thermocouple seal.max temperature reading ☐ (°C)

Seal Face materials* ☐

Elastomers* ☐

Flush System

Flush media ☐

Flush Type: * ☐ Buffer - Flush Pressure as low as possible below discharge pressure

☐ Barrier - Flush Pressure 1Bar above pump discharge pressure

Max Flush temperature (°C): ☐ Recommended Flow : ☐ l/h

Temperature and Flow should be monitored at the outlet of the seal flush housing

Comments : ☐

Points marked with an asterix are filled in if known and if applicable to the application

How to contact Alfa Laval
Contact details for all countries are
continually updated on our website.
Please visit www.alfalaval.com to access the information directly.

© Alfa Laval Corporate AB
This document and its contents is owned by Alfa Laval Corporate AB and protected by laws governing intellectual property and thereto related rights. It is the responsibility of the user of this document to comply with all applicable intellectual property laws. Without limiting any rights related to this document, no part of this document may be copied, reproduced or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the expressed permission of Alfa Laval Corporate AB. Alfa Laval Corporate AB will enforce its rights related to this document to the fullest extent of the law, including the seeking of criminal prosecution.