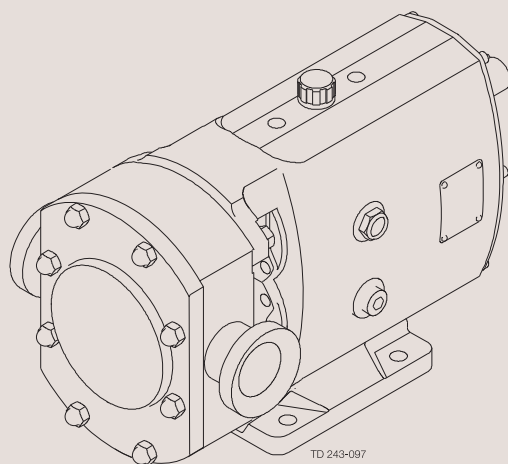


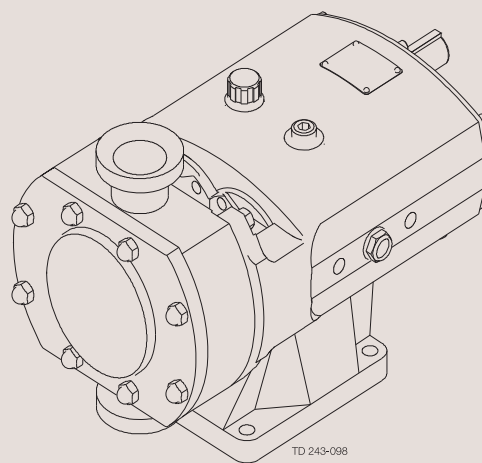


Instruction Manual

ATEX Addendum to SRU Instruction Manual - Rotary Lobe Pump - SRU Range



TD 243-087



TD 243-098

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.

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

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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 - SRU ATEX addendum
Type

From serial number 10.000 to 1.000.000
Technical file 9612-9601, 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:	<u>1998 Pumps and pump unit for liquids - common safety requirements.</u>
ESE13463-1 2001:	<u>Non-electrical equipment for potentially explosive atmospheres</u>
EN13463-5 2003:	<u>Non-electrical equipment for potentially explosive atmospheres-Part 5: Protection by constructional safety "c"</u>
prEN13463-6:	<u>Non-electrical equipment for potentially explosive atmospheres-Part 6: Protection by control of ignition source "b"</u>
ESE13463-8: 2003	<u>Non-electrical equipment for potentially explosive atmospheres-Part 8: Protection by liquid immersion "k"</u>
ISO9001:	<u>2008 Quality Management System.</u>

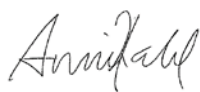
The person authorised to compile the technical file is the signer of this document

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 - SRU ATEX addendum

Type

From serial number 10.000 to 1.000.000
Technical file 9612-9601, 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:

Protection 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 atmospheres-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

Annie Dahl
Signature



1 EC Declaration of Conformity

1.1 ATEX Directive 94/9/EC

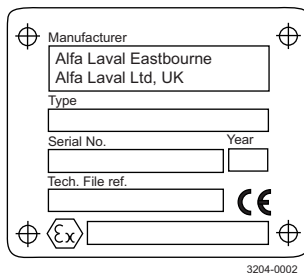
ATEX Directive 94/9/EC

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



Typical nameplate

1. Pump type
2. Serial no.
3. Production year
4. Reference of technical file at notified body: 9612-9601
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 Special conditions for safe use and 2.22.2 General information.

2.1 Special conditions for safe use



- **Ensure** checks and running conditions for the pump unit during operation to be according to “Operation” section 4.
- **Never** operate pump outside max duty conditions specified in “Seal Operation Data” section 6.3 Seal Operation Data. If the duty conditions change please refer to pump manufacturer.

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 6.3 Seal Operation Data
- **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 purposes.
- **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 unit. Necessary knowledge includes the understanding of the:

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

3.1 Installation



Pumps and motorized pump units

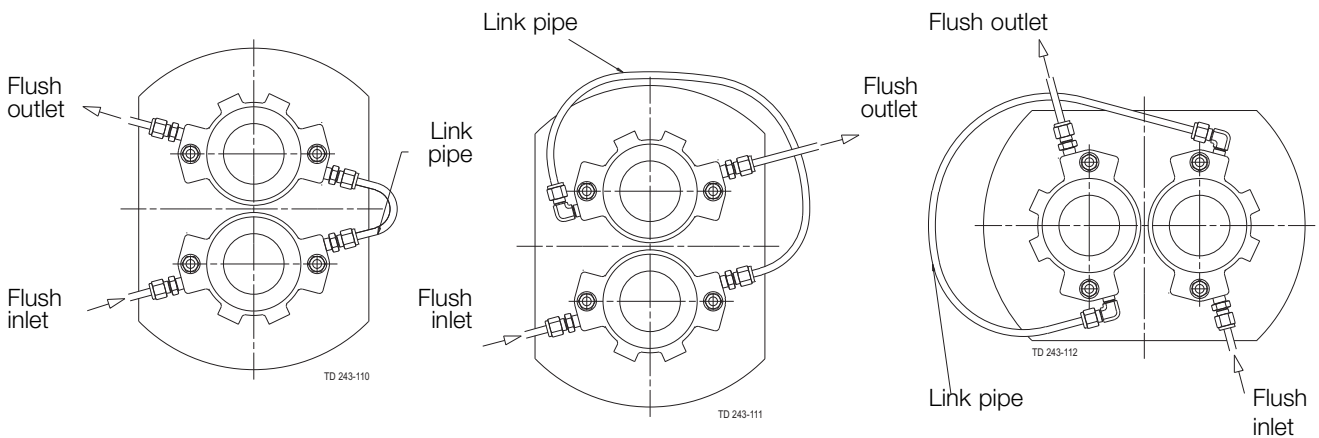
- **Always** follow the Installation instructions in the Standard Instruction Manual in conjunction with this addendum
- **Always** ensure that instructions for all ATEX compliant equipment and components are followed (motors, couplings, reduction gears etc.)
- **Always** make sure that pump gearbox,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

Thermocouple installation See section 5.3.2 and 5.3.5 "Maintenance"



Flush system

- **Always** connect the two flush housings in series, see examples in the sketch below.
- **Always** measure flush media parameters at flush housing outlet eg. temperature, flow and/or pressure (see Technical data, section 6.1, for more information)
- **Ensure** inlet connection to be lower than outlet connection on the individual housing
- **Ensure** the distance between the flush housing outlet and the temperature sensor (if optional thermocouple is fitted) does not exceed 200mm. For information on required flows, pressures etc. (see Technical data, section 6.1)



4.1 Operation



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 seal cavities and flush housing (if applied) of air/gas prior to start-up to avoid any dry-running.
 - **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
 - **Ensure** that the temperature of the heating jacket/saddle, if fitted, does not exceed the Temperature Class rating (eg. T4 is 135°C).
 - **Never** run pump with suction side and/or pressure side blocked
 - **Never** operate other equipment/components in pump unit outside limits specified in manufacturers instructions manuals eg. motor, reduction gear, coupling etc.
 - **Never** expose thermocouple lead (if fitted) to any force higher than 5N (eg. high pressure cleaning etc.)
 - **Never** use a heating/cooling media in saddles/jackets, that can cause a hazardous situation in case of leakage
 - **Never** run the pump dry unless a flushed mechanical seal is fitted and operated correctly.
-

4.2 Seal operation safety checks

Pumps fitted with Double Flushed Mechanical Seals

The end user is required to ensure that:

- Flush media is present.
- Flush media is at a pressure of 1.0 bar min. above the pump discharge pressure.
- Seal faces are receiving the required volume of flush media, so as to cool them .and dissipate any heat build up.

In practice this means the end user **should** monitor:

- Flush media pressure.
- Flush media flow rate.

and **must** monitor:

- Temperature - either of flush media or change of temperature at outboard seal face.

Pumps fitted with Single Flushed Mechanical Seals

The end user is required to ensure that:

- Flush media is present.
- Seal faces are receiving the required volume of flush media, so as to cool them and .dissipate any heat build up.

In practice this means the end user should monitor:

- Flush media pressure or flow rate.

and **must** monitor:

- Temperature of flush media.

Pumps fitted with Single Mechanical Seals

The end user is required to ensure that:

- Seal face temperature does not exceed the temperature class limit.

In practice this means the end user **must** monitor either:

- Presence of pumped media either by flow rate or pressure indicator.
- Pumped media temperature.

or alternatively:

- Seal face temperature change.
-

4 Operation

4.3 Daily Checks

Shaft seals, all types:

- Ensure there is no unacceptable leakage.

Shaft seals fitted with optional thermocouple:

- Ensure proper function of signals and alarms related to the thermocouple.
- Ensure for single seal, that the thermocouple reading is similar to the process media temperature (no more than 20°C above). If this is not the case, check for abnormal running conditions.
- Ensure, for double flushed mechanical seals, that the thermocouple reading is similar to the flush media temperature (no more than 20°C above). If this is not the case, check for abnormal running conditions.

Pump unit:

- Ensure the oil levels to be correct with 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.
- Ensure the pump duty conditions never exceed the limits specified in 'Seal Operation Data' section 6.3.
- Ensure that any dust deposits are removed.

Control / Monitoring equipment:

- Ensure the correct function of control and monitoring equipment.
-

5.1 General Maintenance Guidelines

- **Always** follow the Maintenance instructions in the Standard Instruction Manual
- **Always** read “Technical information” section 6.1 and the “Seal Operation Data” section 6.3
- **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

Pump Gearbox

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.

Pump model	Bearing changing intervals (pump running hours x1000)		
	Process media differential pressure		
	0 to 8 bar	8 to 10 bar	10 to 15 bar
SRU1/005	30	Non-applicable	Non-applicable
SRU1/008	30*	Non-applicable	Non-applicable
SRU2/013	30	30	9
SRU2/018	20	10	Non-applicable
SRU3/027	30	30	30
SRU3/038	30	30	Non-applicable
SRU4/055	30	30	13
SRU4/079	30	18	5,5
SRU5/116	30	30	20
SRU5/168	30	25	8
SRU6/260	20	12	3,8
SRU6/353	12	6	2

* SRU1/008 pump, differential pressure is 5 bar max.

5.2 Ordering Spare Parts

When ordering spare parts please quote Pump Serial No.

5 Maintenance

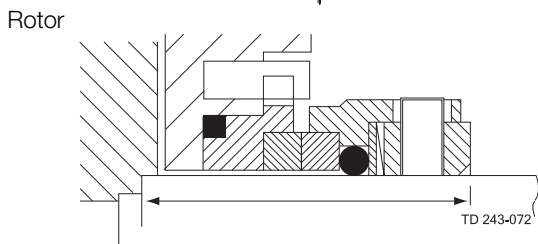
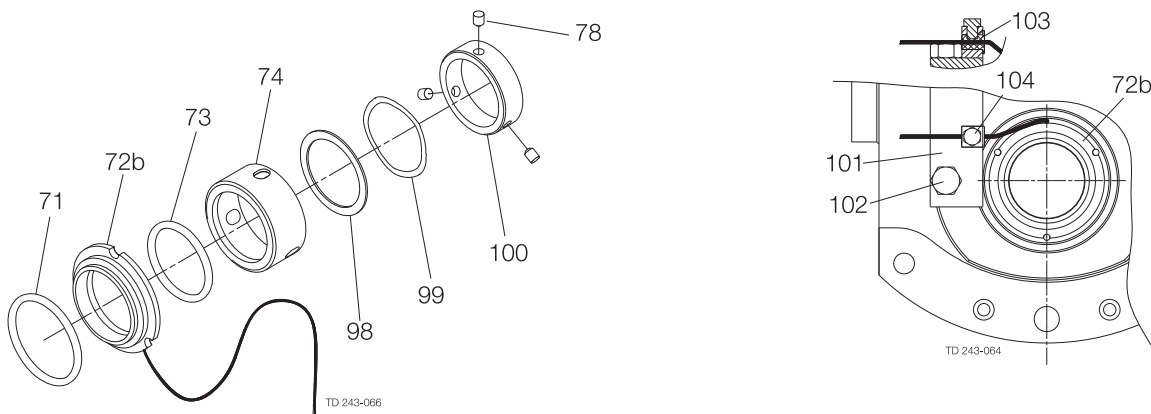
5.3 Mechanical seals

Mechanical seals should not be removed unless they are to be replaced.

5.3.1 R90 Single mechanical seal

Refer to section 4.5.1 in Standard Instruction Manual

5.3.2 R90 Single mechanical seal with optional thermocouple



Shaft Setting
 Dimension

Pump	Setting mm	Dimension in	Grub Screw (78) Torque (Nm)
SRU1	33.6	1.32	4.5
SRU2	35.6	1.40	4.5
SRU3	38.1	1.50	4.5
SRU4	39.6	1.56	4.5
SRU5	47.6	1.87	8
SRU6	50.7	2.00	15

Item	Description
71	Stationary seal ring O-ring
72b	Stationary seal ring with thermocouple
73	Rotary seal ring O-ring
74	Rotary seal assembly comprising of rotary seal ring, Washer (98), wave spring (99), drive ring (100) and grub screw (78)
101	Thermocouple clamp plate
102	Clamp plate screw
103	Plastic bush
104	Bush locking screw

Seal removal

1. Unplug or disconnect the thermocouple lead connection – keep lead clamped to rotorcase until rotorcase removed
2. Remove the rotorcase, cover, rotors and rotorcase
3. Loosen bush locking screw (104)
4. Extract the stationary seal ring (72b) ensuring not to damage thermocouple wire, and remove o-ring (71)
5. Loosen the grub screws (78)
6. Remove the rotary seal assembly (74) from the shaft.
7. Remove abutment spacer if fitted.
8. Extract the rotary seal O-ring (73) from the rotary seal assembly

Seal fitting

1. Mark the shaft to indicate the seal setting length.
2. Lightly lubricate O-rings (71 and 73) with appropriate grease and fit to rotary and stationary seals (74 and 72).
3. If fitted replace abutment spacers.
4. Slide rotary seal assembly on to the shafts until aligned with the setting dimension mark.
5. Tighten the grub screws (78) to the recommended torque figure as shown above.
6. Press stationary seals into rotorcase bores ensuring the thermocouple wire is oriented towards the center of the rotorcase.
7. Fit lead through thermocouple fixture and position plastic bush (103) in the fixture.
8. Tighten the bush locking screw (104), torque 4Nm, holding the static seal face in place. Do not apply more than 5N force to lead.
9. Wipe clean the sealing faces with solvent.
10. Refit the rotorcase, rotors and front cover.
11. Make sure the lead from the thermocouple is mounted properly and kept away from any moving parts and sharp edges.
12. Connect the flying leads of the thermocouple to data system, type K connection
13. Verify the function and reading of the thermocouple. If there is no signal, the thermocouple has been damaged or incorrectly connected.
14. Verify proper function of seal and temperature reading at startup, see "Seal Operation Data" section 6.3

For horizontally ported pumps, the thermocouple is fitted on the upper shaft and for vertically ported pumps the thermocouple can be fitted on either shaft.

The components and equipment used for the monitoring system must comply with the requirements of appropriate ATEX standard e.g. EN13463-6.

The thermocouple should be installed and maintained according to appropriate standards for intrinsically safe circuits eg. EN60079-11/17

5 Maintenance

Mechanical seals should not be removed unless they are to be replaced.

5.3.3 R90 Single flushed mechanical seal

Refer to section 4.5.2 in Standard Instruction Manual

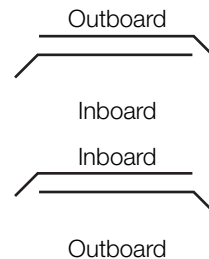
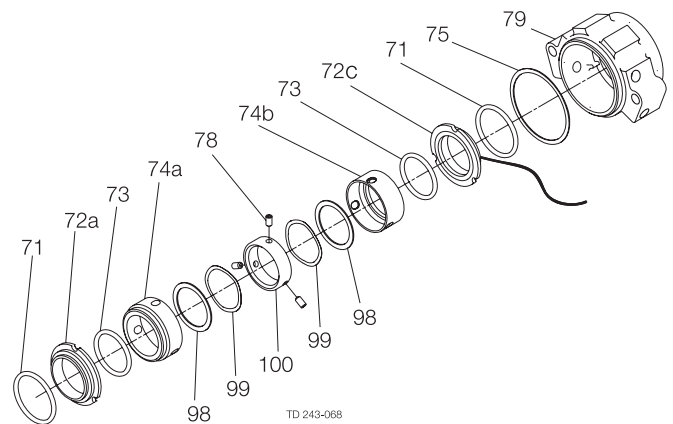
5.3.4 R90 Double flushed mechanical seal

Refer to section 4.5.3 in Standard Instruction Manual

5.3.5 R90 Double flushed mechanical seal with optional thermocouple

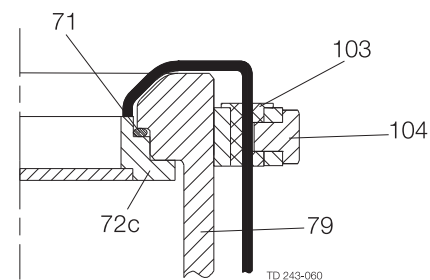
Item	Description
71	Stationary seal ring O-ring
72	Stationary seal ring
72c	Stationary seal ring with thermocouple
73	Rotary seal ring O-ring
74a	Rotary seal ring assembly - inboard Comprising of rotary seal ring, washer (98), wave spring (99) and drive ring (100)
74b	Rotary seal ring assembly - outboard Comprising of rotary seal ring, grub screw (78), washer (98) and wave spring (99)
75	Seal housing gasket
79	Seal housing
103	Plastic bush
104	Bush locking screw

Type	Torque Nm
SRU1	4.5
SRU2	4.5
SRU3	4.5
SRU4	4.5
SRU5	15.0
SRU6	15.0
SRU4	4.5
SRU5	15.0
SRU6	15.0



Series 1, the outboard seal fits over the inboard seal.

Series 2-6, the inboard seal fits over the outboard seal.



Seal removal

1. Ensure the flush media is turned off and disconnect the flushing pipework.
2. Remove the rotorcase cover and rotors.
3. Turn the drive shaft until the drive ring grub screws (78) are visible through the flushing connections.
4. Loosen the grub screws.
5. Remove the rotorcase.
6. Remove seal housings (79) complete with rotary seal assemblies (74a and 74b) and outboard stationary seals.
7. Loosen bush locking screw (104) on thermocouple fixture and extract carefully without damaging the thermocouple wire.
8. Extract the seal housing gasket (75), stationary seal ring (72) and O-ring (71) from the rotorcase.

Seal fitting:

Ensure seal orientation is correct.

1. Lightly lubricate O-rings (71 and 73) with appropriate grease and fit to rotary seal assemblies and stationary seal rings (74A, 74B and 72).
2. Fit stationary seals into the rotorcase bores and seal housings (79) making sure the thermocouple lead is positioned at the thermocouple fixture.
3. Fit lead carefully through thermocouple fixture and position plastic bush (103) in the fixture. Do not apply more than 5N to the lead.
4. Tighten the bush locking screw (104), torque 4Nm, holding the static seal face in place. Do not apply more than 5N force to lead.
5. Fit gaskets (75) into the rotorcase bores.
6. Wipe clean the sealing faces with solvent.
7. Locate rotary seal assemblies and fit the seal housings to the rotorcase ensuring that the grub screws (78) are accessible so they can be tightened.
8. Refit the rotorcase.
9. Turn the drive shaft until the grub screws are visible through the flushing connections.
10. Tighten the grub screws to the recommended torque figure as shown above.
11. Refit the rotors and rotorcase cover.
12. Make sure the lead from the thermocouple is mounted properly and kept away from any moving parts and sharp edges.
13. Connect the flying leads of the thermocouple to data system, type K connection
14. Verify the function and reading of the thermocouple. If there is no signal, the thermocouple has been damaged or incorrectly connected.
15. Verify proper function of seal and temperature reading at startup, see "Seal Operation Data" section 6.3
16. Verify proper function of overall pump unit at startup

For horizontally ported pumps, the thermocouple is fitted on the upper shaft and for vertically ported pumps the thermocouple can be fitted on either shaft.

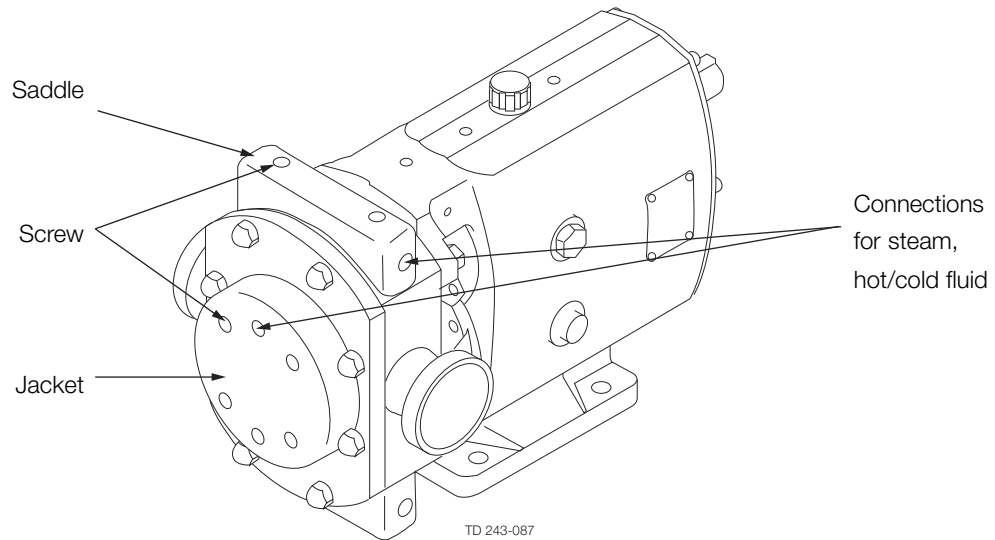
The components and equipment used for the monitoring system must comply with the requirements of appropriate ATEX standard e.g. EN13463-6.

The thermocouple should be installed and maintained according to appropriate standards for intrinsically safe circuits eg. EN60079-11/17

5 Maintenance

5.4 Heating/Cooling devices

SRU pumps have the option of being fitted with jackets to the rotorcase cover and/or saddles to the rotorcase. These are primarily used for heating the pumphead so as to maintain the pumped media temperature. They may also be used for cooling purposes.



The maximum allowable pressure and temperature of heating/cooling fluid is 3.5 bar (50 psi) and 150°C (302°F) respectively, except in T4 applications in which the maximum allowable temperature is 130°C.

6.1 Shaft Seals

The correct function of a mechanical seal is largely dependent upon its lubrication and cooling of the sealing surfaces. It is therefore extremely important to avoid any dry-running of the seal faces since this can cause excessive generation of heat and thus the possibility of exceeding the specified temperature class. During normal operation a mechanical seal will generate a very small but controlled leakage which will increase upon failure. If dry-running of the process media cannot be avoided or if any leakage of the process media can cause a hazardous situation (i.e. flammable media), a flush system must be fitted.

The standard ATEX compliant mechanical seal options are described below:

A. Double Flushed Mechanical Seal

This seal arrangement provides the user with the highest level of protection against the seal faces running hot. 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. Flush housings should be connected in series (not parallel). Proper function of the flush system is essential - if the flush flow is interrupted or stopped the outboard seal will run dry and the seal face temperature increased to become a potential explosion risk, see section 6.2

A double mechanical seal fitted with a thermocouple, section 6.3.5, allows the user to provide alarms based on the temperature at the seal face, see section 6.2

Thermosiphon flush systems are not recommended.

B. Single Flushed Mechanical Seal

This seal arrangement provides the user with a high level of protection against the seal faces running hot. On this seal arrangement the flush is used as a 'Buffer' fluid. The pressure of the buffer fluid should be 0.5 bar max. The seal interface film will therefore be pumped media. The buffer fluid will act as a coolant for the seal and prevent the pumped media from coagulating, solidifying or crystallising on the seal faces. Any leakage of pumped media is carried away to ensure good seal function. Flush housings should be connected in series (not parallel). Proper function of the flush system is essential - if the flush flow is interrupted or stopped the seal will run dry and the seal face temperature increased to become a potential explosion risk, see section 6.2

Note: A double flushed mechanical seal can also be operated in a low pressure flush mode as above.

C. Single Mechanical Seal

On this seal arrangement the seal interface film is the pumped media. The pumped media acts as a coolant and lubricant for the seal faces. For single mechanical seals without a thermocouple fitted there is no monitoring device or protection and relies on the process media to cool and lubricate the seal faces to stay within the stated temperature class. The process must be controlled / monitored to ensure the seal faces do not exceed the temperature limit. This can be achieved by ensuring there is a reasonable flow of the process media and the process temperature does not exceed the values listed in the 'Seal Operation Data', section 6.3.

A single mechanical seal fitted with a thermocouple, section 5.3.2, allows the user to provide alarms based on the temperature at the seal face, see section 6.2

6.2 Monitoring 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 measured locally at the seal face does not exceed the temperature listed in the 'Seal Operation Data', section 6.3, e.g. with a thermocouple fitted to the stationary seal ring.
- B. For double and single flushed mechanical seals only, ensuring the barrier / buffer fluid temperature does not exceed the value listed in the 'Seal Operation Data', section 6.3, and the total flow is a minimum of 30 l/hr. The temperature and flow must be measured after the flush housing outlet. If a recommended flow higher than 30 l/hr is stated on the 'Seal Operation Data', this should be adhered to.
- C. For double and single flushed mechanical seals only, ensuring the barrier / buffer fluid temperature does not exceed the value listed in the 'Seal Operation Data', section 6.3, and the total flow is sufficient to reach the temperature sensor within 10 seconds after leaving the flush housing outlet. The distance between the flush housing outlet and the temperature sensor should not exceed 200mm. This applies when the barrier / buffer flow is lower than 30 l/hr.

6 Technical data

Thermocouple

The thermocouple will allow temperature measurement when connected to appropriate instrumentation. The temperature reading of the thermocouple must not exceed the maximum temperature stated in the 'Seal Operating Data - section 6.3'.

The thermocouple supplied is of Type K design and should be installed and maintained to appropriate standards for intrinsically safe circuits e.g. EN60079-11/17.

When the use of thermocouples for monitoring is selected, then depending upon nature of application one or alternatively two thermocouples per pump may be used (one per seal). The thermocouple is only available on SRU pumps fitted with R90 type mechanical seals. The only seal face/seat option being silicon carbide versus silicon carbide. For horizontally ported pumps, the thermocouple is fitted on the upper shaft (seal more likely to run dry), regardless of whether pump has single or double mechanical seals. For vertically ported pumps, the thermocouple is fitted on the shaft (seal) being flushed last when pump has double mechanical seals and on either shaft when pump has single mechanical seals.

False temperature readings

False temperature readings can result from:

1. The thermocouple lead being cut, thereby the signal is subsequently lost.
2. If a short circuit occurs on the thermocouple lead the temperature measuring point will move from the seal face to the new point in contact and thus give a false reading. Therefore it is important to ensure that the temperature is being read at the seal face.

Correct function of the thermocouple

Correct function of the thermocouple must be ensured to avoid false temperature readings. Prior to start-up the thermocouple must be calibrated as closely as possible to the temperature of the pumped media i.e. $\pm 5^{\circ}\text{C}$. This must be undertaken during commissioning:

Example 1 (one thermocouple per pump)

Checking by manual inspection with the pump stationary.

1. Inspect visually that the thermocouple lead is fixed properly and there are no signs of wear or damage to the lead due to vibration, moving parts etc.
2. Produce a local temperature change around the stationary seal fitted with the thermocouple, making sure that the temperature reading reflects the change in temperature. This can be done by spraying cold spray on the back of the seal.

Example 2 (two thermocouples per pump)

Checking electronic monitoring of the thermocouple function. Compare the readings from both thermocouples. These should be similar during normal operation. If the reading differential between the two thermocouples increases this can be due to:

- A. One of the thermocouples being broken and therefore must be replaced.
 - B. Abnormal operating conditions i.e. dry running. If the temperature reading on both thermocouples exceeds the maximum temperature stated in the 'Seal Operating Data - section 6.3', this indicates abnormal operating conditions and the pump must be stopped.
-

6.3 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: * Single mechanical seal - low pressure flush
 Double mechanical seal - high pressure flush
 Max Flush temperature (°C): Recommended Flow : l/h

Note: End user must ensure that flush media is compatible with pumped media.

Comments :

Data marked * is to be entered if known and if applicable to the required duty.

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