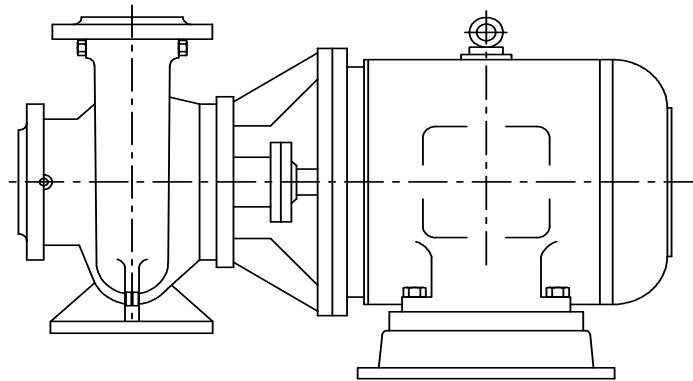


Eurostream Pumps



SPP Pumps Limited Crucible Close Mushet Industrial Park Coleford Gloucestershire GL16 8PS	Telephone: + 44 (0)1594 832 701	Document No: W22-001E Revision No: 9 Revision Note No: Windchill
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We **SPP Pumps Limited**

Of Crucible Close
Mushet Industrial Park
Coleford
Gloucestershire
England
GL16 8PS

Declare that:

Equipment: **CENTRIFUGAL PUMP**
Model/Type: **EUROSTREAM RANGE**
Serial Number: As shown on the Pump Nameplate

For pumps and pumpsets:

in accordance with the following Directives:

2006/42/EC	The Machinery Directive and its amending directives
2006/95/EC	Low Voltage Directive

have been designed and manufactured to the following specifications:

EN 809:1998+A1:2009	Pumps & Pump Units for Liquids - Safety Requirements
EN 12100:2003	Parts 1 and 2 - Safety of Machinery
EN 60204-1:2006	Safety of Machinery - Electrical Equipment

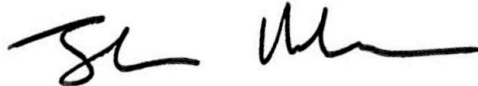
We hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The units comply with all essential requirements of the Directive.

For pumps supplied without drivers:

We hereby declare that this equipment is intended to be incorporated into, or assembled with other machinery to constitute relevant machinery to comply with the essential health and safety requirements of the Directive.

The machinery covered by this declaration must NOT be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive.

Signed:



Name: John Hollins

Position: Engineering Manager - Authorised to sign on behalf of SPP Pumps Limited
Mushet Industrial Park, Crucible Close, Coleford, Gloucestershire, GL16 8PS, England

Date: 25 February 2010

W22-001E

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Manufacturers Information:

(Where applicable)

Electric Motor Appendix I

Introduction

This manual gives the safety, installation, operation and maintenance instructions for pumps in the SPP Pumps EUROSTREAM range of close-coupled horizontal, end suction, centrifugal pumps for general and industrial use

Eurostream pumps are identified by their size code, the first number is the delivery branch diameter and the second number is the nominal diameter of the impeller in centimetres.

The pump sizes covered by this manual are:

32/13	32/16	32/20	32/26	-
40/13	40/16	40/20	40/26	-
50/13	50/16	50/20	50/26	-
65/13	65/16	65/20	65/26	65/32
-	80/16	80/20	80/26	80/32
-	-	100/20	100/26	100/32
-	-	-	125/26	-
(Clamped Casing Cover)			(Bolted Casing Cover)	

Eurostream pumps share common components with the SPP Pumps Unistream range of long coupled pumps.

1. General Information and Safety Instructions

The products supplied by SPP Pumps Ltd. have been designed with safety in mind. Where hazards cannot be eliminated, the risk has been minimised by the use of guards and other design features. Some hazards cannot be guarded against and the instructions below **MUST BE COMPLIED WITH** for safe operation. These instructions cannot cover all circumstances; **YOU** are responsible for using safe working practices at all times.

1.1 SPP Pumps products are designed for installation in designated areas, which are to be kept clean and free of obstructions that may restrict safe access to the controls and maintenance access points.

A **pump nameplate** is fitted to each unit and **must not be removed**. Loss of this plate could make identification impossible. This in turn could affect safety and cause difficulty in obtaining spare parts. Should accidental loss or damage occur, contact SPP Pumps Ltd. immediately.

1.2 Access to the equipment should be restricted to the personnel responsible for installation, operation and maintenance and they must be trained, adequately qualified and supplied with the appropriate tools for their respective tasks.

1.3 SPP Pumps Ltd. requires that all personnel that are responsible for installation, operation or maintenance of the equipment, have access to and study the product instruction manual **BEFORE** any work is done and that they will comply with all local and industry based safety instructions and regulations.

1.4 Ear defenders should be worn where the specified equipment noise level exceeds locally defined safe levels. Safety glasses or goggles should be worn where working with pressurised systems and hazardous substances. Other personal protection equipment must be worn where local rules apply.

1.5 Do **NOT** wear loose or frayed clothing or jewellery that could catch on the controls or become trapped in the equipment.

1.6 Check and confirm that the manual is the relevant copy by comparing the serial number on the identification plate with that on the manual.

- 1.7 Note any limits of product application specified in the contract documentation. Operation of the equipment outside these limits will increase the risk from hazards noted below and may lead to premature and hazardous pump failure.
- 1.8 Clear and easy access to all controls, gauges and dials etc. MUST be maintained at all times. Hazardous or flammable materials must NOT be stored in pump rooms unless safe areas or racking and suitable containers have been provided.
- 1.9 **IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF THIS SPP PUMPS PRODUCT COULD RESULT IN INJURY OR DEATH.**
- 1.10 Within the manual, safety instructions are marked with safety symbols.



Hazard

This symbol refers to general mechanical aspects of safety.



Hazard

This symbol refers to electrical safety.

ATTENTION

This symbol gives warning of a hazard to the pump itself, which in turn, could cause a risk to personal safety.

2. Transport Handling and Storage Instructions

2.1 Transport

Eurostream pumps are despatched fully assembled. Pumps are protected against corrosion and packed for transport by normal road, rail and sea carriers. Handling



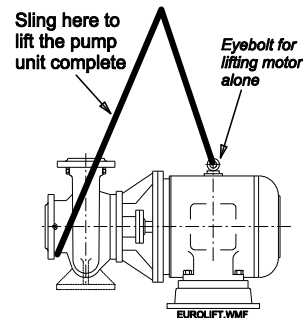
Crushing Hazard

When lifting the pump unit, use lifting equipment having a safe working load rating suitable for the weight specified. Use suitable slings for lifting any pump not provided with lifting points.

The use of suitable forklift truck and four-chain crane sling equipment is recommended but locally approved equipment of suitable rating maybe used.

Pumps are usually supplied on pallets for handling by forklift truck, to lift from the pallet the pump should be slung as shown.

Pump dimensions and weights are shown on the pump general arrangement drawing.



2.3 Storage

2.3.1 Temporary Storage for up to Six Weeks

If the pump is not to be used immediately, it should be stored carefully in a horizontal position, in a sheltered, dry location. Additional rust preventative should be applied to all unpainted carbon steel or cast iron parts, and should not be removed until final installation.

2.3.2 Long Term Storage



Shearing Hazard

Do NOT place fingers or hands etc. into the suction or discharge pipe outlets and do NOT touch the impeller, if rotated this may cause severe injury.

To prevent ingress of any objects, retain the protection covers or packaging in place until removal is necessary for installation. If the packaging or suction and discharge covers are removed for inspection purposes, replace afterwards to protect the pump and maintain safety.

For special protection of electric motors, refer to the manufacturers' instructions. In the Appendix I.

2.3.3 Exposed or Extreme Conditions Storage

For exposed storage or extreme variants in atmospheric or environmental conditions, please refer to SPP Pumps Ltd. for special storage instructions to suit the conditions applicable.

3. General Description

The SPP Pumps range of Eurostream Pumps are horizontal centrifugal pumps that comply with Pump Standard DIN24255.

The mechanical assembly comprises an electric motor fitted with an extended shaft to carry a double shrouded type impeller. This

is connected by a support frame to an end suction volute casing, fitted with wear ring(s). The motor, frame, shaft and impeller assembly can be withdrawn from the volute for maintenance without disconnection of pipework.

The discharge branch is normally positioned vertically opposite the motor mounting feet, but it can be orientated in any other direction that the motor flange holes permit. Motors can be supplied with or without slide rails, and on smaller pump sizes only, flange mounted motors may be specified. Additional mounting feet are fitted to the volute casing **BUT these are NOT to be used to support the pump** unless the pump is fitted with a flange-mounted motor.

The shaft is sealed with a standard mechanical seal.

Nameplate details are shown on the back cover, full pump specification can be supplied on a data sheet, if requested.

- Note (1) - Head specified is the Duty Head generated by the pump only.
 (2) - Suction pressure must be included when assessing the Maximum Working Pressure.

For details of the motor supplied, refer to the manufacturer's instructions in Appendix I.

4. Assembly and Installation



Shearing Hazard

Do NOT place fingers or hands etc. into the suction or discharge pipe outlets and do NOT touch the impeller, if rotated this may cause severe injury. To prevent ingress of any objects, retain the protection covers or packaging in place until removal is necessary for installation.

4.1 Initial Inspection for Damage

During transport and storage, accidental damage to the pump may have occurred. When the pump is to be installed, or in the event of a handling accident, carefully check that the pump has sustained no damage **before** installation and commissioning.

4.2 Preparation for Mounting

Before installation, check that the pump mounting location is suitable for accepting the pump. Refer to Section 8, for details of pump installation dimensions or to a certified General Arrangement Drawing when available.

4.3 Pump Preparation



Abrasion and Entrapment Hazard

Do NOT touch any moving or rotating parts. Guards are provided to prevent access to these parts, where they have been removed for maintenance they **MUST** be replaced before operating the equipment.

Remove packaging but leave the flange covers in place, check that impeller rotates freely by hand by turning the shaft.

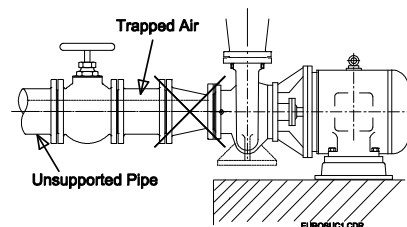
4.4 Pump Installation

Eurostream pumps are designed to be mounted on rigid foundations, using four bolts to firmly attach the motor feet or slide rails to suitable baseplate, framework or concrete plinth. **Only when using flange mounted motors is the pump to be mounted using the volute casing feet.**

4.5 Suction Pipework

The run of suction pipework must be such that air can NOT become trapped where it would be sucked into the pump on starting. The bore of suction pipe is recommended to be one or two sizes larger than the pump suction branch and reducers if used must be eccentric to eliminate the possibility of an air pocket being formed.

Unacceptable Suction Pipework



Bends in the suction pipeline should be as large as possible, the pipe made as short and as straight as possible and all joints must be fully airtight. If fitting a foot valve, it should have a free area of one and a half times the area of the suction pipe.

Where pumping water at temperatures above 70°C, care must be taken to ensure that enough pressure is available at the impeller entry to prevent vaporisation.

An appropriate fine strainer is recommended to prevent foreign matter from being drawn into the pump. A screen or basket strainer may also be required to hold back larger items. These should be sized to maintain the

flow through them to below 0.6 m/s.

The suction pipe work must be flushed clean to ensure that site debris is not drawn into the pump when it is commissioned.

4.7 Discharge Pipework

The bore of the discharge pipe should be sized to ensure a flow velocity of 2.5 to 3 m/s is not exceeded. This is usually one size larger than the discharge branch. Pipework should be as short and straight as possible to reduce friction head loss.

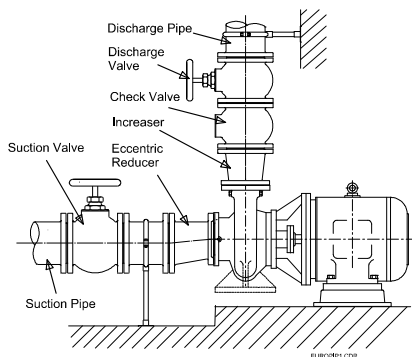
A non-return valve is usually fitted to prevent the pump from excessive back pressure and reverse rotation and a discharge valve is usually fitted to regulate the flow and allow for inspection and maintenance on the pump.

The suction and discharge pipework must be independently supported and positioned such that no excessive forces and moments are exerted on the pump flanges.

ATTENTION

Failure to support suction and delivery pipework may result in distortion of the pump casing, with the possibility of early pump failure.

Preferred Pipework



4.8 Foundations

The motor feet or slide rails must be secured to substantial foundations with suitable foundation bolts to minimise vibrations. After the pump has run for about 200 hours, the foundation bolts should be checked for tightness

5. Commissioning and Operation

5.1 Commissioning Checks

These checks must be done after first installation and after pump maintenance that required removal of the rotating assembly.



Abrasion and Entrapment Hazard

Do NOT touch any moving or rotating parts. Guards are provided to prevent access to these parts, where they have been removed for maintenance they MUST be replaced before operating the equipment.

Check that the rotating assembly is free to rotate by hand before connecting the power supply. Also check that the piping system has been properly connected with all joints tightened and instrumentation is in position.

ATTENTION

Check that the pump is primed. Pumps should never be run dry as the pumped liquid acts as a lubricant for the close running fits surrounding the impeller and damage will be incurred.

Prime the pump using an ejector, exhauster or vacuum pump. If a foot valve is used in the suction line the pump may be primed by venting and filling the casing with liquid.

Connect the electrical supply to the pump unit. Momentarily switch on motor and check direction of rotation. This should be such that the pump assembly turns clockwise when viewed on the driven end. For three phase electric motors, if direction of rotation is incorrect, disconnect the supply and change over two of three supply wires.

5.2 Starting Procedure

BEFORE A EUROSTREAM PUMP IS STARTED ALWAYS ENSURE THAT THE SUMP IS FILLED TO THE CORRECT LEVEL WITH LIQUID, AND THAT ANY LEVEL CONTROLS ARE FUNCTIONING CORRECTLY.



Abrasion and Entrapment Hazard

Do NOT touch any moving or rotating parts. Guards are provided to prevent access to these parts, where they have been removed for maintenance they MUST be replaced before operating the equipment.

Check that the suction valve is open and that the pump is primed.

Open the discharge valve to one quarter open to prevent hydraulic lock from occurring. Switch on the motor and allow it to build up to full operating speed. Slowly open discharge valve until the pump reaches the required duty condition.

Check that the motor is not overloading, unit is not vibrating or excessively noisy, the motor is not overheating, and that the pump is developing the correct flow and head requirements.

If the pump is operating at its normal speed, the pump should be shut down at once if any of the following defects are found:

- a) No liquid delivered.
- b) Not enough liquid delivered.
- c) Not enough pressure.
- d) Loss of liquid after starting.
- e) Vibration.
- f) Motor runs hot.
- g) Excessive noise from cavitation.
- h) Pump overheating.

Recommended corrective action for these faults is given in Section 7 Faults and Remedial Action.

5.3 During Operation



Hot Surfaces Hazard

Do NOT touch surfaces that during normal running will be sufficiently hot to cause injury. These are marked with the HOT warning symbol. Note that these surfaces will **remain hot after the pump has stopped**; allow sufficient time for cooling before maintenance. Be cautious and note that other parts of the pump may become hot if a fault is developing.



Cold Conditions Hazard

Do NOT operate water pumps in temperatures below freezing point, without first checking that the pumped fluid is not frozen and the pump is free to turn. Pumps in these environments should be drained down during inactivity and re-primed before starting.



Hazardous Noise

In addition to local or site regulations for noise protection, SPP Pumps Ltd. recommend the use of Personal Ear Protection equipment in all enclosed pump rooms and particularly those containing diesel engines. Care must be taken to ensure that any audible alarm or warning signal can still be heard with ear defenders

worn.

Periodic Checks:

- a) **Motor Bearings:**
Check the bearing temperatures do not exceed 70°C as an increase may indicate the early stages of bearing trouble.
- b) **Noise:**
Listen for any unusual noise or an increase in normal sound level.

This may result from:

- i) Loose fasteners for guards and other equipment.
- ii) Air trapped in the pump i.e. the pump was not fully primed.
- iii) Cavitation caused by air in the liquid from leaks in the suction pipework.
- iv) Small solids in the liquid.

NOTE - At certain installations or at certain operation points on the pump curve, the noise level 70dB (or the actual pump specified noise level) can be exceeded.

- c) **Suction Gauge Reading:**
If this is higher than normal, investigate and check that valves in the suction pipework are fully open or that the suction lift may have increased.
- d) **Discharge Gauge Reading:**
If this is lower than normal, check for a leak in the associated pipework or that a valve in the delivery line has been opened when normally it is partially closed.

5.4 Stopping Procedure

Stop the motor then fully close the discharge valve.

6. Maintenance and Service

6.1 General Introduction

SPP Pumps Eurostream pumps will provide many years of trouble free service when maintained in accordance with these instructions. In the event of failure of the pump it is recommended that SPP Pumps Ltd. Service Department be called to investigate and carry out repairs. The following instructions are given to cover the main elements of strip and rebuild but do NOT include instructions for work that MUST be done by an SPP Pumps Ltd. Service Engineer.

Recommended Maintenance Schedule

Period:	Maintenance Required:
Weekly	Carry out periodic checks as shown in Section 5.3 and take corrective action as shown in Section 7.
Where specified in the motor manufacturer's instructions at the recommended intervals, check and lubricate the motor bearings.	
Half Yearly or After 5000 Hours Running	Check and tighten all holding down bolts if found loose, refer to Section 9 for recommended bolt tightening torques.
Each Year	Assess the performance of the pump against the duty specifications and take corrective action as shown in Section 7

The following hazards may arise during maintenance work:



Fluid Pressure Jet Hazards

Check and ensure that the pump operates at below the Maximum Working Pressure specified in the manual or on the pump nameplate and before maintenance, ensure that the pump is drained down.



Hazardous Materials

Wear a suitable mask or respirator when working with packing or gasket components that contain fibrous material, as these can be hazardous when the fibrous dust is inhaled. Be cautious, if other supplier's components have been substituted for genuine SPP Pumps parts, these may then contain hazardous materials.



Hazardous Gases, Mists, Sprays and Leaks

Be aware of the hazards relating to the pumped fluid, especially the danger from inhalation of noxious and toxic gases, skin and eye contact or penetration. Obtain and understand the hazardous substance (COSHH) data sheets relating to the pumped fluid and note the recommended emergency and first aid procedures.

BEFORE ATTEMPTING ANY MAINTENANCE ON A PUMP, PARTICULARLY IF IT HAS BEEN HANDLING ANY FORM OF HAZARDOUS LIQUID, ENSURE THAT THE UNIT IS SAFE TO WORK ON. THE PUMP MUST BE FLUSHED THOROUGHLY WITH A SUITABLE CLEANSER TO PURGE AWAY ANY OF THE PRODUCT LEFT IN THE PUMP COMPONENTS. THIS SHOULD BE CARRIED OUT BY THE PLANT OPERATOR AND A CERTIFICATE OF CLEANLINESS OBTAINED BEFORE STARTING WORK. TO AVOID ANY RISK

TO HEALTH IT IS ALSO ADVISABLE TO WEAR PROTECTIVE CLOTHING AS RECOMMENDED BY THE SITE SAFETY OFFICER, ESPECIALLY WHEN REMOVING OLD SEALS OR GASKETS THAT MAY BE CONTAMINATED.

6.2 Preparation for Maintenance



Electric Shock & Accidental Starting

Hazard

ISOLATE the equipment before any maintenance work is done. Switch off the mains supply, remove fuses, apply lockouts where applicable and affix suitable isolation warning signs to prevent inadvertent re-connection.

In order to avoid the possibility of maintenance personnel inhaling dangerous fumes or vapours. It is recommended that maintenance work be carried out away from the pump location by removal of the motor and shaft assembly to a suitable maintenance area.

No special tools are required for dismantling and re-assembling, however, it is important to ensure the suitable lifting equipment is available and that the work is carried out in a clean area.

6.3 Maintenance of Mechanical Seals

Generally there are is no maintenance required on mechanical seals, they should be replaced if leakage occurs.

6.4 Dismantling and re-assembly:

6.4.1 General

If the pump is maintained and serviced regularly, breakdowns that require the pump to be dismantled should not occur.

If a fault occurs, the cause should be identified before dismantling. Refer to Section 7 - Faults and Remedial Action. Refer to Section 8 - for the Pump Section Drawing for your pump.

When the pump is being dismantled, parts must be handled with care, to avoid damage by dropping and hammer blows.

Where new joints are made, correct gasket thickness must be maintained.

After re-assembly the rotor must turn easily by hand, otherwise premature pump failure may occur.

6.4.2 Dismantling

Introduction

In general when pumps are dismantled, inspected and/or replacement parts fitted, the work is undertaken for one of the following reasons.

a) **Preventative Maintenance:**

Because the time for the regular periodic inspection has become due. Planned inspection and maintenance at pre-determined intervals is a sound insurance against a forced shutdown due to a failure at a more inconvenient time.

b) **Remedial Maintenance:**

Perceptible fall off in pump performance affecting capacity and pressure or: failure of mechanical seal or: excessive and continuous vibration with persistent noisy operation.

The extent of dismantling required will depend upon the reasons above.

In the case of preventative maintenance, inspections are done at pre-selected times and the pump usually requires complete dismantling, so that all parts can be cleaned, examined and measured for wear.

The extent of dismantling for remedial maintenance will depend upon the cause of failure and needs only to reveal the source of the trouble.

When dismantling the pump, the volute casing can remain mounted in the pipework. Tightly shut both the inlet (if fitted) and outlet valves and disconnect any external service connectors.

On pumps using motors with frame sizes up to and including D180M, it is NOT advisable to remove the stub shaft under normal pump maintenance conditions. On these pumps, the stub shaft (21.11) is attached to the motor using a collet nut and grub screw arrangement. It requires special tools and fixtures to remove and reassemble correctly. It is recommended that this be performed only by a trained SPP Pumps Ltd. Service Engineer or an authorised SPP Pumps Ltd. dealer/agent.

On pumps with larger motors, nominally over 22kW, the stub shaft locates positively onto the motor shaft and is secured using a Ringfeeder Shrink Disc assembly (150.0).

To dismantle pump, proceed in the following

sequence:

1. Drain liquid from the casing, remove plug (90.3).
2. Unscrew nuts (92.09) on motor slide rail tee bolts (90.8).
3. Unscrew nuts (92.0) on volute casing studs (90.2)
4. Motor (80.1), complete with supporting frame (34.4) and casing cover (16.1), can now slide back along slide rails (102.01) and clear of volute casing (10.2).

Note! On the pumps fitted with a clamped casing cover, care must be taken not to disturb the joint between the casing cover (16.1) and supporting frame (34.4).

5. The impeller (23.0) is now clear of casing (10.2) and can be removed by unscrewing the impeller nut (92.2) in a counter clockwise direction and removing the lock washer (93.0).

6. Remove the impeller key.

7. To remove the rotating elements of the mechanical seal, **either:**

- a) For the following pumps, fitted with shaft sleeves (52.3).

32/13	32/16	32/20	32/26
40/13	40/16	40/20	40/26
50/13	50/16	50/20	50/26*
65/13	65/16	65/20*	
	80/16		

With the impeller (23.0) and key (94.01) removed, the shaft sleeve (52.3) complete with the rotating element of the mechanical seal (43.3) can now be slid off shaft (21.11).

Note * - Pump sizes 65/20 and 50/26 are supplied in either configuration depending on motor size.

- b) or the following pumps, fitted with solid stainless steel shafts (21.1) and abutment rings (160.0)

	50/26*		
65/20*	65/26	65/32	
80/20	80/26	80/32	
100/20	100/26	100/32	
	125/26		

With the impeller (23.0) and key (94.01) removed the rotating element of the mechanical seal (43.3) can be removed from the shaft.

8. The seal should be carefully examined and if worn, should be replaced. Do not remove the rubber or elastomer bellows from the

sleeve, unless necessary for examination or cleaning.

9. To remove the stationary element of the mechanical seal:

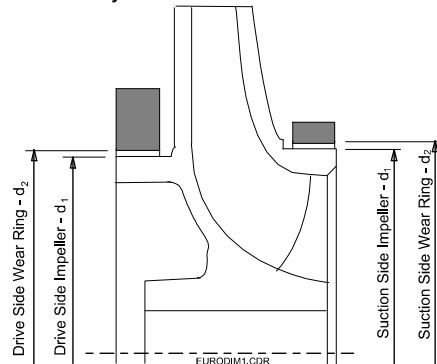
- a) For pumps fitted with bolted casing cover, remove stud nuts (92.02) from casing cover studs (90.22).
- b) For pumps, fitted with a clamped casing cover, and to continue dismantling pumps fitted with bolted casing covers:

Remove the casing cover (16.1), complete with the stationary element of mechanical seal (43.3) from the supporting frame (34.4) by carefully prising apart with screwdrivers or similar tools which fit in recess between the casing cover (16.1) and the supporting frame (34.4).

Care must be taken to ensure that the casing cover (16.1) does not damage the shaft (21.1).

6.4.3 During and After Dismantling

- 1. All parts must be carefully cleared and tested for wear. Recondition or replace parts where necessary.



2. Wear Ring Diameters.

Pump Size	Suction Side		Drive Side	
	Dia. 1	Dia. 2	Dia. 1	Dia. 2
Tolerance	- 0.1mm	F8	- 0.1mm	F8
32/13 32/16	69.7	70	N/A	N/A
32/20 32/26 40/13 40/16 40/20	79.7	80	N/A	N/A
40/26 50/13 50/16 50/20	94.7	95	N/A	N/A
50/26 65/13 65/16 65/20 65/26	114.7	115	N/A	N/A
65/32	129.6	130	124.6	125
80/16 80/20 80/26	129.6	130	N/A	N/A
80/32	139.6	140	134.6	135
100/20 100/26	159.6	160	N/A	N/A
100/32	159.6	160	154.6	155
125/26	179.6	180	N/A	N/A

6.4.4 Re-assembly

- 1. Ensure that all parts to be fitted are clean and free from burrs, with screw threads and abutting faces clear and free from damage
- 2. Lubricate the outer surface of the stationary element of the mechanical seal (43.3) with soapy water or silicone grease (not oil), ensure that it is square to its housing in the casing cover (16.1) and push home by hand, taking care not to apply excessive force or to damage the sealing surface. Check that it has been seated fully and that the sealing surface is clean and undamaged.
- 3. Refit the casing cover (16.1) to the support frame (34.4). for bolted covers only, fit the retaining nuts (92.02), tightening them uniformly and in diagonally opposed pairs sequence.
- 4. To fit the rotating element of the mechanical seal (43.3), **either:**
 - a) For pumps fitted with stainless steel shaft sleeve (52.3).

Lubricate the inner and outer surfaces of the sleeve lightly with silicone grease. Locate spring and spring holder of mechanical seal over shaft sleeve (52.3).

Slide seal face assembly along sleeve (52.3)

up to the spring.

Slide shaft sleeve (52.3) over shaft (21.1), larger bore first, ensuring that mechanical seal faces are clean, free from damage and square and that gasket (40.01) is correctly seated.

Ensure that the rotating seal face is floating against the spring before re-fitting the impeller.

- b) For pumps fitted with solid stainless steel shaft (21.11) and no sleeve.

Slide the seal face assembly along the shaft (21.11) until it butts against the fixed face.

Locate the spring and spring holder over the shaft.

Slide abutment ring (160.0) over shaft.

Ensure that the rotating seal face is floating against the spring before re-fitting the impeller.

Locate impeller key (94.01) into shaft key way.

Relocate impeller (23.0) on shaft (21.1).

Refit impeller lock washer (93.0) and screw on impeller nut (92.2) and **carefully tighten**.

Ensure impeller rotates freely by hand. If not investigate and rectify.

Where used, slide motor tee-bolts (90.09) back into slide rails (102.01).

Relocate casing cover (16.1) into casing (10.2), using casing studs (90.2), ensuring that gasket (40.0) is seated correctly.

Fit nuts (92.0) and tighten uniformly in diagonally opposed pairs sequence.

Fit and tighten the motor mounting bolts or where used, the tee-bolt nuts (92.09).

Reconnect supply, ensuring correct pump rotation.

For SPP Pumps Ltd. Spares and Service Department, telephone 0118 9323123, see the back cover for further details of SPP Pumps Ltd. After Sales Service.

7. Faults and Remedial Action

POTENTIAL FAULT OR DEFECT:					
No liquid delivered.					
Insufficient liquid delivered.					
Liquid delivered at low pressure.					
Loss of liquid after starting.					
Excessive vibration.					
Motor runs hotter than normal.					
Excessive noise from pump cavitation.					
Pump bearings run hotter than normal.					
PROBABLE CAUSES					
●					Pump not primed.
●	●	●			Speed too low.
				●	Speed too high.
●	●	●	●	●	Air leak in suction pipework.
	●	●			Air leak in mechanical seal.
		●	●	●	Air or gas in liquid.
●	●	●		●	Discharge head too high (above rating).
		●			Suction lift too high.
	●				Not enough head for hot liquid.
●	●	●	●	●	Inlet pipe not submerged enough.
	●	●		●	Viscosity of liquid greater than rating
				●	Liquid density higher than rating.
●	●	●	●	●	Insufficient nett inlet head.
●	●		●		Impeller blocked.
●	●	●			Wrong direction of rotation.
	●	●			Excessive impeller clearance.
	●	●	●		Damaged impeller.
				●	Rotor binding.
				●	Defects in motor.
				●	Voltage and/or frequency lower than rating.
				●	Lubricating oil dirty or contaminated.
				●	Foundation not rigid.
				●	Misalignment of pump and driver.
				●	Bearing worn.
				●	Rotor out of balance.
				●	Shaft bent.
	●				Impeller too small.

CAUSE	REMEDIAL ACTION
Pump not primed.	Fill pump and suction pipe completely with fluid.
Speed too low.	Check that the motor is correctly connected and receiving the full supply voltage also confirm that the supply frequency is correct.
Speed too high.	Check the motor voltage.
Air leak in suction pipework	Check each flange for suction draught, rectify as necessary.
Air leak in mechanical seal.	Check all joints, plugs and flushing lines, if fitted. Note that prolonged running with air in the mechanical seal will result in damage and failure of the seal.
Air or gas in liquid.	It may be possible to increase the pump performance to provide adequate pumping.
Discharge head too high (above rating).	Check that valves are fully open and for pipe friction losses. An increase in pipe diameter may reduce the discharge pressure.
Suction lift too high.	Check for obstruction of pump inlet and for inlet pipe friction losses. Measure the static lift, if above rating, raise the liquid level or lower the pump.
Not enough head for hot liquid.	Reduce the positive suction head by raising the liquid level.
Inlet pipe not submerged enough.	If the pump inlet cannot be lowered, provide a baffle to smother the inlet vortex and prevent air entering with the liquid.
Viscosity of liquid greater than rating	Refer to SPP Pumps Ltd. for guidance to increase the size or power of the motor or engine.
Liquid density higher than rating.	Refer to SPP Pumps Ltd. for guidance to increase the size or power of the motor or engine.
Insufficient nett inlet head.	Increase the positive suction head by lowering the pump or raising the liquid level.
Impeller blocked.	Dismantle pump and clean the impeller.
Wrong direction of rotation.	Check driver rotation with the direction arrow on the pump casing.

CAUSE	REMEDIAL ACTION
Excessive wear ring clearance.	Replace the wear rings and/or the impeller when the clearance exceeds the maximum adjustment.
Damaged impeller.	Replace if damaged or vanes are eroded.
Rotor binding.	Check for shaft deflection, check and replace bearings if necessary.
Defects in motor.	Ensure that motor is adequately ventilated. Refer to manufacturers instructions.
Voltage and/or frequency lower than rating.	If voltage and frequency are lower than the motor rating, arrange for provision of correct supply.
Lubricating oil dirty or contaminated.	Dismantle the pump, clean the bearings, reassemble the pump and fill with new oil.
Foundation not rigid.	Ensure that the foundation bolts are tight; check that foundations match SPP Pumps Ltd. recommendations.
Misalignment of pump and driver.	Realign the pump and driver as specified.
Bearings worn.	Remove the bearings, clean and inspect for damage and wear, replace as necessary.
Rotor out of balance.	Check impeller for damage, replace as necessary.
Shaft bent.	Check shaft run-out and replace if needed.
Impeller too small.	Refer to SPP Pumps Ltd. for options to fit a larger impeller.

8. Pump Details

8.1 Pump Dimensions

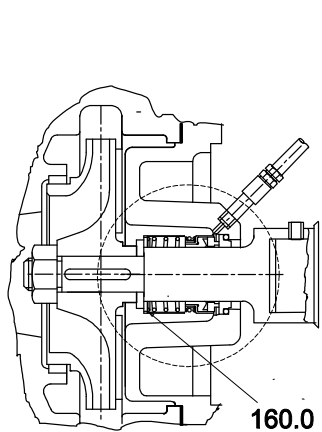
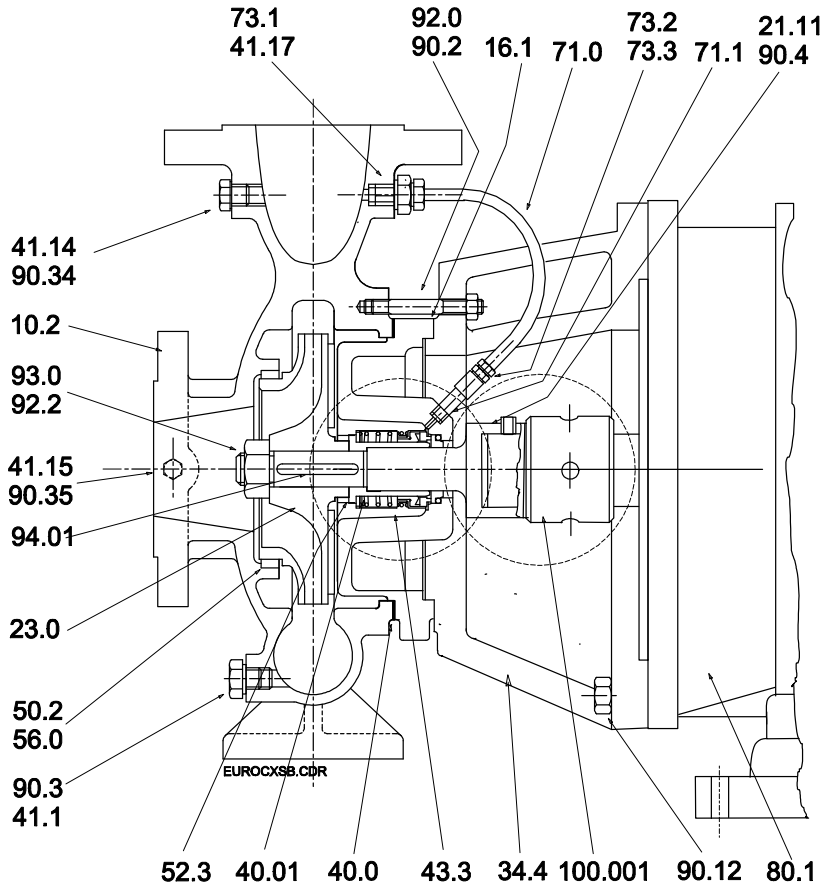
For installation dimensions and pump weights, please refer to a Pump General Arrangement drawing or to pump information from the SPP RAPID electronic catalogue.

8.2 Eurostream Pump Connections

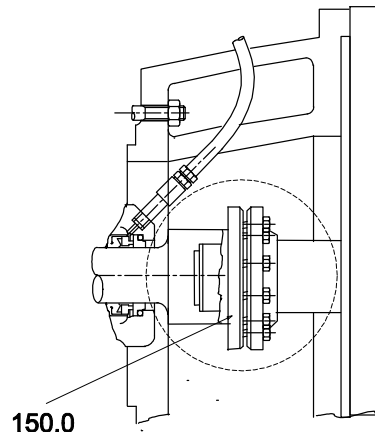
Suction & Delivery Flanges:	Auxiliary Connections:			
Suction and Delivery Flanges are drilled to BS4504 PN16 with Raised Face	I	Pressure Gauge	Rp ¹ / ₄	Except for sizes 100/26, 125/26, 80/32, 100/32, 125/32, 150/32, 100/40, 125/40, & 150/40 which are Rp ¹ / ₂
	II	Suction Gauge	Rp ¹ / ₄	
	III	Vent / Seal Flush	Rp ¹ / ₄	All Sizes
	VII	Casing Drain	Rp ³ / ₄	Except sizes 32/13, 40/13, 50/13, 65/13, 32/16, 40/16, 50/16, 32/20, 40/20 & 50/20 which are Rp ¹ / ₄

8.3 Pump Cross Section Drawings

Typical sections for pumps with clamped casing covers:
Pump sizes - 32/13, 32/16, 40/13, 40/16, 50/13, 50/16, 65/13, 65/16, 80/16, 80/20, & 100/20.



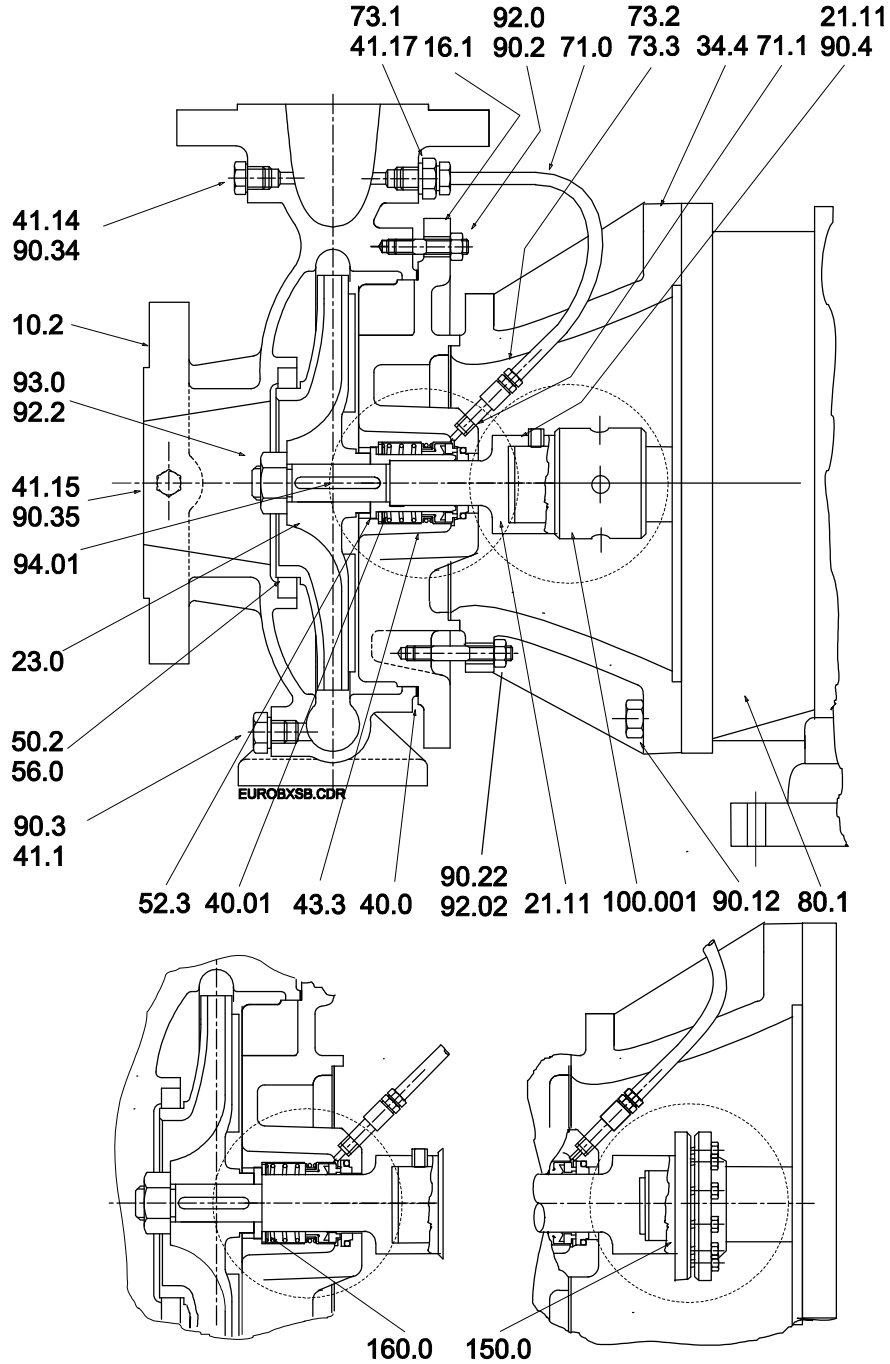
**Seal mounted on the shaft
for pumps 80/20 & 100/20
with motor frame sizes from
D100 to D180**



**Ring Feeder shaft attachment
for pumps 80/20 & 100/20
with motor frame sizes from
D200 to D250**

**Typical sections for pumps with bolted casing covers:
Pump sizes - 32/20, 32/26, 40/20, 40/26, 50/20, 50/26, 65/20, 65/26, 65/32,
80/26, 80/32, 100/26, 100/32 & 125/26.**

Please Note: Pump sizes 65/32, 80/32 & 100/32 are fitted with back case wear rings, not shown below.



**Seal mounted on the shaft for
pumps 65/26, 80/26, 100/20
& 125/26 with motor frame
sizes from D100 to D180**

**Ring Feeder shaft attachment
for pumps 50/26, 65/26, 80/26
& 100/26 with motor frame
sizes from D200 to D250**

8.4 Parts Identification List - (Numbers as shown on cross section drawings)

Part No.	Description:	Part No.	Description:
10.2	Volute Casing	80.1	Electric Motor
16.1	Casing Cover	90.12	Hexagon Head Screw
21.11	Stub Shaft	90.2	Stud (Volute Casing)
23.0	Impeller	90.22	Stud (Casing Cover)
34.4	Support Frame	90.3	Drain Plug (Volute)
40.0	Gasket (Volute to Cover)	90.34	Plug (Delivery Gauge Tapping)
40.01	Gasket (Shaft to Sleeve)	90.35	Plug (Suction Gauge Tapping)
41.1	Joint Ring (Volute Drain)	90.4	Grub Screw (Stub Shaft)
41.14	Joint Ring (Delivery Gauge Tapping)	92.0	Nut (Volute Studs)
41.15	Joint Ring (Suction Gauge Tapping)	92.2	Impeller Nut
41.17	Joint Ring (Flushing Line Tapping)	93.0	Lock washer (Impeller)
43.3	Mechanical Seal	94.01	Key (Impeller)
50.2	Wear Ring (Outer)	100.001	Locking Nut
50.21	Wear Ring (Inner - not shown)	101.001	Hex Socket Head Screw (Not Shown)
52.3	Shaft Sleeve	102.001	Slide Rail (Not Shown)
56.0	Pin (Case Wear Ring)	103.001	Tee Bolt (Not Shown)
71.0	Flexible Pipe	104.001	Nut (Tee Bolt - Not Shown)
71.1	Pipe	105.001	Motor Packer (Not Shown)
73.1	Pipe Union (Flushing Line)	150.0	Ring Feeder Assembly
73.2	Pipe Union (Flushing Line)	160.0	Abutment Ring
73.3	Pipe Coupling		

Replacement parts should be obtained from SPP Pumps Ltd. Spares Department; use of parts from un-approved suppliers will invalidate the pump warranty. Spare parts kits are available to cover replacement of major components, please refer to the following tables. When ordering spare parts please quote the pump serial number from the pump identification plate.

Spares Kits for Eurostream Pumps

Spares Kit Application	Comprising Parts (Where required - see Parts List)
Gasket Set	40.0, (40.01) & 93.0
Mechanical Seal Replacement	43.3, (52.3, 40.01) & 93.0
Shaft Replacement	21.11, 90.4, 92.2, 93.0 & 94.01
Impeller Replacement	23.0, 50.2, 56.0, 93.0 & 94.01

(Note - A Gasket Set is needed when replacing major components)

Spares Kit Part Numbers (Quote as 'SPK ***)

Pump Size	Gasket Kit	Mech. Seal Kit	Shaft Kit	Impeller Kit	Pump Size	Gasket Kit	Mech. Seal Kit	Shaft Kit	Impeller Kit
32/13	531	101	604	201	65/16	532	101	607	208
32/16	532	101	606	205	65/20	533	101	609	213
32/20	533	101	607	210	65/26	532	105	605	231
32/26	534	101	608	214	65/32	535	105	605	231
40/13	531	101	606	202	80/16	532	101	608	209
40/16	532	101	607	206	80/20	536	105	611	233
40/20	533	101	609	211	80/26	532	105	605	234
40/26	534	101	609	215	80/32	535	105	605	235
50/13	531	101	606	203	100/20	536	105	605	236
50/16	532	101	609	207	100/26	532	105	605	237
50/20	533	101	609	212	100/32	535	105	611	238
50/26	534	101	610	216	125/26	532	105	605	239
65/13	531	101	607	204					

9. Additional Information

9.1 Standard Metric Nut and Bolt Torque Recommendations

This information is for reference only. The user must check that the torque figures listed here are applicable to the fasteners used. Nuts and bolts should be neither under nor over tightened.

Grade of Bolt	Approximate Torque (Nm) for Bolt Diameters									
	M5	M6	M8	M10	M12	M16	M20	M24	M30	M36
4.6	2.7	4.5	11	22	38	95	185	320	633	1110
8.8	6.9	11.7	28	56	98	244	476	822	1634	2855
10.9	9.4	15.9	38	77	134	332	646	1120	2223	3885
12.9	11.2	19.1	46.4	92	160	397	775	1342	2666	4660

Note: These torque figures are approximate, and for **unplated** fasteners only. No allowance has been made for special finishes or lubricants, washers or mating surfaces.

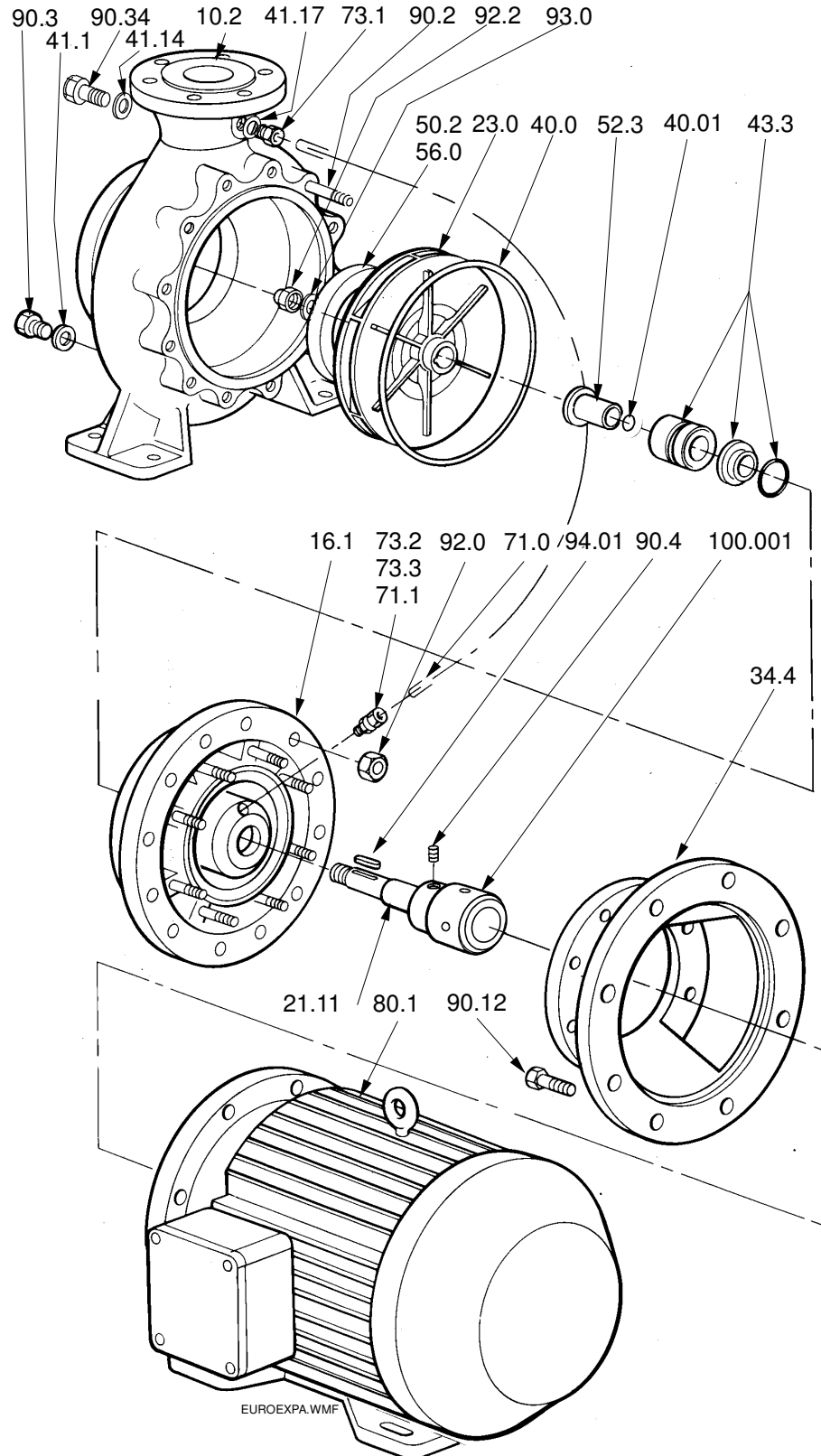
Bolt and Nut Grade Combinations

Grade of BOLT	4.6	8.8	10.9	12.9	Note: It is permissible to fit higher grade nuts than recommended.
Grade of NUT	4	8	12	12	

Grade Identification

BOLTS & NUTS - Grade 4.6 BS4190 (ISO272, 885, 888 & 4759/1). Grade marking is optional. Normally there will be no mark other than the 'M' thus:		
BOLTS - Grade 8.8 BS 3692 (ISO272, 4759/1). Grade marking is mandatory, may also have trademarks.		NUTS - Grade 8 Indented marks as a clock face, dot at 12.00, bar at 8.00, indicates grade 8 nut.
High Strength Friction Grip Bolts & Nuts		
BOLT 	NUT 	BOLT Grade 10.9
		NUT Grade 12

9.2 Exploded Pump Diagram Showing Typical Pump (for information only)



SPARES & SERVICE

SPP Pumps operate a comprehensive Spares and Service support network throughout the world, and can be contacted as follows:

SPARES & SERVICE

Telephone:

+44 (0)118 932 3123

For spare parts, supply only.

ask for -

Spares Dept.

For breakdowns, spare parts and on-site fitting, pump installation and commissioning, and service contracts.

ask for -

Service Dept.

For breakdowns outside office hours.

Telephone:

+44 (0) 8443 759662

Spares & Service Office
SPP Pumps Limited
1420 Lakeview
Arlington Business Park
Reading
Berkshire
RG7 4SA

General Fax line:


+44 (0)118 932 3123

Direct Fax line:

+ 44 (0)118 930 3259

Copies of this manual are available from the SPP Pumps Limited Spares & Service Department by quoting the manual reference number and revision number.

You may enter details from your pump nameplates here for quick reference.

		SPP Pumps Coleford, ENGLAND	
		Tel: +44(0)1594 832701	
PUMP TYPE		SERIAL No.	
CAPACITY	L/s		
SPEED	rpm	HEAD	m