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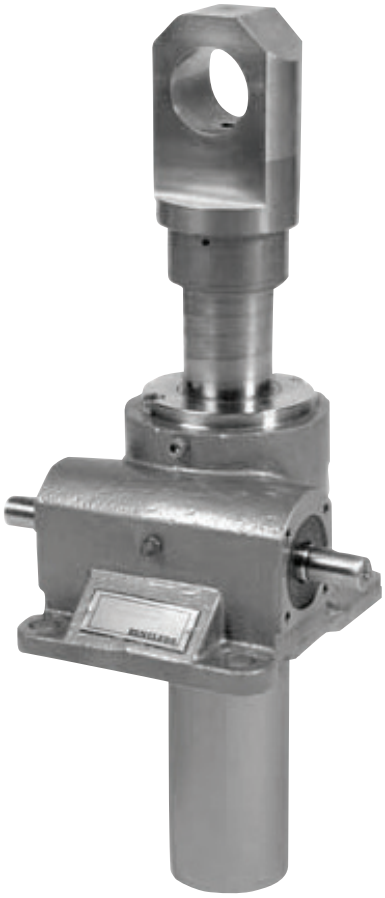
Series BD - Screw Jacks

Installation & Maintenance



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985011-GB

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Product Safety Information

IMPORTANT

General - The following information is important in ensuring safety. It **must** be brought to the attention of personnel involved in the selection of the equipment, those responsible for the design of the machinery in which it is to be incorporated and those involved in its installation, use and maintenance.

Our equipment will operate safely provided it is selected, installed, used and maintained properly. As with any pumping equipment **proper precautions must be taken** as indicated in the following paragraphs, to ensure safety.

Potential Hazards - these are **not** necessarily listed in any order of severity as the degree of danger varies in individual circumstances. It is important therefore that the list is studied in its entirety:-

1) Fire/Explosion
   (a) Oil mists and vapour are generated within gear units. It is therefore dangerous to use naked lights in the proximity of the pump openings, due to the risk of fire or explosion.
   (b) In the event of fire or serious overheating (over 300 oC), certain materials (rubber, plastics, etc.) may decompose and produce fumes. Care should be taken to avoid exposure to the fumes, and the remains of burned or overheated plastic/rubber materials should be handled with rubber gloves.
2) Guards - Rotating shafts and couplings must be guarded to eliminate the possibility of physical contact or entanglement of clothing. It should be of rigid construction and firmly secured.
3) Noise - High speed gearboxes and gearbox driven machinery may produce noise levels which are damaging to the hearing with prolonged exposure. Ear defenders should be provided for personnel in these circumstances. Reference should be made to the Department of Employment Code of Practice for reducing exposure of employed persons to noise.
4) Lifting - Where provided (on larger units) only the lifting points or eyebolts must be used for lifting operations (see maintenance manual or general arrangement drawing for lifting point positions). Failure to use the lifting points provided may result in personal injury and/or damage to the product or surrounding equipment. Keep clear of raised equipment.
5) Lubricants and Lubrication
   (a) Prolonged contact with lubricants can be detrimental to the skin. The manufacturer's instruction must be followed when handling lubricants.
   (b) The lubrication status of the equipment must be checked before commissioning. Read and carry out all instructions on the lubricant plate and in the installation and maintenance literature. Heed all warning tags. Failure to do so could result in mechanical damage and in extreme cases risk of injury to personnel.
6) Electrical Equipment - Observe hazard warnings on electrical equipment and isolate power before working on the unit or associated equipment, in order to prevent the machinery being started.
7) Installation, Maintenance and Storage
   (a) In the event that equipment is to be held in storage, for a period exceeding 6 months, prior to installation or commissioning, we must be consulted regarding special preservation requirements. Unless otherwise agreed, equipment must be stored in a building protected from extremes of temperature and humidity to prevent deterioration.

   The rotating components (gears and shafts) must be turned a few revolutions once a month (to prevent bearings brinelling).
   (b) External pump components may be supplied with preservative materials applied, in the form of a "waxed" tape overwrap or wax film preservative. Gloves should be worn when removing these materials. The former can be removed manually, the latter using white spirit as a solvent.

   Preservatives applied to the internal parts of the pump do not require removal prior to operation.
   (c) Installation must be performed in accordance with the manufacturer's instructions and be undertaken by suitably qualified personnel.
   (d) Before working on the pump or associated equipment, ensure that the load has been removed from the system to eliminate the possibility of any movement of the machinery and isolate power supply. Where necessary, provide mechanical means to ensure the machinery cannot move or rotate. Ensure removal of such devices after work is complete.
   (e) Ensure the proper maintenance of gearboxes in operation. Use only the correct tools and our approved spare parts for repair and maintenance. Consult the Maintenance Manual before dismantling or performing maintenance work.
8) Hot Surfaces and Lubricants
   (a) During operation, pumps may become sufficiently hot to cause skin burns. Care must be taken to avoid accidental contact.
   (b) After extended running the pump may reach temperatures sufficient to cause burns. Allow equipment to cool before servicing or performing adjustments.
9) Selection and Design
   (a) Where gear units provide a backstop facility, ensure that back-up systems are provided if failure of the backstop device would endanger personnel or result in damage.
   (b) The driving and driven equipment must be correctly selected to ensure that the complete machinery installation will perform satisfactorily, avoiding system critical speeds, system torsional vibration, etc.
   (c) The equipment must not be operated in an environment or at speeds, powers, torques or with external loads beyond those for which it was designed.
   (d) As improvements in design are being made continually the contents of this catalogue are not to be regarded as binding in detail, and drawings and capacities are subject to alterations without notice.

The above guidance is based on the current state of knowledge and our best assessment of the potential hazards in the operation of the pump.

Any further information or clarification required may be obtained by contacting our Application Engineers.

1. IDENTIFICATION

This manual contains technical data and safety instructions on installation, settings, startup, operation and maintenance of serie BD.

WARNING: SELECTION AND DESIGN!
As improvements in design are being made continual- ly the contents of this catalogue are not to be regar- ded as binding in detail, and drawings and capacities are subject to alterations without notice.

1.1 MACHINE DESCRIPTION

BD is a screw jack with single or double start trapezoidal lifting screw available with a translating lifting screw.

1.1.1 Description of purpose

These jacks are intended for (examples):

- indoor use and in the interior of an industrial environment (such as steel mills, food industry, paper industry)
- outdoor use in the marine environment where there is some effect of splashing fresh or salt water (stainless execution only).

1.1.2 Reasonably foreseeable misuse and prohibited usages

- Your choice of unit is carefully evaluated based on your requirements which are verified through our selection guide in our screw jack catalogue. We can not guarantee the safety if our products are used for purposes other than what they are originally designed for.

At the slightest doubt, you are requested to contact our Sales Department. They will help you with computer calculations and suggestions, for both standard and special applications.

Range of working temperature (ºC):	from -30 to +100
At an ambient temperature of 25ºC:	The degree of utilization (ED) at full load may not exceed 40% per 10 minutes, but no more than 20% per hour in total.

NOTE: ABOUT GREASE!
Benzlers screw jacks are filled with grease in EP-Ad- ditive quality at delivery. The lifting screw should be lubricated with the same type of grease.

NOTE: ABOUT MANUALLY OPERATING THE JACK!
AB Benzlers jacks are not primarily intended to be used manually using a crank, wheel or similar. If the jack is to be used manually this must comply with the machine directive 2006/42/EG, contact our Sales Department for assistance.

DANGER: RISK OF PERSONAL INJURY!
It is prohibited to use the jack to lift persons.

1.1.3 System overview

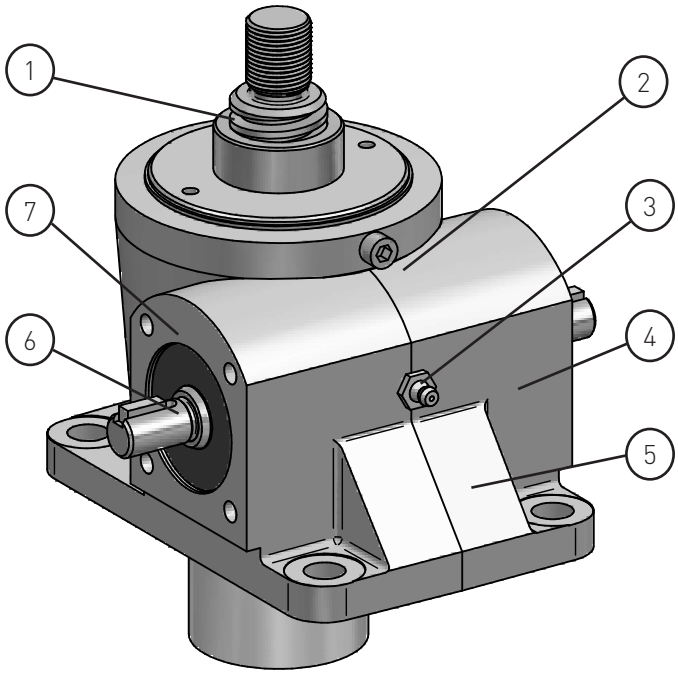


Figure 1

1. Trapezoidal lifting screw
2. Thrust and radial bearings
3. Grease with EP-additive
4. Housing of nodular cast iron
5. Alkyd paint 85 micron thickness in RAL 5009
6. Worm screw hardened and ground
7. Worm wheel of centrifugally cast tin bronze or in stainless steel
8. Bellows in PVC or steel (Not shown. Other materials are available upon request)

1.1.4 Drawings/layouts

NOTE: ABOUT DRAWINGS/LAYOUT!
Drawings/layouts for your specific application, may where appropriate, also be supplied from our website (if appropriate also including technical documentation from subcontractors).

1.2 TECHNICAL DATA

1.2.1 Identification

Product type	BD
Serial number	See Product Sign
Year of manufacture	See Product Sign
Compression load / Tension load (kN)	See Product Sign
Load Case (Euler I, II or III	See Product Sign

Single start spindle:

Product size	27	40	58	66	86	100	125	200
Max capacity (kN)	10	25	50	150	200	300	500	1000
Ratio (L)	9:1	7:1	6.75:1	7:1	7:1	7:1	7.5:1	12:1
Starting torque (Nm)	6	23	55	210	320	640	1280	2235
Ratio (H)	27:1	30:1	27:1	28:1	28:1	28:1	30:1	36:1
Starting torque (Nm)	5	10	32	115	160	320	640	1335

Double start spindle:

Product size	27	40	58	66	86	100	125	200
Max capacity (kN)	8	20	40	120	160	240	400	800
Ratio (L)	9:1	7:1	6.75:1	7:1	7:1	7:1	7.5:1	12:1
Starting torque (Nm)	6	23	55	210	320	640	1280	2120
Ratio (H)	27:1	30:1	27:1	28:1	28:1	28:1	30:1	36:1
Starting torque (Nm)	4.8	10. 1	32.5	117	164	323	624	1265

1.2.2 External Electrical Power — Supply data

Connecting information regarding electric system.

Connecting voltage and number of phases	See Product Sign
Frequency	See Product Sign
Power	See Product Sign
Motor Effect	See Product Sign
Protection class	See Product Sign
Classification of degree	IK 08

The jack complies with IEC standards. The effect required depends on the load. For further information contact AB Benzlers.

NOTE: ABOUT IK CODE!

IK code means the classification of degrees of protection provided by enclosure for motors against external mechanical impacts. IK 08 = Resistance against impacts with an energy up to 5J.

1.2.3 IP code, clear text

The IP Code (International Protection Rating) classifies the degrees of protection provided against the intrusion of solid objects such as dust, accidental contact and water in electrical enclosures as defined in the international standard IEC 60529. An IP Code consists of the letters IP followed by two digits and an optional letter. The first digit indicates the level of protection that the enclosure provides against access to hazardous parts and the ingress of solid foreign objects. The second digit indicates the protection of the equipment inside the enclosure against harmful ingress of water.

See the motor manual for the IP Code of the connected motor. The table below shows the IP Code of the most common used motors.

Motor types	IP Code	Protected against	Details
M2V A M3A A	IP 55	Dust Water jets	Ingress of dust is not entirely pre- vented, but it must not enter in suf- ficient quantity to interfere with the satisfactory operation of the equip- ment; complete protection against contact. Water projected by a nozzle against enclosure from any direction shall have no harmful effects.

NOTE: ABOUT IP CODE FOR THE JACK!

The IP code for the jack is different from the motor's IP code and only jacks in stainless execution (not standard) are allowed to operate in a moist environment.

1.2.4 Environmental conditions and limits

All standard screw jack units are provided with protection for indoor usage. Other environmental conditions must be specified upon ordering units.

Where units are to operate in extreme conditions, or where they are to stand for long periods without running, e.g. during plant construction, consult AB Benzlers so that arrangements for adequate protection can be made.

- In the event that equipment is to be held in storage see "Storing and protecting" on page 29.

NOTE: ABOUT OTHER CONDITIONS!

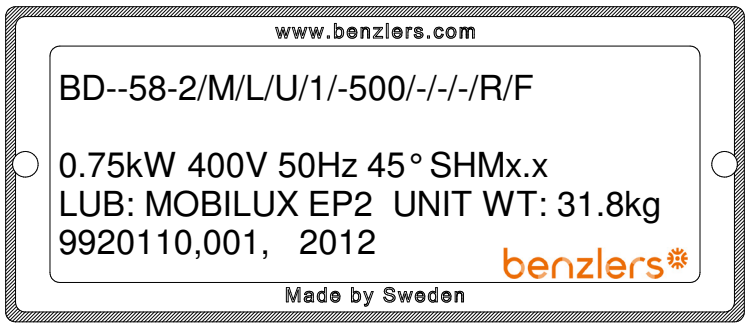
For other conditions consult Benzlers. Being an inter- national company, we are able, through our own sub- sidiaries and active agents, to give the optimum- solution, on a local basis.

1.3 PRODUCT MARKING

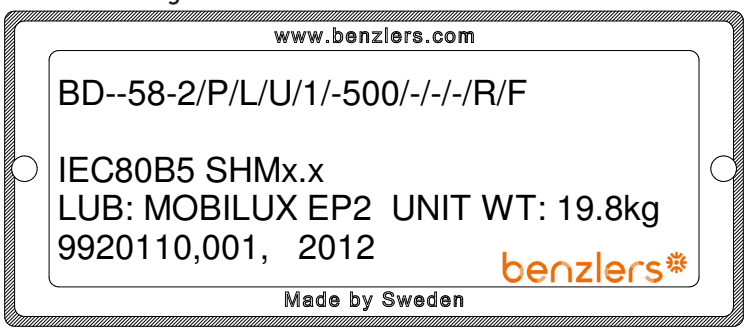
1.3.1 Product sign

Product examples:

Motor



IEC motor flange



Free input shaft

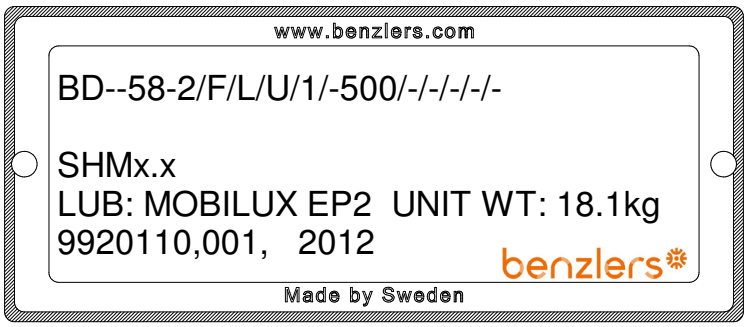


Figure 2. Product sign – General description (type "BD" as an example):

1. Line 1: Product code
2. Line 2: –
3. Line 3: Example with
   – Motor: Power (kW), Voltage (V) Frequency (Hz), Pos. of terminal box, Gap at delivery SHM
   – IEC motor flange: IEC size, Gap at delivery SHM
   – Free input shaft: Gap at delivery SHM
4. Line 4: Lub = Type of lubrication, WT = Total weight of the unit (kg)
5. Line 5: Order number and sub-number of the order position, Manufacturing year

NOTE: ABOUT MOTOR CONNECTIONS!
For more information about motor connection see "Motor Connections" on page 26.

1.3.2 Option – extra sign according to ATEX directive

Jacks ordered to comply with EU directive 2014/34/EC have an extra sign.

Figure 3. Extra sign according to ATEX directive

NOTE: ABOUT ATEX!
AB Benzlers must be consulted in advance to adapt the jack to comply with 2014/34/EC. The jack will be marked with an extra sign according to ATEX directive. For more information see our Product Catalog.

1.3.3 Understanding ATEX Directive - Markings

CAUTION: RISK OF MACHINE DAMAGE!
Only jacks ordered to comply with 2014/34/EC and marked with an ATEX sign are allowed to be used in an explosive environment.

NOTE: ABOUT ANY OTHER EQUIPMENT FITTED TO THE SCREW JACK!
Motors, gears, couplings, or any other equipment fitted to the screw jack unit must also comply with this directive.
If the screw jack unit is supplied with a motor (or any other equipment fitted) it is important to check that the nameplate corresponds with the classification of the potentially explosive atmosphere in which the unit is to be installed.

The jack will be typically marked as shown

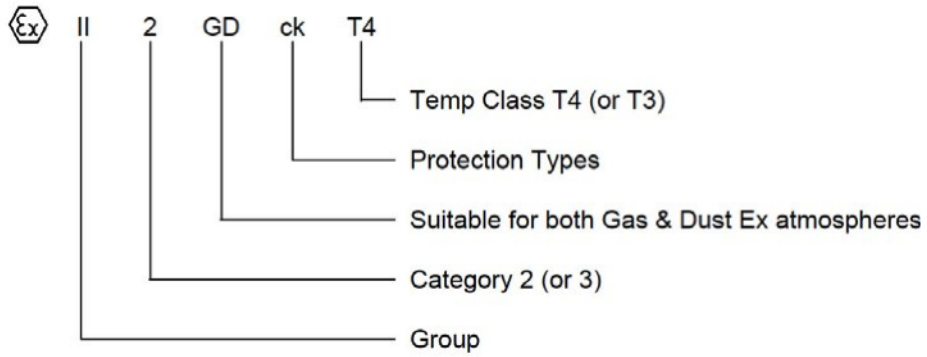


Figure 4. ATEX marking
The maximum surface temperatures for the jack are 110 °C (T3) and 105°C (T4).

CAUTION: RISK OF MACHINE DAMAGE!
Standard configuration is not suitable for these temperatures.

The protection type in areas with combustible dust and in hazardous areas is 'ck' where 'c' stands for protection by constructional safety (couplings and gear drives) and 'k' stands for protection by liquid immersion (gears).
GD means that the jack is suitable for gas and dust explosive atmospheres.
Group II means areas with potentially explosive atmospheres (except mines and firedamp areas).

For Category 2 and Category 3 see table below.

Cat	Design of Safety	Design Requirements	Application	Zone of Use
2	High level of safety	Safe with frequently occuring disturbances or with an operating fault	Where explosive atmospheres are likely to occur	Zone 1 - An atmosphere where a mixture of air and flammable substances in the form of gas, vapor or mist is likely to occur in normal operation occasionally. Zone 21 - An atmosphere where a cloud of combus- tible dust in the air is likely to occur in normal operation occasionally.
3	Normal level of safety	Safe in normal operation	Where explosive atmospheres are likely to occur infrequently and be of short duration	Zone 2 - An atmosphere where a mixture of air and flammable substances in the form of gas, vapor or mist is not likely to occur in nor- mal operation but, if it does occur, will persist for only a short period. Zone 22 - An atmosphere where a cloud of combus- tible dust in the air is not li- kely to occur in normal operation but, if it does oc- cur, will persist for only a short period.

2 USE OF THIS MANUAL

2.1 GENERAL INFORMATION ABOUT THIS MANUAL

The manual contains operating and safety instructions.
Carefully study the manual and check that the manual is constantly available to the staff concerned. The instructions apply to all types of work, the machine as well as immediate surroundings around the machine.
Serious personal injuries and machine damages may occur if the information is not attended to.
Consider all the danger-, warning-, caution- and note- signs mentioned in the manual.

- Consider that all types of electric equipment may be live.
- During service and maintenance: switch off the machine and make sure that the electrical supply is off (safety and main switches locked). Supervision may be carried out by an operator. Remaining service may be performed by qualified service staff only.

Consideration shall be taken to the local restrictions inside the factory.

2.2 IMPORTANT INFORMATION ABOUT THIS MANUAL

The following is compulsory:

- The manual together with similar useful documents shall be kept during the entire life of the equipment.
- This manual together with similar useful documents shall be considered part of the equipment.
- The information in the manual shall be updated when the machine owner makes completions or other modifications of this equipment.
- In case of owner exchange the manual shall be enclosed to the new owner or user of the equipment.
- In case of rebuilding or reconstruction a new risk analysis should be established.

All changes shall be approved by the machine owner.

2.3 TARGET GROUP FOR THIS INFORMATION

The manual shall be used for information about safety for all staff, who perform or will perform any kind of work near the screw jacks, as an example:

- Installation and maintenance personnel
- Operators
- Cleaners, etc.

2.3.1 Demands on personnel

Information about instructions in this manual. Site/location of instructions.

NOTE: ABOUT OPERATORS!
Operators and other staff are only allowed to handle that part of the screw jack for which they are trained.

This manual must be available in direct connection to the other instructions of the screw jack.

2.3.2 Procedure for revision and amendment

If necessary and especiallity according to issues about safety the content of this manual may need to be updated at any time.

On these occasions, it is especially important that this manual is replaced with a new updated manual and that the old manual is collected and archived /discarded.

3 DESCRIPTION OF FUNCTION

3.1 OVERALL

BD is a screw jack with single or double start trapezoidal lifting screw available with translating lifting screw.

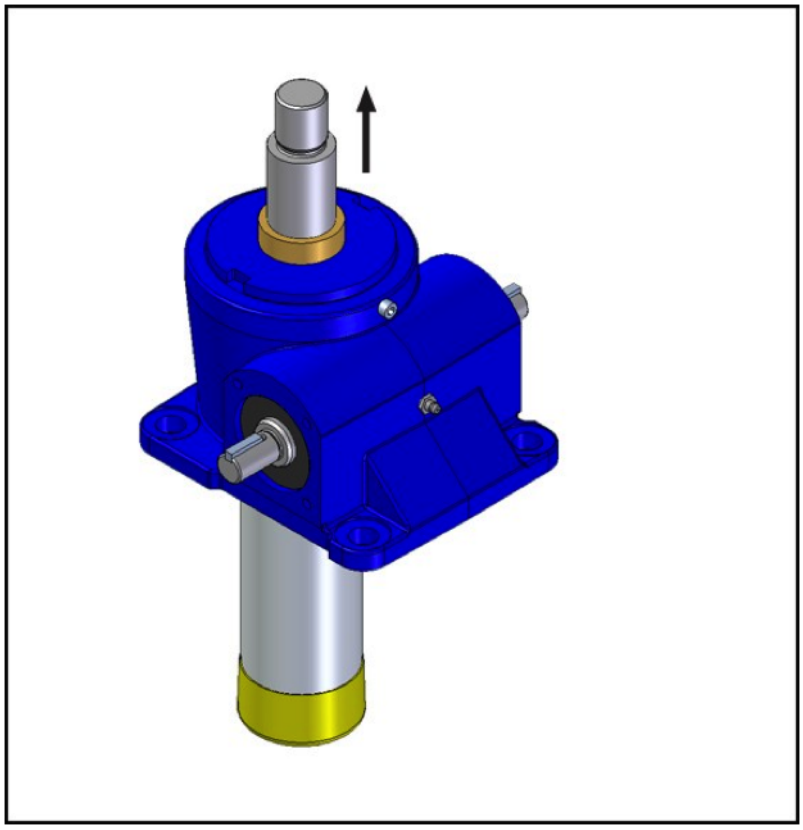


Figure 5. BD
It is available in 8 sizes as standard.

NOTE: ABOUT STOP NUT!
BD is available with a stop nut. If you chose not to use the stop nut another security feature must be included in the system.

The jack is used to push, pull, lift, lower and position loads of anything from a couple of kilograms up to one hundred of tons with good precision and consistency.

3.1.1 Control devices

Control devices for the jack shall be designed according to the description below:

- Control devices for setting power driven jacks in motion shall be of the hold-to-run type.
- Control devices for power driven jacks shall be protected against unintentional operation.
- The direction of movement caused by the control device shall be identified in a durable, unambiguous and easily recognisable manner.
- The direction of motion can be identified by symbols or words. The identification can be attached to the control device itself or immediately alongside it.

NOTE: ABOUT CONTROL DEVICES!
Control devices are not included at standard delivery.

WARNING: CRUSHING RISK!
Safety measures must be taken to prevent the possibility of pinched fingers or chruched hands, which can lead to permanent injury.

WARNING: RISK OF ENTANGLEMENT!
A shaft protection prevents, for example, loose clothing or similar to entangle itself in the shaft, which can lead to permanent injury.

DANGER: CRUSHING RISK!
A stop nut prevents the lifting screw from being able to run out of the gear housing, which, if a person/persons standing under the jack, can lead to instant danger to life.

More information, see "Stop nut (SM)" on page 12.

3.2 OPTIONS

NOTE: IMPORTANT INFORMATION ABOUT ALL OPTIONS!
For the up-to-date configuration of your Srew Jack, see the product code on the product sign that is mounted on the jack.

NOTE: COMBINING OPTIONS!
Combination of various options can be restricted. Consult Benzlers for more information.

3.2.1 Stop nut (SM)

Stop nuts can be fitted to all BD screw jacks, both above and below the main body.
These must be included when there is an inherent risk of over travel resulting in the spindle becoming disengaged from the worm thread.

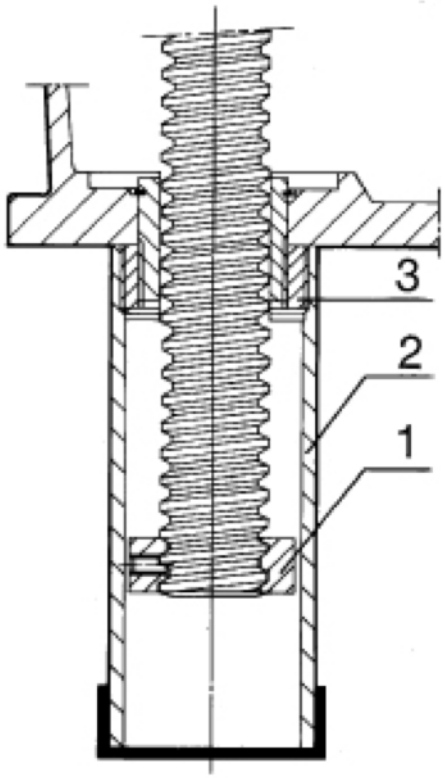


Figure 6.
1. Stop nut
2. Protection tube
3. Tube sleeve

3.2.2 Stop nut (SM) + Limit Switch (LS)

All BD jacks can be supplied with limit switches to suit most applications. Standard is two limit switches and one stop nut. Upper/lower limits can be mounted on the protection tube. Adjustable limits are also available on request.

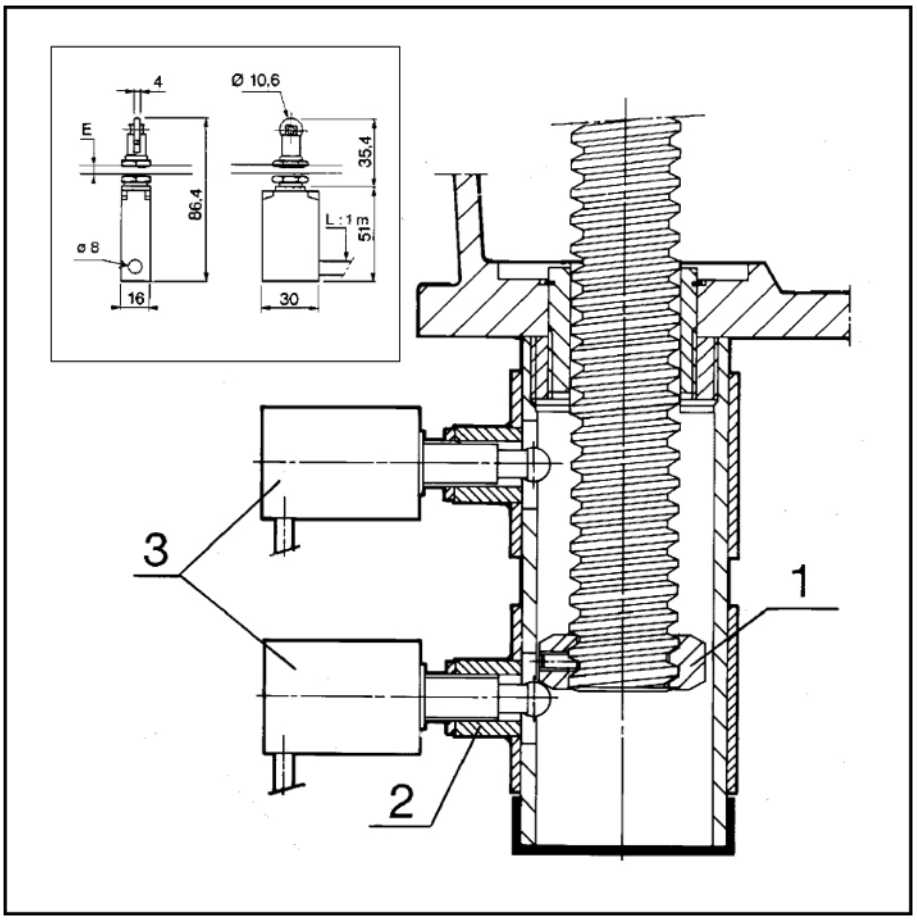


Figure 7.

1. Stop nut
2. Carrier
3. Limit switch

3.2.3 Locked against rotation – two options are available:

– LR - Locked Against Rotation (Tube)
– LRK - Locked Against Rotation (Key)

NOTE: IMPORTANT INFORMATION ABOUT THESE OPTIONS!

For applications where a load is to be raised/lowered and a permanent fixation of e.g. top plate/clevis end is not practical, the spindle must be prevented from rotating.

Combinations with other options are restricted.

3.2.4 LR - Locked Against Rotation (Tube)

Protection tube manufactured in square section mild steel. Spindle end complete with nut (sized to suit square section).

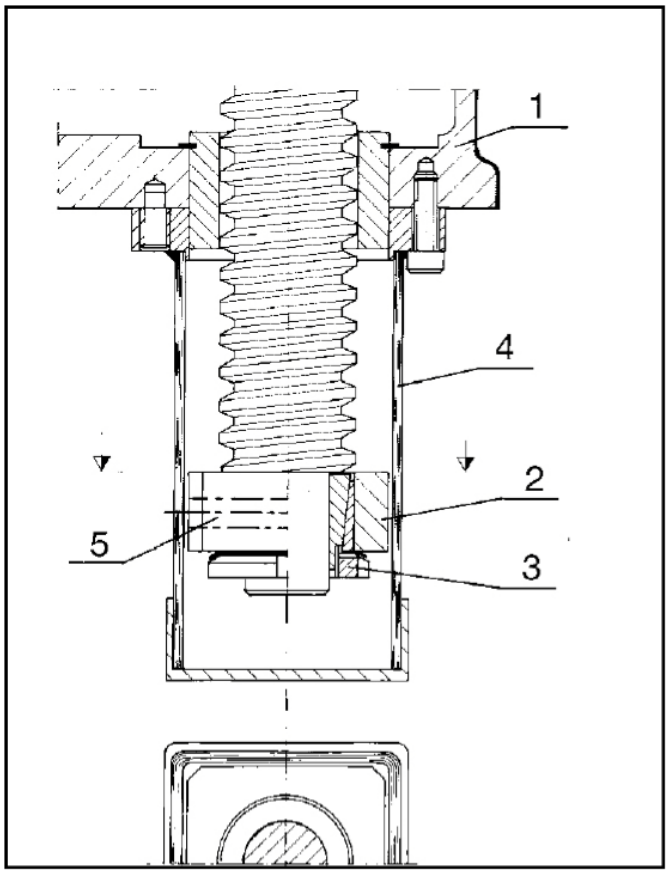


Figure 8.

1. Gear housing
2. Locking nut
3. Locking assembly
4. Tube
5. Pin

3.2.5 LRK - Locked Against Rotation (Key)

Jack internals are modified to incorporate a rectangular key which engages in a precision keyway cut into the spindle length. Primarily used in precision applications requiring minimal radial movement.

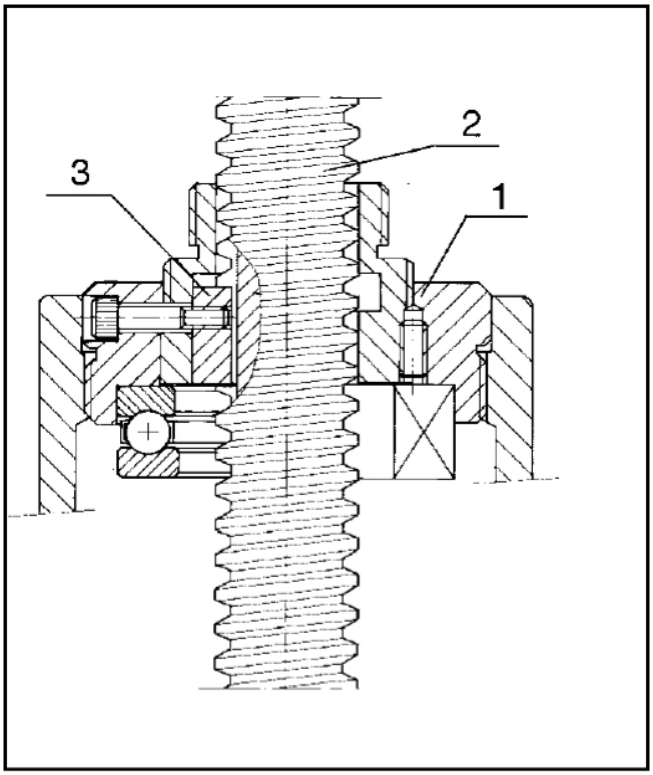


Figure 9.

1. Top cover
2. Lifting screw/spindle
3. Key

3.2.6 Safety Nut (SHM)

In certain applications the addition of a safety nut may be required. The safety nut should prevent the load collapsing in the event of the trapezoidal thread failing.

NOTE: IMPORTANT INFORMATION ABOUT THIS OPTION!
Load direction is very important!
Combinations with other options are restricted.

Monitoring of the safety gap (s) between the spacer (2) and the safety nut (1) gives an indication of the wear.

NOTE: THE SAFETY GAP MUST BE CHECKED REGULARY!
When the safety gap reaches zero the thread in worm wheel has reached its wear limit and requires changing. In applications where the safety nut is inaccessible, electro/mechanical switches are available to indicate when maximum wear is reached.

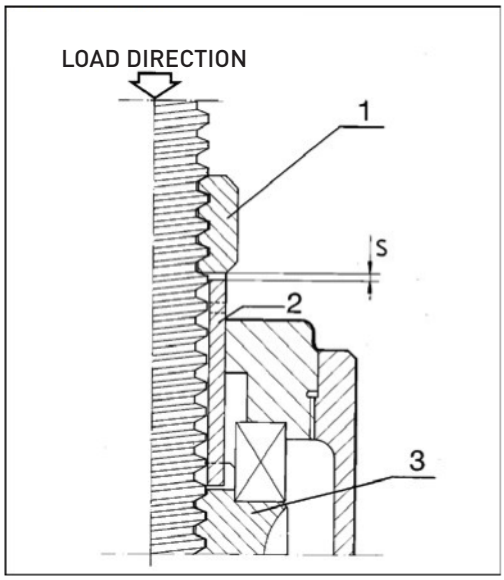


Figure 10.

1. Safety nut
2. Spacer
3. Worm wheel

s = Safety gap

3.2.7 Antibacklash (ABL)

Where the loading on a screw jack can be in both tension and compression and the spindle backlash is critical, units can be supplied with a Backlash Eliminator comprising of a modified worm wheel fitted with a secondary nut, allowing contact on both face and flank of trapezoidal thread.
Excessive backlash can be reduced to 0.01-0.05 mm by adjustment of the top cover. Adjustment must be made over time as the thread is worn. When thread pitch has been reduced by 25%, the worm wheel and adjusting nut should be replaced.

NOTE: IMPORTANT INFORMATION ABOUT THIS OPTION!
Combinations with other options are restricted.

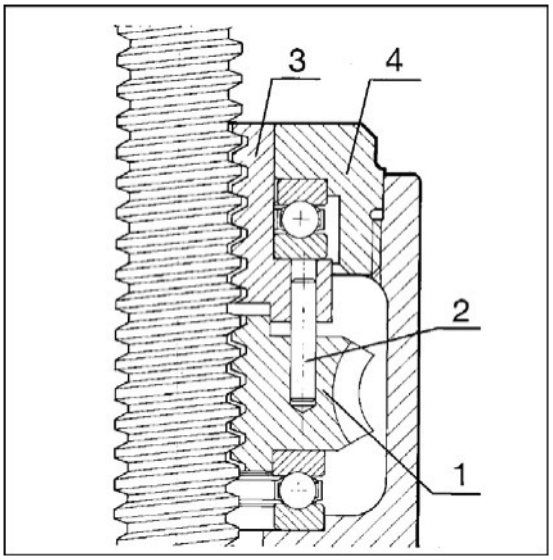


Figure 11.

1. Worm wheel
2. Dowel pin
3. Adjusting nut
4. Top cover

4 SAFETY INFORMATION

4.1 GENERAL MACHINE SAFETY

WARNING: CRUSHING RISK!
Never start the machine when people are inside the risk area. The mechanical protection of the free input shaft must always be intact.

4.1.1 Emergency stop function

AB Benzlers recommend that the integrator chooses the right category for emergency stops, and the correct security category of the emergency stop circuits.

4.1.2 Safety layout – emergency & safety stops zones

AB Benzlers is not normally responsible for the installation. The integrator must draw a security layout of the whole system.

4.1.3 Hazard text

Danger-, Warning-, Caution-, and Note-texts have the following meanings in the manual:

DANGER!
Neglecting this information will result in instant danger to life!

WARNING!
Neglecting this information may cause danger to life or severe personal injury!

CAUTION!
Neglecting this information may result in slight per- sonal injury or damage to the machine!

NOTE!
Information demanding special attention!

4.2 OPERATORS LOCATIONS

When the machine is started or in operation, the operators shall not be in the danger zones.

WARNING: CRUSHING RISK!
It is not allowed to work under the raised load until it is secured by suitable means. It is necessary that the operator can watch the lifting device and the load during all movements.

4.2.1 Noise

Noise measurement in accordance with the directions concerning noise from the National Board of Occupational Safety and Health (2003/10/EG). During normal operation the sound level of the jack does not exceed 70 dB (A).

NOTE: CHECK MOTOR NOISE!
Do not forget to check the sound level of the connected motor according to EN 60204-32.

CAUTION: RISK OF HEARING LOSS!
Noise protection must be built if the sound level of the connected motor exceeds 70 dB.

4.2.2 Stability

For lifting instructions see "Lifting" on page 23.

DANGER: CRUSHING RISK!
The base, on which the jacks are mounted, should be strong enough to carry the max. load and should be rigid enough to prevent swings or turns on the supporting beam of the jack.

NOTE: ABOUT DECOMMISSIONING!
The information above also applies to the dismantling and decommissioning of the jack.

4.2.3 Remaining risks

WARNING: RESIDUAL RISKS!
Integrators must be aware of the residual risks when drawing the security layout. Ensure that no operators can be situated in the danger zones during operation.

DANGER: RISK OF BURNS!
Be aware of hot surfaces during operation.

DANGER: RISK OF ENTANGLEMENT!
Be aware of moving parts. Additional protective bellows are available upon request if the residual risks cannot be reduced when integrated in the security layout.

DANGER: CUTTING RISK!
Be aware of sharp edges. Additional protective bellows are available upon request if the residual risks cannot be reduced when integrated in the security layout.

4.3 PERSONAL PROTECTION, UNINTENTIONAL USE

Local rules for personal protective equipment apply; however, take special care that
- your clothes fit with no loose ends improperly fastened.
- no other objects are hanging loose outside your clothing.

NOTE: IF REQUIRED, WEAR PROTECTIVE CLOTHING!
Wear protective clothing during service and mainte- nance.

NOTE: IF REQUIRED, WEAR PROTECTIVE GLOVES!
Wear protective gloves during service and maintenance.

NOTE: IF REQUIRED, WEAR PROTECTIVE GLASSES!
Wear protective glasses during service and maintenance.

NOTE: IF REQUIRED, WEAR PROTECTIVE SHOES!
Wear protective shoes during service and maintenance.

4.4 SAFETY INSTRUCTION

The following safety instruction is limited to cover only all work with or all work in the vicinity of this machine. Beside the safety demands described in this manual it is important also to be informed of the local safety instructions of the factory. See to it that:
- no unauthorized personnel or other visitors are inside or near the risk area of the machine when starting the machine,
- you always use a normal pitch while working at the machine. High voices and yelling might give the impression of an emergency situation,
- that you know where your colleagues are before you start the machine.

4.4.1 Specific safety rules

- You are only allowed to open protections during the machine condition “Operation off”.

5 PREPARATIONS BEFORE USE

5.1 SAFETY PRECAUTIONS BEFORE USE

CAUTION: RISK OF SYSTEM FAILURE!
The driving and driven equipment must be correctly selected to ensure that the complete machinery installation will perform satisfactorily, avoiding system critical speeds, system torsional vibration, etc.

CAUTION: RISK OF SYSTEM FAILURE!
The equipment must not be operated in an environment or at speeds, powers, torques or with external loads beyond those for which it was designed.

5.2 UNPACKING AND STORAGE

The jack is packed in a box and tightly secured with straps to avoid damage during transport. Its lifting screw is protected with anticorrosion paper.

CAUTION: RISK OF DETERIORATION!
In the event that equipment is to be held in storage, for a period exceeding 6 months, prior to installation or commissioning, AB Benzlers must be consulted regarding special preservation requirements. Unless otherwise agreed, equipment must be stored in a building protected from extremes of temperature and humidity to prevent deterioration. The rotating components (gears and shafts) must be turned a few revolutions once a month (to prevent leaking from sealings).

5.2.1 Repackaging to prevent damage in transport

Tightly secure the jack in a protective box. Use straps only on the housing of cast iron and be careful not to damage the lifting nut or lifting screw.
The lifting screw should be protected with anticorrosion paper.

5.2.2 Safely disposing of packaging material

The anticorrosion paper has a thermal value of more than 11.000 KJ/kg, the material can be furnished for energy use. If such utilisation is not technically possible or reasonable, the material can in accordance with local official regulations, be disposed of with domestic refuse or burned.

NOTE: WEAR PROTECTIVE GLOVES!
Wear protective gloves while handling the anticorrosion paper.

5.3 PREPARATORY WORK BEFORE INSTALLATION AND ASSEMBLING

5.3.1 Prior to Installation

CAUTION: RISK OF SKIN IRRITATION!
External gearbox components may be supplied with preservative materials applied, in the form of a waxed tape overwrap or wax film preservative. Gloves should be worn when removing these materials. The former can be removed manually, the latter using white spirit as a solvent. Preservatives applied to the internal parts of the gear units do not require removal prior to operation.

WARNING: RISK OF SYSTEM FAILURE!
Installation must be performed in accordance with the manufacturers' instructions and be undertaken by suitably qualified personnel.

WARNING: CRUSHING RISK!
Before working on a screw jack or associated equipment, ensure that the load has been removed from the system to eliminate the possibility of any movement of the machinery and isolate power supply. Where necessary, provide mechanical means to ensure the machinery cannot move or rotate. Ensure removal of such devices after work is complete.

1. Check that the screw jack unit has not been damaged.
2. Check that the screw jack/motor nameplate matches the requirements of the machine the unit is to be installed into.
3. Thoroughly clean the screw jack and mounting surfaces that are to be used and check that the shafts are free of paint & anti-corrosion agents using a commercially available solvent. Ensure solvent does not make contact with the oil seals.

5.3.2 Fitting of components to the unit input shaft

The input shaft extension diameter tolerance is to ISO tolerance j6 (for shaft diameter < 40mm) and k6 (for shaft diameter > 40mm) and the fitted components should be to ISO tolerance K7.

1. Ensure that shaft extensions, bores & keys etc are cleaned.
2. Items (such as gears, sprockets, couplings etc) should not be hammered onto these shafts since this would damage the shaft support bearings.
3. Items being fitted may be heated to 80/100°C to aid assembly further.

WARNING: RISK OF ENTANGLEMENT!
Rotating shafts and couplings must be guarded to eliminate the possibility of physical contact or entanglement of clothing. It should be of rigid construction and firmly secured.

5.3.3 Lifting

The easiest way to lift the screw jack is with a lifting strap attached to the bushings on each side as near the housing as possible. In the case of a long lifting screw the screw jack can be lifted with straps attached to the bushing on the lifting screw side and to the protection tube (to ensure balance). See figure below:

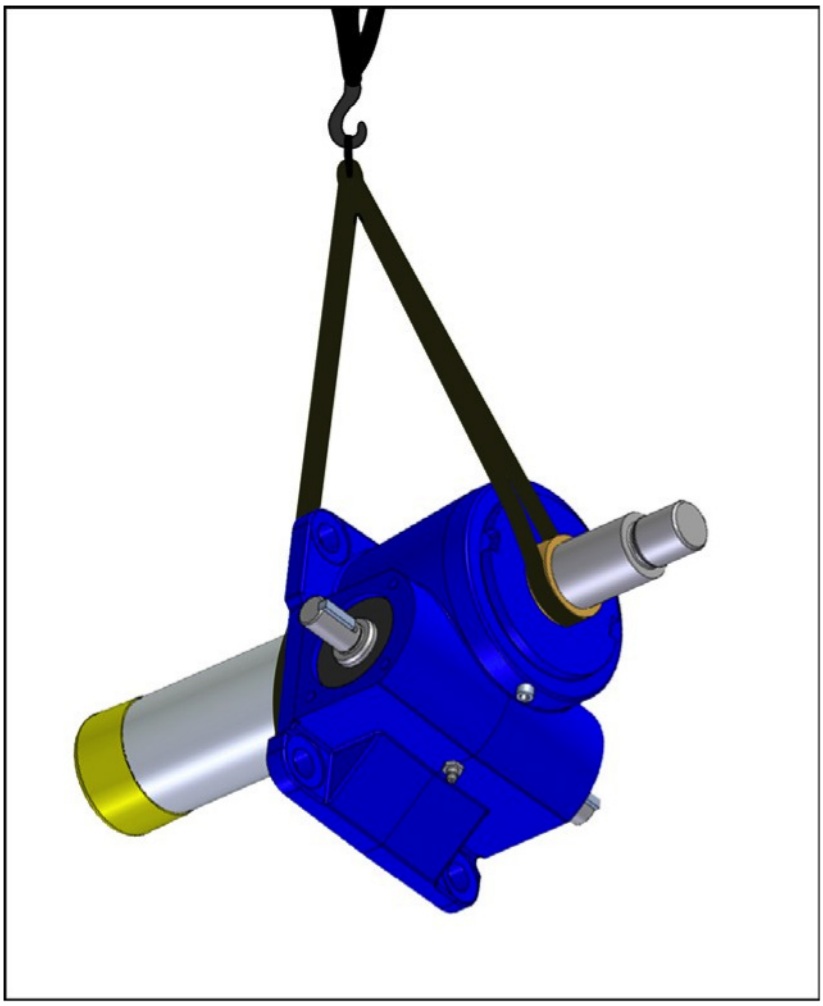


Figure 12. Lifting

CAUTION: RISK OF MACHINE DAMAGE!
Straps must be placed as near to housing as possible to avoid causing bending or machine damage.

WARNING: CRUSHING RISK!
Where provided (on larger units) only the lifting points or eyebolts must be used for lifting operations. Failure to use the lifting points provided may result in personal injury and/or damage to the product or surrounding equipment. Keep clear of raised equipment.

5.4 INSTALLATION

5.4.1 Fitting the screw jack to the machine

- Check that the threaded spindle is perpendicular to the mounting plan and that the load and threaded spindle are n line to ensure that the jack is installed in a manner that does not create radial loads.
- Check that connecting shafts and worm shafts are exactly aligned.
- When jacks, shafts, gear boxes, etc. have been connected, it should be possible to turn the main driving shaft by hand (provided that the jacks are unloaded). If there are no signs of seizure or misalignment, the jack system is now ready for normal operation.

DANGER: CRUSHING RISK!
The screw jack must not be overloaded.

DANGER: CRUSHING RISK!
The base on which the screw jack is mounted must be strong enough to carry the maximum load and rigid enough to prevent swings or turns on the supporting beam of the jack.

CAUTION: RISK OF MACHINE DAMAGE!
If radial loads occur in the machine, that are bigger than maximum allowed value in catalogue, additional guides are necessary.

CAUTION: RISK OF MACHINE DAMAGE!
Using the total length of stroke, must be done carefully. It is important that the spindle of the screw jack is not screwed beyond the closed height, otherwise the worm gear could be severely damaged.

CAUTION: RISK OF MACHINE DAMAGE!
Each end position of jacks must be limited mechanically or hydraulically. The jack must be fitted with a safety if the lifting screw is not secured in any other way when integrated in a system.

NOTE: RETRACT SPINDLE!
The screw jack spindle must not be permitted to collect dust or sand in the threads. If possible, the spindle should be retracted to the closed position when not in service.

5.4.2 Units for use in a potentially explosive atmosphere

Object	Checklist
Atmosphere	Check the nameplate of unit corresponds with the sites potentially explosive atmosphere classification.
Temperature	Check that ambient temperature falls within lubricant grade recommendations.
Installation	Check that no potentially explosive atmosphere exists during installation.
Ventilation	Make sure that screw jack unit is sufficiently ventilated with no external heat input – cooling air temperature should not exceed 40°C.
Fitted equipment	Check motors, couplings or any other equipment fitted to the screw jack unit has ATEX approval.
Environment	Check that the information listed on nameplates correspond to the environmental conditions of the site.
Gearbox	Ensure gearbox is not subjected to any loading greater than those marked on the nameplate.
Motor	For units operated with inverter drives, check motor suitability for use with the inverter. Ensure that the inverter parameters do not exceed those of the motor.
Belts	For belt driven units, check all belts fitted are of sufficient electrical leakage resistance (< 109 W).
Electrical equipment	Ensure screw jack unit and other equipment is electrically grounded (Earthed).
Guards and covers	Check and adjust guards and covers so that there is no ignition source from sparks that may be thrown by moving parts making contact with guards etc. Ensure coupling guards, covers etc. are dust tight or are designed in such a way that a buildup of dust deposits cannot form when the unit is used in Zone 21 & Zone 22 classification areas.

NOTE: DAMAGES DURING TRANSIT!
If the unit has been damaged in transit, do not use. (Remove all transport fixtures and packings prior to start up).

DANGER: RISK OF FIRE/EXPLOSION!
In the event of fire or serious overheating (over 300°C), certain materials (rubber, plastics, etc.) may decompose and produce fumes. Care should be taken to avoid exposure to the fumes, and the remains of burned or overheated plastic/rubber materials should be handled with suitable gloves.

DANGER: RISK OF FIRE/EXPLOSION!
Correctly installed and operated, the equipment complies to 2014/34/EC as marked on the nameplate. Failure to comply could lead to severe or fatal injury.

5.4.3 Motor Connections

Connection	Comment
Mains	Connection of the electric motor to the mains supply should be made by a qualified person. The current rating of the motor will be identified on the motor plate, and correct sizing of the cables to electrical regulations is essential.
Motor terminal connection	Motor terminal connection should be made in accordance with appropriate documentation supplied by the motor manufacturer.

NOTE: SECURITY AGAINST OVERLOADING!
Make sure that motor protection is used and adjusted to the current load. See information from current engine supplier.

NOTE: BRAKING MECHANISMS!
Make sure that braking mechanisms operates automatically after the control device has returned to the "OFF" position or when the drive power is interrupted. Also make sure that braking mechanisms are designed in away that the operator cannot alter their constructionally defined effect without the aid of tools.

WARNING: RISK OF ELECTRICAL HAZARDS!
Observe hazard warnings on electrical equipment and isolate power before working on the screw jack or associated equipment, in order to prevent the machinery being started.

CAUTION: RISK OF MACHINE DAMAGE!
The motor used for the jack must comply with the jack according to AB Benzlers' recommendations and the standard EN 60204-32. A motor which is too strong can lead to a breakdown and a hazardous situation.

6 OPERATORS SETTINGS ETC.

Prior to settings etc, make sure that you have read and understood the section "Safety information" on page 17 and forward.

6.1 INSTRUCTIONS FROM SUB-SUPPLIERS

See motor manual for more information (if motor is included in the order, the motor manual is provided at delivery).

7 OPERATING INSTRUCTIONS

Prior to operation, make sure that you have read and understood the section "Safety information" on page 17 and forward.

DANGER: CRUSHING RISK!
Never start the machine when people are inside the risk area, inside the mechanical protection of the machine, or up on the machine. The mechanical protection of the machine must always be intact.

DANGER: RISK OF CRUSHING AND MACHINE DAMAGE!
Do not handle loads such as molten metal, acids or radiating materials which can lead to a machine breakdown. Be aware of brittle loads which can lead to dangerous situations.

7.1 PREPARATIONS BEFORE START

7.1.1 Start-up of safety systems

- Ensure that all safety devices are in place (i.e. guards fitted).
  - Check and adjust guards and covers so that there is no ignition source from sparks that may be thrown by moving parts making contact with guards etc.
  - Ensure coupling guards, covers, etc. are dust tight or are designed in such a way that a build up of dust deposits cannot form when the unit is used in Zone 21 & Zone 22 classification areas.
- Remove any safety devices fitted to prevent machine rotation.
- Starting up should only be performed or supervised by suitably qualified personnel.
- The first test runs should be carried out without load and with carefully cleaned and greased spindle.
  - Operate the unit only intermittently and increase the load gradually.
  - Regularly check the operating temperature during the run-in period.
- The loads, speeds, duty cycles and operating conditions for which the crew jack and the attached elements are designed must not be exceeded – not even for a short time.

7.2 OPERATION

7.2.1 Noise

The range of product satisfies a noise (sound pressure level) of 85 dB(A)
or less when measured at 1 metre from the unit surface. Measurements taken in accordance with
ISO 8579-1:2002.

7.2.2 General safety

Potential hazards which can be encountered during installation, maintenance and operation of drives are covered in greater detail in the product safety pages.
Advice is also given on sensible precautions that need to be taken to avoid injury or damage.

7.2.3 Initial start-up in a potentially explosive atmosphere

During initial running-in, it is important to measure the screw jack unit maximum surface temperature when run under maximum load after approximately 3 hours operation. The maximum surface temperature must not exceed 110°C. If this temperature is exceeded, shut down immediately and contact AB Benzlers.

7.2.4 Spillage of grease

Use an absorbate to soak up the grease. Contaminated waste should be collected in a plastic bag and placed in containers for contaminated
waste oil.

8 EMERGENCY, MISHAP AND SUSPENSION

8.1 CHANGE OF DIRECTION OF MOTION, RELIEF OF STORED ENERGY

AB Benzlers recommend that the control system for the jack is built in a way that makes it easy to change the direction of movement in case of emergency.
The trapezoidal lifting screw are self sustaining in case of emergency (only single start screw jacks).

8.2 MEASURES FOR THE ESCAPE AND RESCUE OF TRAPPED PERSONS

NOTE: ABOUT HAND CRANK!
A hand crank can be included in the system to be able to lower the load by hand in case of emergency. Contact our Sales Department if you need assistance.

WARNING: RISK OF ENTANGLEMENT!
Remove the hand crank during operation to avoid entanglement.

8.3 METHOD TO BE FOLLOWED IN CASES OF ACCIDENT OR BREAKDOWN

Use e.g. a hand crank to lower the load by hand the in case of emergency.

WARNING: RISK OF PERSONAL INJURY!
For product size 100, 125, 200 the jack must be lowered by several persons.

8.4 STORING AND PROTECTING

In the event that equipment is to be held in storage, for a period exceeding 6 months, prior to installation or commissioning, AB Benzlers must be consulted regarding special preservation requirements. Unless otherwise agreed, equipment must be stored in a dry environment protected from extremes of temperature, dust, dirt and humidity to prevent deterioration. The rotating components (gears and shafts) must be turned a few revolutions once a month (to prevent bearings brinelling). If the the storage period exceeds five years the grease must be changed.

8.5 TAKING PRODUCT OUT OF OPERATION

- The jack must be unloaded and the lifting screw must be in zero postion during decommissioning.
- To lift the jack, see "Lifting" on page 23.

8.5.1 Advice on disposal / disposal of waste

Metals, PVC and rubber and lubricants etc. should be seperated for recycling and disposed of at a local recycling center. For further information and references contact AB Benzlers.

9 MAINTENANCE AND CLEANING

9.1 PROTECTION INSTRUCTIONS

Prior to maintenance & cleaning, make sure that you have read and understood the section "Safety information" on page 17 and forward.

DANGER: CRUSHING RISK!
Never start the machine when people are inside the risk area.

9.1.1 Prior to any maintenance operations

- De-energise the drive and secure against unintentional switch on.
- Wait until the unit has cooled down – danger of skin burns.

NOTE: ABOUT CHANGES!
Changes which do not comply with SS-EN 1494+A1:2008 are not allowed.

WARNING: RISK OF BURNS!
During operation, units may become sufficiently hot to cause skin burns. Care must be taken to avoid accidental contact.

WARNING: RISK OF BURNS!
After extended running,the lubricant in the units and lubrication systems may reach temperatures sufficient to cause burns. Allow equipment to cool before servicing or performing adjustments.

9.2 CONTROL OF SAFETY FUNCTIONS

9.2.1 Control of markings

Check the state of the markings and that no danger signs are missing. The markings/name plate may not be altered and shall remain intact as upon delivery.

9.3 ADJUSTMENT

9.3.1 Prevent self loosening objectww

CAUTION: RISK OF MACHINE FAILURE!
Always use thread-locking liquid to prevent that screws, pins, bolts and similar parts come off by themselves.

9.4 MAINTENANCE AND CLEANING BY USERS

9.4.1 Lubrication – general

- All worm gear screw jack units are despatched with grease in the worm wheel stage. AB Benzlers grade and type of grease will be stamped on the sign.
- Lubricating the threaded spindle is the responsibility of the customer and must be done using lubricants according to the table "Type of grease (* = standard at delivery)" on page 31.
- Lubricating the threaded spindle is an important and determining factor in the proper functioning of the jack.
- It must be done in intervals thus assuring a constant coat of clean lubricant between the contact parts.
- Insufficient or improper lubrication leads to increased heat and wear, which naturally reduces the operating life and promotes breakdown.

WARNING: RISK OF SKIN IRRITATION!
Prolonged contact with lubricants can be detrimental to the skin. The manufacturer's instructions must be followed when handling lubricants.

WARNING: RISK OF PERSONAL INJURY AND MACHINE DAMAGE!
The lubrication status of the equipment must be checked before commissioning. Read and carry out all instructions on the lubricant plate and in the instal- lation and maintenance literature. Heed all warning tags. Failure to do so could result in mechanical damage and in extreme cases risk of injury to personnel.

9.4.2 Lubrication – temperature limitations

Check if lubricant grade (stamped on nameplate) is suitable for the operating ambient temperature range.

Type of grease		
I	**At ambient temperature -30°C to +30°C**	
	BP	Energrease LS-EP2
	Castrol	Spheerol EPL2
	Esso	Beacon EP2
	Gulf	Gulflex MP
	Mobil	Mobilux EP2 *
	Shell	Alvania EP Grease 2 alt Retinax A
	SKF	Alfalub LGEP2
	Texaco	Multifak EP2
II	**At ambient temperature -45°C to 0°C**	
	Mobil	Mobilgrease 28
III	**At ambient temperature 0°C to + 60°C**	
	Mobil	Mobiltemp SHC 100
	Seal rings in viton are recommended	

Figure 13. Type of grease (* = standard at delivery)

9.4.3 Screw jack body grease quantity

Type	Grease quantity (if empty)
BD/BDL/BDKL 27	0.3 kg
BD/BDL/BDKL 40	0.5 kg
BD/BDL/BDKL 58	0.9 kg
BD/BDL/BDKL 66	1.2 kg
BD/BDL 86	1.4 kg
BD/BDL 100	2.5 kg
BD/BDL 125W	5.2 kg
BD/BDL 200	15 kg
BDK 27	0.4 kg
BDK 40	0.7 kg
BDK 58	1.7 kg
BDK 66	2.0 kg

To refill the jack, see picture below.

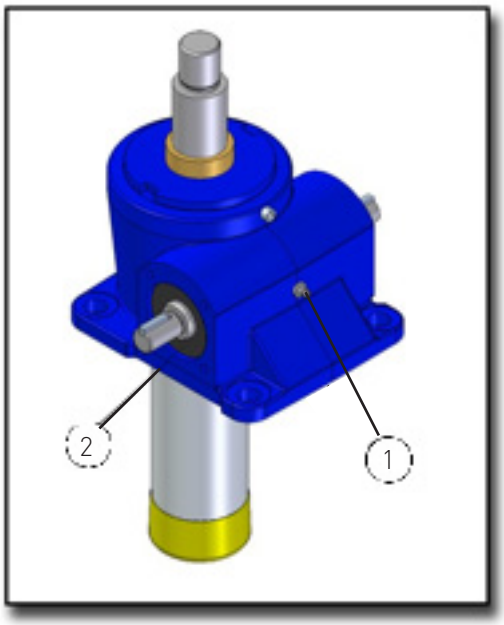


Figure 14. Refill grease

1. Add grease with a grease gun through the grease nipple.
2. The jack is refilled when grease leaks through the seals.

9.4.4 Lubrication – periods

- Lubrication intervals.
  – Normal duty ⩽ 1000 mm/min lifting speed: Every 30 hours of duty.
  – Arduous duty>1000 mm/min lifting speed: Every 10 hours of duty.

- Periodic inspection.
  – The spindle thread shall always be kept well covered with grease and are to be relubricated at regular intervals.
  – The service life of the unit depends largely upon regular and effi- cient lubrication.
  – We recommend to choose the intervals for the lubrication of the spindle according to operating time and optical inspection.

- Grease changes.
  – For all sizes regular grease changes are essential and the follo- wing factors should be used to determine the frequency at which these are carried out:

Unit temperature (when operating under load)
Type of grease
Environment (humidity, dust, ambient temperature etc.)
Operating conditions (shock, loading, etc.)

  – At elevated temperatures, the effective life of the grease is very much reduced. This is most pronounced with greases containing fatty and EP additives.
  – Renew grease every 400 hours of duty or after 24 months operation at the latest.

- For units installed in potentially explosive atmosphere it is essential to ensure that the grease is changed on or before the renewal period specified above.

9.4.5 Worm wheel and Lifting nut

Maximum wear for screw jacks type BD and BDL is reached when the thread thickness of the worm wheel or lifting nut is reduced to 50%. Worm wheel or lifting nut must then be replaced. For single threaded trapezoid spindles the permitted wear is 25% of the lead. The customer should regularly check that the normal permitted wear is not exceeded.

9.4.6 Measuring of thread wear in worm wheel

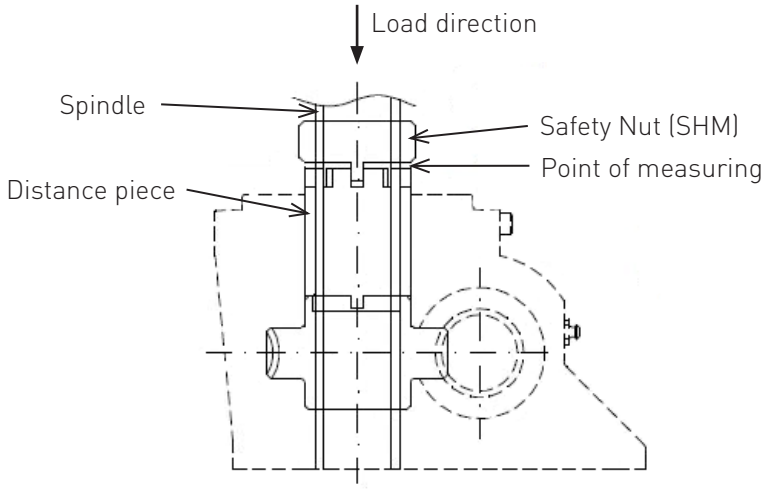


Figure 15a. Wear in worm wheell

All jacks with SHM (see "Safety Nut (SHM)" on page 15) are marked with dimension value between SHM and SHM distance that is valid at delivery. The information is stamped onto the product sign with the following format: "SHMx.x" where x.x is the actual dimension in mm with one decimal.

NOTE: TEST FROM OUR FACTORY OR OUR SERVICE WORKSHOPS!
Note that when the SHM gap is measured at Benzlers, the spindle is loaded (with appr. 500 to 1000 N) in the direction that the SHM shall secure and the SHM is displaced as much as possible from the distance piece with moderate force (or enough force to get separation).

NOTE: THE WEAR MUST BE CHECKED REGULARLY!
For monitoring of change of worm wheel wear in thread, the same procedure must be applied to get comparable values! If necessary, contact Benzlers service department.

NOTE: ABOUT WEAR DISTANCE!
The values at delivery can differ between individuals (dimension = 25 - 37% of thread pitch). Maximum allowed wear distance is 25% of thread pitch.

9.4.7 Measuring of thread wear in lifting nut - BDL type screw jack

When checking for thread wear, the same procedure as described in the notes under 9.4.6 on page 34 must be followed.

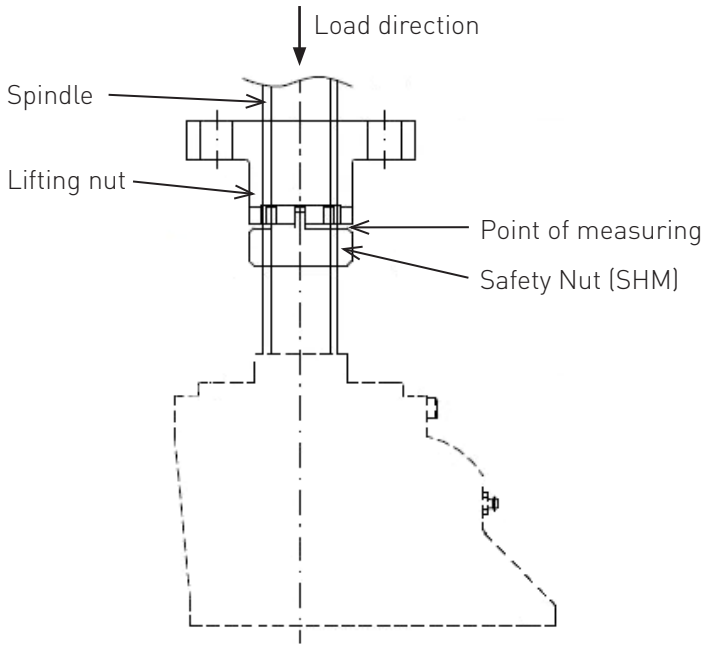


Figure 15b. Wear in lifting nut

9.4.8 Antibacklash

Screw jacks with the ABL option reduces the backlash by adding pressure on both flanks of the spindle from the gear housing cover pressing down on a secondary nut. As the flanks are worn, the backlash will increase. The backlash is adjusted by tightening the gear house cover.

9.4.9 Bearings

Bearings should be replaced every 5 years for EX marked units to avoid sparks and loose fragments which could lead to hazardous situations.
Alternatively they should be replaced in accordance with the agreed specification.

9.4.10 Cleaning

- With the drive stationary, periodically clean any dirt or dust from the screw jack unit and the electric motor cooling fins and fan guard to aid cooling and to avoid hazardous situations.
- Ensure build-up of dirt or dust does not exceed 5 mm.

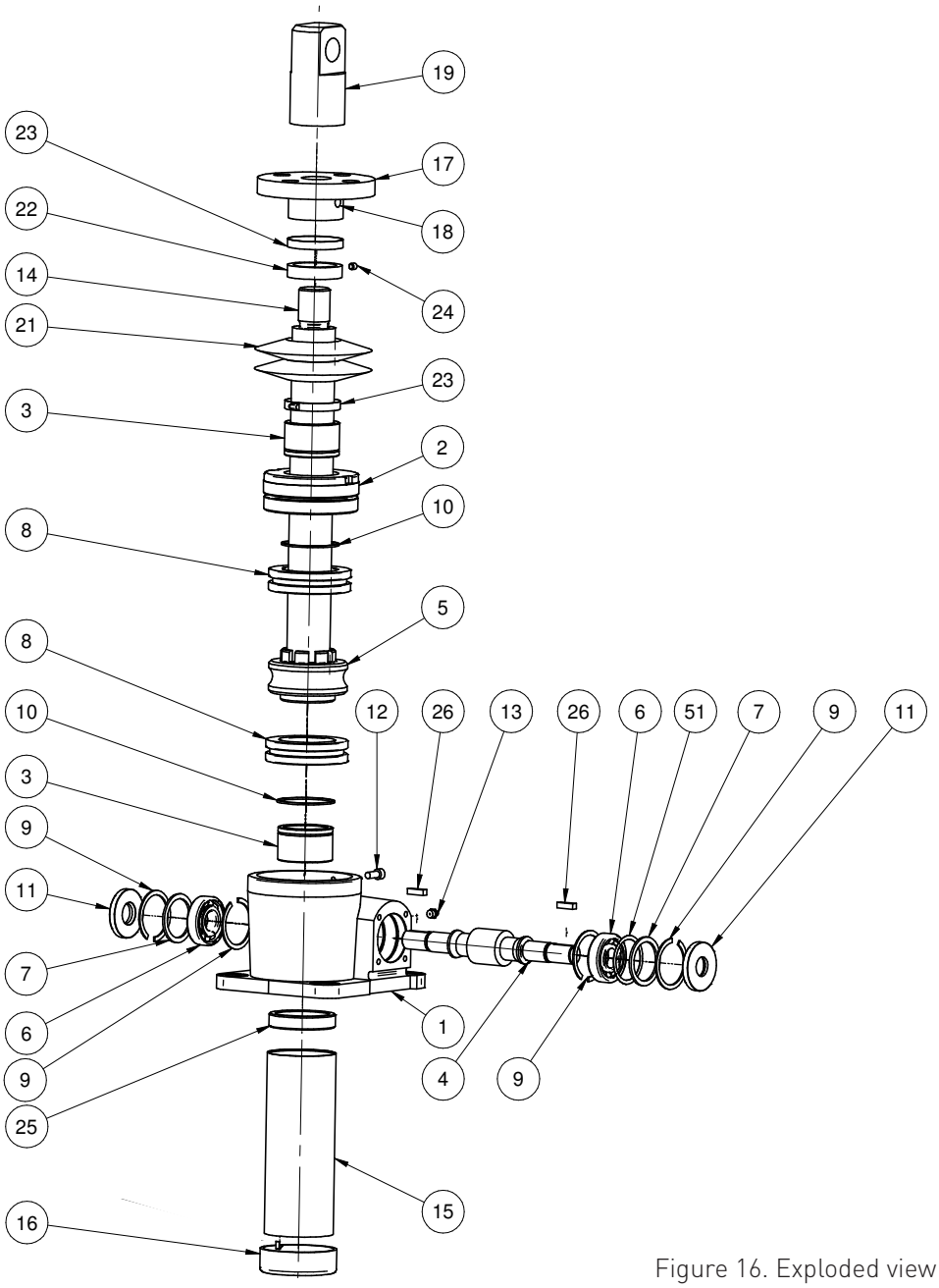
9.5 MAINTENANCE AND CLEANING BY QUALIFIED PERSONNEL

Repairs involving the replacement of such components, which in itself means that the jack is disassembled and reassembled should be performed only by qualified personnel.

NOTE: IN THE CASE OF A BREAKDOWN!
In the case of a breakdown the whole jack must be disassembled.

9.5.1 Renew grease

Renew grease every 400 hours of duty or after 24 months operation at the latest. See picture and table below to disassemble and assemble the jack.



No.	Item
1	Housing
2	Cover
3	Bushing
4	Worm screw
5	Worm wheel
6	Bearing
7	Support ring
8	Bearing
9	Ring
10	Ring
11	Seal
12	Screw
13	Grease-nipple
14	Lifting screw
15	Protection tube
16	Protection cap
17	Top plate
18	Pin
19	Clevis end
21	Bellow
22	Bellow fixing
23	Hose clamp
24	Screw
25	Tube sleeve
26	Key
51	Shim

Figure 16. Exploded view

10 TROUBLE-SHOOTING

10.1 TROUBLE-SHOOTING, FAULT DIAGNOSIS, AND REPAIR

10.1.1 Common errors with actions

Screw jack worm gear unit problems:

Symptom	Possible Causes	Remedy
Spindle does not move even though the motor is running or the input shaft is rotating.	Drive between shafts interrupted in the unit.	Return the gear unit for repair. Contact AB Benzlers.
Unusual, regular running noise.	a) A meshing or grinding sound: damage to bearings. b) A knocking sound: irregularity in gearing.	a) Check grease (See Maintenance). b) Contact AB Benzlers.
Unusual, irregular running noise.	Foreign matter present in the grease.	a) Check grease (See Maintenance). b) Stop the unit, contact AB Benzlers.
Grease leaking 1) • from unit cover • from gear unit flange	a) Defective seal on gear unit cover. b) Defective seal on input shaft.	a) Contact AB Benzlers. b) Contact AB Benzlers.
1) It is normal for small amounts of grease to leak out of the oil seal during the running-in period (24 hours running time).		

10.1.1 Other errors

Errors of alignment fall into categories of angularity and eccentricity, or a combination of both.

NOTE: ABOUT SHAFT ALIGNMENT!
Errors of angularity should be checked for, and corrected, before errors of eccentricity. Alignment in accordance with the following procedure will ensure vibration levels meeting those set out in ISO 10816 Part 1.

Errors of Angularity:

Figure 17. Angularity

1. Take measurements with a block gauge and feelers at the four points 1, 2, 3 and 4 as shown in the figure below.

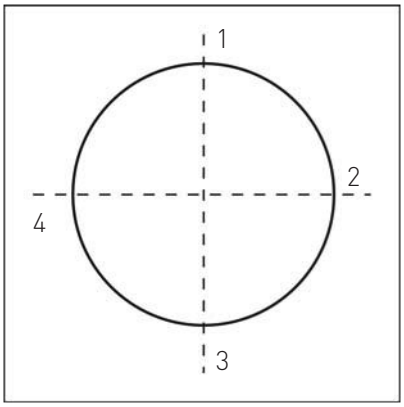


Figure 18. Four points

- The difference between the reading 1 and 3 will give the error of alignment in the vertical plane, (over the length of shaft equal to the diameter of the coupling flanges, and from this the difference in the relative heights of the feet of the motor or other connected machine can be found by proportion.)

- The difference between the reading 2 and 4 gives the amount of sideways adjustment necessary to correct any errors of alignment in the horizontal plane.

NOTE: ABOUT WORKING TEMPERATURE!
Check the alignment after running the unit until it has attained its normal working temperature. Any discrepancies can then be rectified.

The permitted angularity error is as follows:

Type of Coupling	Allowable Gap (G) (mm)
Rigid Coupling	G = 0.0005 D
All other types	Please see appropriate Installation and Maintenance Manual for coupling type fitted.

NOTE: ABOUT 'D'!
D is the diameter (mm) at which the gap is measured.

Errors of Eccentricity:

Figgure 19. Eccentricity
– Clamp a dial indicator suitably to one half coupling and bearing on the hub or flange of the other, as shown in figure 20 below, and measure the eccentricity.

Figure 20. Dial indicator

NOTE: ABOUT SUPPORT FOR DIAL INDICATOR!
Ensure that the support for the dial indicator is sufficiently rigid to prevent the weight of the indicator from causing deflection which could lead to inaccurate readings.

11 SERVICE AND REPAIRS

Before undertaking service and repairs, make sure that you have read and understood the section "Safety information" on page 17 onwards.

DANGER: CRUSHING RISK!
Never start the machine when people are inside the risk area, inside the mechanic protection of the machine, or up on the machine. The mechanical protection of the machine must always be intact.

11.1 SERVICE CYCLES FOR SUB-SUPPLIERS

It is crucial for the product stability that instructions for service and preventive maintenance are being followed. Go through relevant technical documentation in order to check that the specific maintenance demands for each component are being met.

NOTE: FUTHER INFORMATION!
Further information, see manuals from our sub-suppliers.

11.2 ADDRESSES OF SERVICE AGENTS

For addresses and service agents contact AB Benzlers or go to www.benzlers.com.

11.3 REPACKAGING

In case of claims on spare parts etc., pack together and mark with the order- or project number.

11.4 LIST OF SPARE PARTS AND CONSUMABLES

11.4.1 Drawings and spare part lists

For drawings and spare part lists go to www.benzlers.com or contact AB Benzlers.

11.4.2 Consumables

For recommended lubrications see "Lubrication – temperature limitations" on page 31.

NOTE: ABOUT CONSUMABLES!
All consumables should be followed by a safety data sheet indicating the potential risks of these products. No other products are allowed to be used than those verified by AB Benzlers.

CONTACT US

AUSTRALIA

Radicon Transmission (Australia) PTY Ltd

Australia
Please refer to web site

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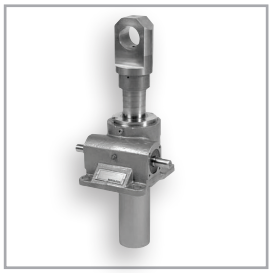

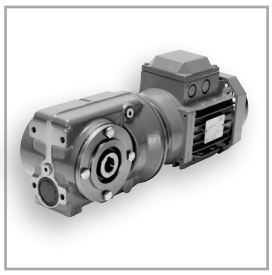
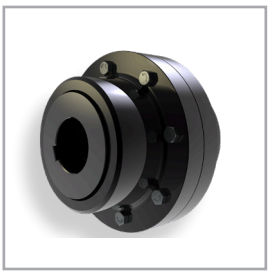

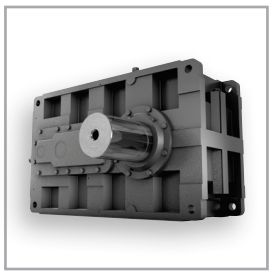

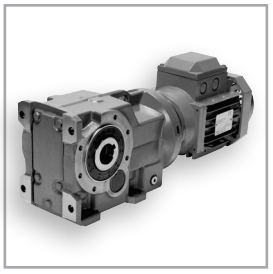
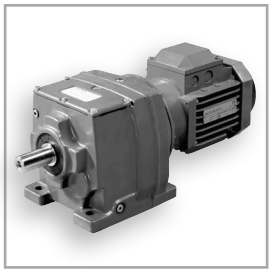


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