

alpha





Revision	Date	Comment	Chapter
01	14.12.04	New version	All
02	20.10.10	Technical Data, Layout WITTENSTEIN	All
02a	03.12.12	Translation corrections	2.4

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1 Regarding this manual

These instructions contain necessary information for safe operation of the planetary gearhead SP⁺ in areas with explosion hazards, referred to as gearhead in the following.

The operator must ensure that this operating manual is read through by all persons assigned to install, operate, or maintain the gearhead, and that they fully comprehend them.

Store these instructions within reach of the gearhead.

These **safety instructions** should be shared with colleagues working in the vicinity of the device to ensure individual safety.

The original instructions were prepared in German; all other language versions are translations of these instructions.

1.1 Signal words

The following signal words are used to indicate possible hazards, prohibitions, and important information:

This signal word points out to an imminent danger that can cause serious injuries and even death.
This signal word points out to a possible danger that can cause serious injuries and even death.
This signal word points out to a possible danger that can cause slight to serious injuries.
NOTICE
This signal word points out to a possible danger that can cause material damage.
A note without a signal word indicates application tips or especially important information for handling the gearhead.

1.2 Safety symbols

The following safety symbols are used to indicate possible hazards, prohibitions, and important information:



General danger



Environment protection



Information

A



Danger of being pulled in



Electric voltage

Hot surface Suspended loads

Explosion

1.3 Design of the safety instructions

The safety instructions of this operating manual are designed according to the following pattern:



- A = Safety symbol (see Chapter 1.2 "Safety symbols")
- B = Signal word (see Chapter 1.1 "Signal words")
- C = Type and consequence of the danger
- **D** = Prevention of the danger

1.4 Information symbols

The following information symbols are used:

- Indicates an action to be performed
 - Indicates the results of an action
- ① Provides additional information on handling



An "explosion protection symbol" indicates information on handling in areas with explosion hazards.

2 Safety

These instructions, especially the safety instructions and the rules and regulations valid for the operating site, must be observed by all persons working with the gearhead.

In addition to the safety specifications mentioned in this operating manual, the general and also the local regulations on the prevention of accidents and on environmental protection should be observed.

2.1 EC directive for devices and protective systems in areas with explosion hazards



Within terms of the EC machinery directive 94/9 EC, the gearhead is considered a device that is mounted together with other devices in a machine. A declaration of conformity for this gearhead can be found in the appendix (see Chapter 9.6 "Declaration of Conformity").

Operation is prohibited within the area of validity of the EC directive until it has been determined that the machine in which this product is installed corresponds to the regulations within this directive.

2.2 Dangers

The gearhead has been constructed according to current technological standards and accepted safety regulations.

To avoid danger to the operator or damage to the machine, the gearhead may be put to use only for its intended usage (see chapter 2.4 "Intended use") and in a technically flawless and safe state.

• Be informed of the general safety instructions before beginning work. (see Chapter 2.7 "General safety instructions").

2.3 Personnel

Only persons who have read and understood these instructions may carry out work on the gearhead.

2.4 Intended use

The gearhead serves to convert torques and speeds. It is designed for industrial applications.



The gearhead can be used in areas with explosion hazard group II, zones 1 and 2, and zones 22 and 21, thus in the device categories 2 and 3. The gearhead can be operated in a gas atmosphere in temperature class T3. In dust atmosphere, a maximum surface temperature of 150 °C is possible.

• Observe the instructions on the type plate and the appendix on the written certificate of conformity.

The gearhead is manufactured and declared applying EN 13463 standards and the 94/9/EC directive for use in areas with explosion hazards.

- Strictly observe the restrictions of speeds and torques (see Chapter 9.5 "Technical specifications").
- Our Customer Service department is available to answer any questions.

The gearhead is specified for installment on motors that: ∇

- Correspond to the design B5 (for any divergences, consult our Customer Service department [technical customer service])
- Show a radial and axial runout tolerance of at least "N" according to DIN 42955
- Have a smooth shaft
- Feature at least the same temperature class as the gearhead
 - ① We recommend temperature class T3 and higher, because the gearhead may not be permitted to heat up to more than 90 °C in normal conditions. The gearhead can be heated additionally through heat connection to the motor, and thus reach a higher housing temperature than 90 °C. The performance of our gearhead in explosion-risk areas would therefore no longer be guaranteed.

2.5 Reasonably predictable misuse



Any use transgressing the maximum permitted speeds, torques and temperature (especially ignoring the regulations on explosion protection) is not compliant with the regulations, and thus prohibited.

2.6 Guarantee and liability

Guarantee and liability claims are excluded for personal injury and material damage in case of

- Ignoring the information on transport and storage
- Improper use (misuse)
- Improper or neglected maintenance and repair
- Improper assembly / disassembly or improper operation
- Operation of the gearhead when safety devices and equipment are defective
- Operation of the gearhead without lubricant
- Operation of a heavily soiled gearhead
- Operating the gearhead despite leakage or unusual running noises



Operating the gearhead in an atmosphere whose ignition temperature lies under the temperature class specified on the type plate.

Modifications or reconstructions that have been executed without written approval of **WITTENSTEIN alpha GmbH**

2.7 General safety instructions

Λ	
MAX	Operating the gearhead in areas for which it is not approved can lead to explosions that can cause serious injuries and even death.
	 Make sure that the gearhead is only used in those areas for which it is permitted according to the identification plate (see Chapter 3.1 "Type plate").
Λ	
	Assembly and maintenance in areas with explosion hazards can lead to explosions that can cause serious injuries and even death.
	 Be certain that there is no explosive atmosphere during assembly and maintenance

(Ex)	Table "Tbl-1" lists a summary of the possible hazards, their causes and protective measures for areas with explosion hazards.					
(Ex)	Dangers	Possible causes	Protective measures			
	Hot surfaces	Increased friction and dissipated power because of wear, improper assembly, overload, or leaks.	Reduction of the torques and speeds in comparison to standard gears			
			Limiting the motor current and maximum speed of the motor			
			Maintenance intervals for wear parts and lubrication according to maintenance schedule			
			Inspection of the temperature behavior and the running-in behavior before startup			
			Regular visual and acoustic inspections			
			Prohibition of certain mounting positions and conditions			
		Increased surface temperature because of dust deposits.	Cleaning regulations according to maintenance plan			
	Mechanically caused sparks	Overload on shafts, moving parts and connection elements.	Reduction of the torques and external loads in comparison to standard gears			
			Limiting the motor current of the motor			
			Maximum load test before startup			
	Electrostatic loading	Potential differences between components, cleaning processes, insulating layers	Grounding the gearhead and the motor			

Tbl-1: Summary of the hazards and protective measures for areas with explosion hazards

WARNING Objects flung out by rotating components can cause serious injuries. Remove objects and tools from the gearhead before putting it into operation.
 A WARNING Rotating components on the gearhead can pull in parts of the body and cause serious injuries and even death. Keep a sufficient distance to rotating machinery while the gearhead is running. Secure the machine against restarting and unintentional movements during assembly and maintenance work.







3 Description of the gearhead

The gearhead is a single- or multi-stage, low-backlash planetary gearhead, which is manufactured as standard in the following versions:

"M" (motor-mounted gearhead)

Motor centering of the motor-mounted gearhead is performed:

- Up to gearhead size SP⁺ 100 and a motor shaft diameter of 28 mm by the clamping hub (plug receptacle)
- From gearhead size SP⁺ 140 and a motor shaft diameter of >28 mm by the centering collar of the motor

A radial distortion of the motor is avoided.

Adaptation to various motors is done by an adapter plate and a bushing. The output shaft bearing is designed to withstand high tilting moments and axial forces.

3.1 Type plate

The type plate is attached to the gearhead housing.



Tbl-2: Type plate (sample values)

3.1.1 Atex identification in gas atmospheres with explosion hazard

			Designation
		L	Group, category
€ II 2 G c k IIC T3 X	М	Type of ignition protection, explosion group, temperature class	
		Ν	Ambient temperature
	L M N		(See chapter 6.1 "Note during startup")

Tbl-3: Type plate (sample values)



3.1.2 Atex identification in dust-air atmosphere with explosion hazard



Tbl-4: Type plate (sample values)

3.2 Ordering code



3.3 Performance statistics

Based on test results, torques and speeds are reduced in relation to the standard gearhead. The shaft loads are also reduced in relation to the standard gear. Refer to Chapter 9.5 "Technical specifications".



A DANGER

Deviant values can cause the loss of explosion protection.

• If values are divergent, consult our Customer Service department.

3.4 Dimensioning

en-10



A DANGER

Erroneous dimensioning and inspection may lead to loss of explosion protection.

Observe all instructions in this chapter.

- Adopt the construction according to specifications in the total catalogue, Chapter "Information" or "Detailed construction", or contact **WITTENSTEIN alpha GmbH**.
 - Note the reduced output specifications in construction according to Chapter 9.5 "Technical specifications".
 - Our Customer Service department is available to answer any questions.
 - Note the instructions in Chapter 7.1.6 "Replacing the gearhead", if the calculated **bearing life is less than 20,000 h**.
 - Prevent gearhead overloading by the motor by limiting motor current and motor speed.
 - Clarify the chemical stability of the gearhead for every individual case so as to avoid a premature failure of a shaft seal or corrosion on the gearhead. This also includes water and steam, which can cause corrosion. Contact **WITTENSTEIN alpha GmbH** about this.

3.4.1 Inspection



- Make sure that the connection of the motor to the gearhead corresponds to the required protection types (according to DIN 40050):
 - In dust atmosphere IP6x
 - In gas atmosphere IP54

① The required protection types can be achieved for example by the following measures:

- Use surface-bonding agent between motor flange and adapter plate.
- Use sealing plates between motor flange and adapter plate to seal the through-holes of the adapter plate.

Sealing plates are available upon request from WITTENSTEIN alpha GmbH.

3.5 Weight

The table "Tbl-5" specifies the gearhead dimensions with medium-sized adapter plate. If another adapter plate is mounted, the actual dimensions can deviate by up to 10%.

Gearhead size S	P ⁺	060	075	100	140	180
Design	Stages					
Μ	1	1.9	3.9	7.7	17.2	34.0
	2	2.0	3.6	7.9	17.0	36.4

Tbl-5: Weight [kg]

3.6 Noise emission

Depending on the gearhead type and product size, the continuous sound pressure level is up to 66 dB(A).



Contact our Customer Service department if further information is needed regarding a particular product.

4 Transport and storage

4.1 Scope of delivery

- Check the completeness of the delivery against the delivery note.
- ① Missing parts or damage must be notified immediately in writing to the carrier, the insurance, or WITTENSTEIN alpha GmbH.

4.2 Packaging

The gearhead is delivered packed in foil and cardboard boxes.

• Dispose of the packaging materials at recycling sites intended for that. Observe the locally valid regulations for disposals.

4.3 Transport



Suspended loads can fall and can cause serious injuries and even death.

• Do not stand under suspended loads.

Specifications on the weights, refer to Chapter 3.5 "Weight".

4.3.1 Transport of gearheads up to and including size SP⁺ 140

No special transport mode is prescribed for transporting the gearhead.

4.3.2 Transport of gearheads as of size SP⁺ 180

For gearheads as of size SP⁺ 180, a support bore (A) is provided for a ring screw (e.g. acc. to DIN 580). The ring screw is used for attaching the gearhead securely to the hoisting equipment.

	Gearhead size SP ⁺	Support bore (A) [Ø]
0	180	M8
A		

Tbl-6: Support bore on the gearhead

4.4 Storage

Store the gearhead in horizontal position and dry surroundings at a temperature of 0 °C to +40 °C in the original packaging. Store the gearhead for a maximum of 2 years.

For storage logistics, we recommend the "first in – first out" method.

5 Assembly

• Be informed of the general safety instructions before beginning work. (see Chapter 2.7 "General safety instructions").

5.1 Preparations



NOTICE

Pressurized air can damage the gearhead seals.

• Do not use pressurized air to clean the gearhead.



NOTICE

Directly sprayed cleaning agents can alter the frictional values of the clamping hub.

- Only spray cleaning agents onto a cloth for wiping off the clamping hub.
- Clean / de-grease the following components with a clean and lint-free cloth and greasedissolving, non-aggressive detergent:
 - All fitting surfaces to neighboring components
 - Centering
 - The motor shaft
 - The inside diameter of the clamping hub
 - The bushing inside and out
- Dry all fitting surfaces to neighboring components in order to achieve the proper friction values of the screw connections.
- Check the fitting surfaces additionally for damage and impurities.

5.2 Installation conditions

- Provide a metallic frame for connection of the gearhead.
- Provide a ground in the areas of the motor gear and gear-gear connection, so as to prevent any electrostatic charge that may arise.

5.3 Installing the motor onto the gearhead

 Observe the general information and safety instructions of the motor manufacturer.
 Observe the safety and processing instructions of the screw-bonding agents to be used.



- Ensure that the motor is mounted if possible in a vertical direction.
- If the motor shaft has a shaft key, remove the shaft key.
 - If recommended by the motor manufacturer, insert a half wedge.
- Remove the plug (A) from the mounting bore in the adapter plate (B).
- Turn the clamping hub (C) until the clamping bolt (H) can be reached by the mounting bore.
- Loosen the clamping bolt (H) of the clamping hub (C) by one revolution.
- Push the motor shaft into the clamping hub of the gearhead (E).
 - The motor shaft should slip in easily. If this is not the case, the clamping bolt must be loosened more.
 - ① A slotted bushing has to be installed extra for certain motor shaft diameters and applications.
 - The slot of the bushing (if provided) and clamping hub have to be flush with the groove (if provided) of the motor shaft, see table "Tbl-7".
 - ① No gap is permitted between motor (D) and the adapter plate (B).

		Designation
		Clamping bolt
	I	Clamping ring [part of the clamping hub (C)]
	J	Bushing
	К	Grooved shaft
	L	Smooth shaft

Tbl-7: Arrangement of motor shaft, clamping hub, and bushing

- Smear screw-bonding agent (for example Loctite 243) onto the four bolts (F).
- Fasten the motor (A) onto the adapter plate (B) with the four screws (F).
- Tighten the clamping bolt (H) of the clamping hub (I).
- ① For screw sizes and prescribed tightening torques refer to Chapter 9.1 "Specifications on mounting onto a motor", Table "Tbl-12".

• Screw in plug (A) of the adapter plate (B).

① For screw sizes and specified torques refer to table "TbI-8".

Width across flats [mm]	5	8	10
Tightening torque [Nm]	10	35	50

Tbl-8: Torques for the plugs

5.4 Mounting the gearhead to a machine

• Observe the safety and processing instructions of the screw-bonding agents to be used.

- Center the gearhead in the machine bed.
 - Smear a screw-bonding agent (for example Loctite 243) onto the fastening screws.
- Fasten the gearhead on the machine with the fastening screws through the through-holes (A).
 - ① Mount the gearhead in such a way that the type plate remains legible.
 - ① Do not use washers (e.g. plain washers, tooth lock washers).
 - For prescribed screw sizes and torques refer to Chapter 9.2 "Specifications on mounting onto a machine", table "Tbl-13".

5.5 Mounted components on the gear output side

NOTICE
Distortions during mounting operations can damage the gearhead.
 Mount gearwheels and toothed belt pulleys onto the output shaft without forcing.
• Do not on any account attempt an assembly by force or hammering!
 Only use suitable tools and equipment for assembly.
 Make sure not to exceed the maximum static axial forces on the output bearing (F_{2AMax} see Chapter 9.5 "Technical specifications") when pulling or shrink-fitting a gear on the output shaft.

6 Startup and operation

• Be informed of the general safety instructions before beginning work. (see Chapter 2.7 "General safety instructions").



A DANGER

Operating the gearhead in areas for which it is not approved can lead to explosions that can cause serious injuries and even death.

- Make sure that the gearhead is only used in those areas for which it is permitted according to the identification plate (see Chapter 3.1 "Type plate").
- Check the gearhead before startup for possible damage, especially the radial shaft seal on the gear output.



A DANGER

A damaged gearhead can lead to explosions that can cause serious injuries and even death.

• **Never** operate damaged or abnormally running or sounding gearheads in an area of explosion hazard.

6.1 Note during startup



Improper use can cause damage to the gearhead and cause ignition dangers.

Make sure that

•

- the **ambient temperature** does not drop below 0 °C or exceed +40 °C and
- the operating temperature does not exceed +90 °C.
- Prevent gearhead from overloading by limiting the motor current and the maximum motor speed. Otherwise, the drive output should be switched off in case the motor temperature rises 10 °C above the usual operational temperature.
- Use the gearhead only in a clean and dry environment. Contact our Customer Service department if the gearhead is exposed to dust or fluids of any type when in operation.

6.2 Check running-in behavior



- After 4 running hours in maximum operating conditions, check the gearhead for leakage between gear and motor and on the output shaft seal.
- Measure the surface temperature on the input flange (A) and on the housing (B) and bearing flange (C). Consult our Customer Service department if the surface temperature exceeds +90 °C.
- Check the proper assembly of the clamping hub before startup by a maximum load test.

Increased running noises may be caused by faulty motor mounting.

 If so, mount onto motor again according to the operating manual, or consult our Customer Service department.

7 Maintenance and disposal

• Be informed of the general safety instructions before beginning work (see Chapter 2.7 "General safety instructions").

7.1 Maintenance work



The following maintenance work is crucial for the explosion protection.

Perform these tasks thoroughly and diligently.

7.1.1 Visual/Noise inspection

- Dust off the housing. Make sure that the deposit of dust layers on the housing never exceeds a layer thickness of 5 mm.
- Check the entire gearhead for exterior damage and corrosion.
- Check the clamping hub for external damage when inspecting the tightening torques of the clamping bolt.
- Check the gearhead for unusual running noises and vibrations during operation.
- ③ For special information on maintenance-related issues, contact our Customer Service department.

7.1.2 Checking the tightening torques

- Check the tightening torque of the fastening bolts on the gearhead housing.
 - ① The prescribed tightening torques can be found in Chapter 9.2 "Specifications on mounting onto a machine", table "Tbl-13".
- Check the tightening torque of the clamping bolt on the motor mounting.
 - ① The prescribed tightening torques can be found in Chapter 9.1 "Specifications on mounting onto a motor", table "Tbl-12".

7.1.3 Check for leakage

- Check the gear output radial shaft seal for leakage.
- Look for external emission of lubricant from the drive.



A DANGER

When opening up the Ermeto screw connection, dust could collect on the adapter plate and catch fire during later operation.

- Make sure that no explosive dust-air mixture is present and no dust can get into adapter plate before opening the Ermeto screw connection or dismantling the motor.
- Open up the Ermeto screw connection in the adapter plate and check for any lubricant emission inside the adapter plate.
- If a leak is detected, remove the lubricant and re-check the inside of the adapter plate after brief operation.
- In case lubricant still is emitted, shut down the gearhead and consult our Customer Service department.



7.1.4 Exchanging the radial shaft seal on the drive

Observe the safety and processing instructions of the screw-bonding agents to be used.

This step does **not** apply to gearheads with **i=3** ratio (refer to type plate: "Ratio").

• In such cases, contact our Customer Service department.

Disassembling the gearhead



- Have a container for catching lubricant at hand.
- Mark the position of the adapter plate.
- Clamp the gearhead vertically [with the adapter plate (B) to the top].
- Loosen the fastening bolts (M) in the adapter plate (B) and remove the adapter plate.
- Remove adhesive residue from the threaded bores for the fastening screws.

Use a suitable threader.

• Open the vent screw (O) in the input flange (N), to ventilate the gearhead.

Depending on the design, there might also be fastening bolts in the input flange.

• Loosen these bolts as well.

There are two extraction threads in the output flange (N_1) .

- Screw bolts into these extraction threads to loosen the input flange from the housing.
- Empty out the lubricant by letting as much of it as possible flow into the supplied container.

Removing the radial shaft seal



NOTICE

Damaged seal surfaces can increase the wear at the radial shaft seal.
Take care not to scratch the running surface.



- Stick a screwdriver (F) into the middle of the radial shaft seal (E).
- Lever out the radial shaft seal.

Installing the radial shaft seal



- Prior to installation, check the seal surfaces for damage.
 - If any damage is discovered, contact our Customer Service department.
- De-grease the seal surfaces.
- Make an assembly device (Q) that corresponds to the drawing.
 - D_{outside} = RWDR_{outside}Ø + 6 mm
 - $D_{inside} = RWDR_{inside}Ø + 1 mm$
- Additionally, a sleeve of sufficient height is required.
- Pay attention that the gearhead is positioned vertically so that the radial shaft seal is pressed uniformly.
- Smear the outer diameter of the radial shaft seal with a surface-bonding agent (for example Loctite 573 or 574).
- Wet the sealing lip of the radial shaft seal and the running surface thinly with oil (e.g. Tribol 800/220 or 100).
- Place the assembly device (Q) onto the radial shaft seal.
- Press in the radial shaft seal with the aforementioned sleeve under a toggle press or column drill until this fits level in the input flange.

Assembling the gearhead

• Observe the safety and processing instructions of the screw-bonding agents to be used.



- Position the input flange (N) onto the housing by fitting the boreholes onto each other.
 - Make sure that the gear teeth interlink smoothly.
- Press the input flange onto the housing.
- De-grease the vent screw (O), and coat it with a screw-bonding agent (e.g. Loctite 243).
- Hand-tighten the vent screw.
- Position the adapter plate (B) on the input flange (N).
- De-grease the fastening bolts (M).
- Smear screw-bonding agent (for example Loctite 243) onto the fastening bolts (M).
- Screw in the fastening bolts and tighten them in diagonal order by means of a torque wrench (see chapter 9.4 "Tightening torques for common thread sizes in general mechanics").

7.1.5 Exchanging the radial shaft seal on gear output

• Observe the safety and processing instructions of the screw-bonding agents to be used.

Removing the radial shaft seal



NOTICE

Damaged seal surfaces can increase the wear at the radial shaft seal.

Take care not to scratch the running surface.





Installing the radial shaft seal



- Clamp the gearhead vertically (with the radial shaft seal to the top).
- Push a screwdriver (F) from outside between shaft nut and sealing lip of the radial shaft seal ring (E).
- Actuate a tilting moment in the direction of the shaft nut and lever the radial shaft seal out of the housing.

- Prior to installation, check the seal surfaces for damage.
- If any damage is discovered, contact our Customer Service department.
- De-grease the seal surfaces.
- Make an assembly device (G) that corresponds to the drawing.
 - D_{outside} = RWDR_{outside}Ø + 5 mm
 - $D_{inside} = RWDR_{inside}\emptyset + 2 mm$
- Additionally, a sleeve of sufficient height is required.
- Grease the space between dust guard and sealing lip of the radial shaft seal (E) to 30% (Optimol compound CTS X).
- Smear the outer diameter of the radial shaft seal with a surface-bonding agent (for example Loctite 573 or 574).
- Wet the sealing lip of the radial shaft seal and the running surface thinly with oil (e.g. Tribol 800/220).
- Place the radial shaft seal into the housing parallel by hand.
- Place the assembly device onto the radial shaft seal.
- Press in the radial shaft seal with the aforementioned sleeve under a toggle press or column drill until this fits level in the housing.
- Press the sealing lip briefly to the side with a blunt tool (a paper clip will do) to vent the gearhead.

7.1.6 Replacing the gearhead

- Replace the gearhead:
 - When 90 % of the calculated life of the gear output bearing has been reached (see "Cymex®" design or total catalogue: Chapter "Information" or "Detailed construction").
 - At the latest after a total of 20,000 operating hours.
 - ① Alternatively, the gearhead can be checked by WITTENSTEIN alpha GmbH and if necessary, released for further operation.

7.2 Startup after maintenance work

- Clean the outside of the gearhead.
- Attach all safety devices.
- Do a trial run before releasing the gearhead again for operation.

7.3 Maintenance schedule

Maintenance work	At initial startup	After running-in (4 hours)	After every 500 operating hours or 3 months	Every 10,000 operating hours						
Visual/Noise inspection	Х	Х	Х	-						
Checking the tightening torques	X	Х	Х	-						
Check running-in behavior (see Chapter 6.2 "Check running-in behavior")	-	Х	-	-						
Check for leakage	Х	Х	Х	-						
Exchange the radial shaft seal on the drive ¹⁾	-	-	-	Х						
Exchange the radial shaft seal on gear output ¹⁾	-	-	-	Х						
Perform an oil change ¹⁾	-	-	-	Х						
Replace gearhead after reaching 90% of the calculated nominal bearing life, but at the latest after 20,000 operating hours.										
¹⁾ Contact our Customer Servic	e departme	nt for this servi	ce. The necessary do	ocuments, spare						

Contact our Customer Service department for this service. The necessary documents, spare parts, information and any training needed, will be provided..

TbI-9: Maintenance schedule

7.4 Notes on the lubricant used



All gearheads are filled by the manufacturer with synthetic gear oil (polyglycols) of viscosity class ISO VG220.

For information on the type and quantity of lubricant, see the type plate or contact our Customer Service department.

The manufacturer listed below will provide any further information on the lubricants: Castrol Industrie GmbH, Mönchengladbach Tel.: + 49 (0) 21 61 / 9 09 - 30

7.5 Disposal

Consult our Customer Service department for supplementary information on exchanging the adapter plate, on disassembly, and on disposal of the gearhead.

- Dispose of the gearhead at the recycling sites intended for this purpose.
 - ① Observe the locally valid regulations for disposals.

8 Malfunctions



Fault	Possible cause	Solution			
Increased operating temperature	The gearhead is not suited for the task.	Check the technical specifications.			
	Motor is heating the	Check the wiring of the motor.			
	gearhead.	Ensure adequate cooling.			
		Change the motor.			
	Ambient temperature too high.	Ensure adequate cooling.			
Increased noises during operation / increased	Distortion in motor mounting, misalignment	Consult our Customer Service department.			
vibrations	Damaged bearings				
	Damaged gear teeth				
Loss of lubricant	Lubricant quantity too high	Wipe off discharged lubricant and continue to watch the gearhead. Lubricant discharge should stop after a short time.			
	Seals not tight	Consult our Customer Service department.			
Clamp connection of the clamping hub is slipping	Clamping bolt not tightened properly	Check the shaft seat and hub bore for damages. Replace			
	Operating parameters not maintained	damaged parts. Check the clamping bolt for proper tightening torque and secure it against loosening by itself. Check the operating parameters.			

Tbl-10: Malfunctions

9 Appendix

9.1 Specifications on mounting onto a motor

		Designation
H	Н	Clamping bolt
	I	Clamping ring (part of the clamping hub)
	J	Bushing
J A BEAK	К	Motorshaft

Tbl-11: Arrangement of motor shaft, clamping hub, and bushing

Ge	earhead size SP ⁺	Clamping hub interior Ø "x" [mm]	Clamping screw (H) / DIN ISO 4762	Width across flats [mm]	Tightening torque [Nm] property class 12.9	max. axial force clamping hub [N] (plug receptacle)
060	1-stage	x≤11	M4	3	4.1	100
		11< x ≤14	M5	4	9.5	
		14< x ≤19	M6	5	14	
	2–stage	x≤11	M4	3	4.1	80
		11< x ≤14	M5	4	9.5	
075	1-stage	x≤14	M5	4	9.5	120
		14< x ≤19	M6	5	14	
		19< x ≤24	M8	6	35	
	2–stage	x≤11	M4	3	4.1	100
	_	11< x ≤14	M5	4	9.5	
		14< x ≤19	M6	5	14	
100	1-stage	x≤19	M6	5	14	150
		19< x ≤24	M8	6	35	
		24< x ≤28	M6	5	14	
		28< x ≤38	M10	8	79	
	2–stage	x≤14	M5	4	9.5	120
		14< x ≤19	M6	5	14	
		19< x ≤24	M8	6	35	
140	1-stage	x≤24	M8	6	35	200
		24< x ≤38	M10	8	79	
		38< x ≤48	M12	10	135	
	2–stage	x≤19	M6	5	14	150
		19< x ≤24	M8	6	35	
		24< x ≤38	M10	8	79	
180	1-stage	x≤38	M10	8	79	250
		38< x ≤48	M12	10	135	
	2–stage	x≤24	M8	6	35	200
		24< x ≤38	M10	8	79	

Tbl-12: Specifications on mounting onto a motor

9.2 Specifications on mounting onto a machine

Gearhead size SP ⁺	Hole circle Ø [mm]	Bore Ø [mm]	Screw size / property class	Tightening torque [Nm]
060	68	5.5	M5 / 12.9	9
075	85	6.6	M6 / 12.9	15.4
100	120	9.0	M8 / 12.9	37.3
140	165	11.0	M10 / 12.9	73.4
180	215	13.0	M12 / 12.9	126

Tbl-13: Specifications on mounting onto a machine

9.3 Lubricant quantity

Gearhead size SP ⁺	Number of stages	Oil type	Viscosity class ISO VG	Filling quantity [cm ³]
060	1	Tribol 800	220	21
	2	Tribol 800	220	36
075	1	Tribol 800	220	50
	2	Tribol 800	220	80
100	1 Tribol 800		220	95
	2	Tribol 800	220	160
140	1	Tribol 800	220	270
	2	Tribol 800	220	440
180	1	Tribol 800	220	550
	2	Tribol 800	220	1000

Tbl-14: Lubricant quantity

9.4 Tightening torques for common thread sizes in general mechanics

The specified tightening torques for headless screws and nuts are calculated values and are based on the following conditions:

- Calculation acc. VDI 2230 (Issue February 2003)
- Friction value for thread and contact surfaces μ =0.10
- Exploitation of the yield stress 90 %

	Tightening torque [Nm] for threads												
Property class	М3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Bolt / nut													
8.8 / 8	1.15	2.64	5.24	8.99	21.7	42.7	73.5	118	180	258	363	493	625
10.9 / 10	1.68	3.88	7.69	13.2	31.9	62.7	108	173	265	368	516	702	890
12.9 / 12	1.97	4.55	9.00	15.4	37.3	73.4	126	203	310	431	604	821	1042

Tbl-15: Tightening torques for headless screws and nuts

9.5 Technical specifications

9.5.1 Technical specifications for SP⁺ 060 for use in areas with explosion hazards

Technical specifications for SP ⁺ 060, 1-stage								
Ratio		3	4	5	7	10		
Max. Acceleration torque T _{2B}	Nm	21	34	34	34	22		
(max. 1000 cycles per hour)	in.lb	186	297	297	297	198		
Nominal torque at gear output T _{2N}	Nm	17	26	26	26	17		
(At n _{1N})	in.lb	150	230	230	230	150		
Permissible medium drive speed in n _{1N}	min ⁻¹	1800	1850	1900	2450	2600		
(At T _{2N} and 20°C ambient temperature) ^a								
Max. drive speed in n _{1Max}	min ⁻¹			4500				
Average no-load running torque T ₀₁₂	Nm	0.9	0.7	0.6	0.4	0.3		
(At n ₁ =3000 min⁻⁺ and 20 °C gearhead temperature) ^b	in.lb/arcmin	8.0	6.2	5.3	3.5	2.7		
Max. torsional backlash j _t	arcmin	S	tandard	≤ 4 / Re	duced ≤	2		
Torsional rigidity C _{t12}	Nm/arcmin			3.5				
	in.lb/arcmin			31				
Max. axial force F _{2AMax} ^b	N			1680				
	lb _f			378				
Max. radial force F _{2RMax} ^b	N			1890				
	lb _f	425						
Max. tilting moment M _{2KMax}	Nm			98				
	in.lb			867				
Life L _h	h	See	chapter g	7.1.6 "F earhead	Replacing d"	g the		
Weight incl. standard adapter plate m	kg			1.9				
	Ib _m			4.2				
Noise level L_{PA} (At i=10 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)			≤ 58				
Max. permissible housing temperature	°C			+90				
	F			194				
Ambient temperature	۵°	See ch	apter 6.	1 "Note	during s	tartup"		
	F	-						
Paint		Blue RAL 5002						
Direction of rotation		Drive a	and gea	r output	equidire	ctional		
Protection class (w/o connection to motor)				IP 65				
Mass moment of inertia J_1 referring to the	kgcm ²	0.21	0.15	0.12	0.1	0.09		
drive; Bore diameters of the clamping hub: 11 mm	10 ⁻³ in.lb.s ²	0.18	0.13	0.11	0.09	0.08		

Technical specifications for SP ⁺ 060, 1-stage											
Ratio		3	4	5	7	10					
Mass moment of inertia J_1 referring to the	kgcm ²	0.28	0.22	0.2	0.18	0.16					
14 mm	10 ⁻³ in.lb.s ²	0.25	0.2	0.17	0.16	0.15					
Mass moment of inertia J_1 referring to the	kgcm ²	0.61	0.55	0.52	0.5	0.49					
drive; Bore diameters of the clamping hub: 19 mm	10 ⁻³ in.lb.s ²	0.54	0.48	0.46	0.44	0.43					
^a At higher ambient temperatures, lower the speeds and, in the case of mounting position V1, reduce the medium drive speeds n _{1N} by 20% ^b No-load running torques diminish during operation											
^c Based on the shaft or flange center at the	gear output										

Tbl-16: SP⁺ 060, 1-stage: Technical specifications for use in areas with explosion hazards

	Technical s	specifie	cations	s for SI	>+ 060 ,	2-stag	je			
Ratio		16	20	25	28	35	40	50	70	100
Max. Acceleration	Nm	34	34	34	34	34	34	34	34	22
torque T _{2B} (max. 1000 cycles per hour)	in.lb	297	297	297	297	297	297	297	297	198
Nominal torque at gear	Nm	26	26	26	26	26	26	26	26	17
output 1 _{2N} (At n _{1N})	in.lb	230	230	230	230	230	230	230	230	150
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	2900	2900	2900	2900	2900	2900	2900	3600	3600
Max. drive speed in	min ⁻¹		1	1	1	4500	1	1		
n _{1Max}										
Average no-load running torque T_{012} (At n_1 =3000 min ⁻¹ and 20 °C gearhead	Nm	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2
	in.lb/ arcmin	4.4	3.5	3.5	2.7	2.7	2.7	2.7	2.7	1.8
temperature) ^b	archini									
Max. torsional backlash j _t	arcmin			Sta	ndard :	≤ 6 / Re	educed	≤ 4		
Torsional rigidity C _{t12}	Nm/arcmin					3.5				
	in.lb/ arcmin					31				
Max. axial force	N					1680				
F _{2AMax} ⁵	lb _f					378				
Max. radial force	N					1890				
F _{2RMax} ^v	lb _f					425				
Max. tilting moment	Nm					98				
M _{2KMax}	in.lb					867				
Life L _h	h		See	chapter	7.1.6	"Repla	cing the	e gearl	nead"	
Weight incl. standard	kg					2				
adapter plate m	lb _m					4.4				



	Technical specifications for SP ⁺ 060, 2-stage											
Ratio		16	20	25	28	35	40	50	70	100		
Noise level L_{PA} (At i=100 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)					≤ 58						
Max. permissible	°C	+90										
nousing temperature	F		194									
Ambient temperature	°C		See chapter 6.1 "Note during startup"									
	F											
Paint			Blue RAL 5002									
Direction of rotation		Drive and gear output equidirectional										
Protection class (w/o connection to motor)		IP 65										
Mass moment of inertia	kgcm ²	0.077	0.069	0.068	0.061	0.061	0.057	0.057	0.056	0.056		
J ₁ referring to the drive; Bore diameters of the clamping hub: 11 mm	10 ⁻³ in.lb.s ²	0.068	0.061	0.06	0.054	0.054	0.05	0.05	0.05	0.05		
Mass moment of inertia	kgcm ²	0.17	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15		
J ₁ referring to the drive; Bore diameters of the clamping hub: 14 mm	10 ⁻³ in.lb.s ²	0.15 0.15 0.14 0.14 0.14 0.14 0.13 0.13 0.13							0.13			
^a At higher ambient temp reduce the medium drive ^b No-load running torques ^c Based on the shaft or fla	eratures, lov speeds n _{1N} s diminish d ange center	ver the by 209 uring o at the	speed % peratio gear ou	s and, i n ıtput	in the c	ase of	mounti	ng pos	ition V1	,		

Tbl-17: SP⁺ 060, 2-stage: Technical specifications for use in areas with explosion hazards

9.5.2 Technical specifications for SP⁺ 075 for use in areas with explosion hazards

Technical specifications for SP ⁺ 075, 1-stage									
Ratio		3	4	5	7	10			
Max. Acceleration torque ${\rm T_{2B}}$	Nm	60	88	88	88	67			
(max. 1000 cycles per hour)	in.lb	527	779	779	779	589			
Nominal torque at gear output T_{2N}	Nm	47	75	75	75	47			
(At n _{1N})	in.lb	416	664	664	664	416			
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	1600	1650	1700	1900	2000			
Max. drive speed in n _{1Max}	min ⁻¹			3400					
Average no-load running torque T ₀₁₂	Nm	1.8	1.4	1.1	0.8	0.6			
(At n ₁ =3000 min ⁻¹ and 20 °C gearhead temperature) ^b	in.lb/arcmin	15.9	12.4	9.7	7.1	5.3			
Max. torsional backlash j _t	arcmin	Standard \leq 4 / Reduced \leq 2							
Torsional rigidity C _{t12}	Nm/arcmin	min 10							
in.lb/arcmin 89									

Technical specifications for SP ⁺ 075, 1-stage										
Ratio		3 4 5 7 10 2250								
Max. axial force F _{2AMax} ^b	N		•	2350						
	lb _f			529						
Max. radial force F _{2RMax} ^b	N			2800						
	lb _f			630						
Max. tilting moment M _{2KMax}	Nm			165						
	in.lb			1460						
Life L _h	h	See	chapter g	7.1.6 "R earhead	eplacin 1"	g the				
Weight incl. standard adapter plate m	kg			3.9						
	lb _m			8.6						
Noise level L _{PA}	dB(A)	≤ 59								
(At i=10 and n ₁ =3000 min ⁻¹ w/o load)										
Max. permissible housing temperature	°C			+90						
	F	194								
Ambient temperature	°C	See ch	apter 6.	1 "Note	during s	startup"				
	F									
Paint			Blu	e RAL 5	002					
Direction of rotation		Drive a	and gea	r output	equidire	ctional				
Protection class (w/o connection to motor)				IP 65						
Mass moment of inertia J_1 referring to the	kgcm ²	0.86	0.61	0.51	0.42	0.37				
drive; Bore diameters of the clamping hub: 14 mm	10 ⁻³ in.lb.s ²	0.76	0.54	0.46	0.37	0.33				
Mass moment of inertia J_1 referring to the	kgcm ²	1.03	0.78	0.68	0.59	0.54				
19 mm	10 ⁻³ in.lb.s ²	0.91	0.69	0.6	0.52	0.48				
Mass moment of inertia J_1 referring to the	kgcm ²	2.4	2.15	2.05	1.96	1.91				
24 mm	10 ⁻³ in.lb.s ²	2.12	1.9	1.81	1.73	1.69				
^a At higher ambient temperatures, lower the reduce the medium drive speeds n _{1N} by 20 ^c ^b No-load running torques diminish during o ^c Based on the shaft or flange center at the	speeds and, ir % peration gear output	the cas	e of mo	unting p	osition V	' 1,				

Tbl-18: SP⁺ 075, 1–stage: Technical specifications for use in areas with explosion hazards

	Technical s	pecific	cations	s for SF	P ⁺ 075,	2-stag	je			
Ratio		16	20	25	28	35	40	50	70	100
Max. Acceleration	Nm	88	88	88	88	88	88	88	88	63
torque T_{2B} (max. 1000 cycles per hour)	in.lb	779	779	779	779	779	779	779	779	558
Nominal torque at gear	Nm	75	75	75	75	75	75	75	75	47
output T _{2N} (At n _{1N})	in.lb	664	664	664	664	664	664	664	664	416
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	2300	2300	2300	2300	2300	2300	2300	3000	3000
Max. drive speed in	min ⁻¹		3400							
11 _{1Max}	Nino	0.0	0.6	0.6	0.5	0.4	0.4	0.2	0.2	0.2
torque T_{012} (At n ₁ =3000		0.8	0.0	0.0	0.5	0.4	0.4	0.3	0.3	0.3
min ⁻¹ and 20 °C gearhead temperature) ^b	arcmin	7.1 5.3 5.3 4.4 3.5 3.5 2.7 2.7 2.7								2.7
Max. torsional backlash j _t	arcmin	Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity C _{t12}	Nm/arcmin	10								
	in.lb/ arcmin	89								
Max. axial force	Ν	2350								
F _{2AMax} ^b	lb _f					529				
Max. radial force	Ν					2800				
F _{2RMax}	lb _f					630				
Max. tilting moment	Nm					165				
M _{2KMax}	in.lb					1460				
Life L _h	h		See	chapter	7.1.6	"Repla	cing the	e gearh	nead"	
Weight incl. standard	kg					3.6				
adapter plate m	Ib m					8				
Noise level L _{PA} (At i=100 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)					≤ 59				
Max. permissible	°C					+90				
housing temperature	F	194								
Ambient temperature	°C	See chapter 6.1 "Note during startup"								
	F	-								
Paint					Blue	RAL 5	5002			
Direction of rotation		Drive and gear output equidirectional								
Protection class (w/o connection to motor)						IP 65				

Technical specifications for SP ⁺ 075, 2-stage										
Ratio		16	20	25	28	35	40	50	70	100
Mass moment of inertia	kgcm ²	0.16	0.13	0.13	0.1	0.1	0.091	0.09	0.089	0.089
J ₁ referring to the drive; Bore diameters of the clamping hub: 11 mm	10 ⁻³ in.lb.s ²	0.14	0.11	0.11	0.092	0.09	0.081	0.08	0.079	0.079
Mass moment of inertia J_1 referring to the drive;Bore diameters of theclamping hub: 14 mm	kgcm ²	0.23	0.2	0.2	0.18	0.18	0.16	0.16	0.16	0.16
	10 ⁻³ in.lb.s ²	0.2	0.18	0.18	0.16	0.16	0.15	0.15	0.14	0.14
Mass moment of inertia	kgcm ²	0.55	0.53	0.52	0.5	0.5	0.49	0.49	0.49	0.49
J ₁ referring to the drive; Bore diameters of the clamping hub: 19 mm	10 ⁻³ in.lb.s ²	0.49	0.47	0.46	0.44	0.44	0.43	0.43	0.43	0.43
a										

 a At higher ambient temperatures, lower the speeds and, in the case of mounting position V1, reduce the medium drive speeds n_{1N} by 20%

^b No-load running torques diminish during operation

^c Based on the shaft or flange center at the gear output

Tbl-19: SP⁺ 075, 2–stage: Technical specifications for use in areas with explosion hazards

9.5.3 Technical specifications for SP⁺ 100 for use in areas with explosion hazards

Technical specifi	Technical specifications for SP ⁺ 100, 1-stage										
Ratio		3	4	5	7	10					
Max. Acceleration torque T _{2B}	Nm	165	252	252	252	165					
(max. 1000 cycles per hour)	in.lb	1456	2230	2230	2230	1456					
Nominal torque at gear output T_{2N}	Nm	110	170	170	170	110					
(At n _{1N})	in.lb	974	1505	1505	1505	974					
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	1350 1400 1450 1700 18									
Max. drive speed in n _{1Max}	min ⁻¹	2900									
Average no-load running torque T_{012} (At	Nm	3.5	2.7	2.4	1.6	1.4					
temperature) ^b	in.lb/arcmin	31	23.9	21.2	14.2	12.4					
Max. torsional backlash j _t	arcmin	S	tandard	≤ 3 / Re	duced ≤	1					
Torsional rigidity C _{t12}	Nm/arcmin			31							
	in.lb/arcmin			274							
Max. axial force F _{2AMax} ^b	N			3950							
	lb _f			889							
Max. radial force F _{2RMax} ^b	N			4400							
	lb _f	990									
Max. tilting moment M _{2KMax}	Nm	340									
	in.lb			3009							
Life L _h	h	See	chapter g	7.1.6 "F earhead	Replacing d"	g the					

Technical specifications for SPT100, 1-stage										
Ratio		3	4	5	7	10				
Weight incl. standard adapter plate m	kg			7.7						
	Ib m			17						
Noise level L_{PA} (At i=10 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)	≤ 64								
Max. permissible housing temperature	°C			+90						
	F			194						
Ambient temperature	°C	See ch	apter 6.	1 "Note	during s	startup"				
	F									
Paint			Blu	e RAL 5	002					
Direction of rotation		Drive a	and gea	r output	equidire	ctional				
Protection class (w/o connection to motor)		IP 65								
Mass moment of inertia J_1 referring to the	kgcm ²	3.29	2.35	1.92	1.6	1.38				
drive; Bore diameters of the clamping hub: 19 mm	10 ⁻³ in.lb.s ²	2.91	2.08	1.7	1.42	1.22				
Mass moment of inertia J_1 referring to the	kgcm ²	3.99	3.04	2.61	2.29	2.07				
24 mm	10 ⁻³ in.lb.s ²	3.53	2.69	2.31	2.03	1.83				
Mass moment of inertia J_1 referring to the	kgcm ²	3.59	2.65	2.22	1.9	1.68				
28 mm	10 ⁻³ in.lb.s ²	3.18	2.35	1.97	1.68	1.49				
Mass moment of inertia J_1 referring to the	kgcm ²	11.1	10.1	9.68	9.36	9.14				
drive; Bore diameters of the clamping hub: 38 mm	10 ⁻³ in.lb.s ²	9.78	8.95	8.57	8.28	8.09				
^a At higher ambient temperatures, lower the reduce the medium drive speeds n _{1N} by 209 ^b No-load running torques diminish during o	speeds and, ir % peration	the cas	e of mo	unting p	osition V	' 1,				

^c Based on the shaft or flange center at the gear output

Tbl-20: SP⁺ 100, 1–stage: Technical specifications for use in areas with explosion hazards

Te	Technical specifications for SP ⁺ 100, 2-stage									
Ratio		16	20	25	28	35	40	50	70	100
Max. Acceleration	Nm	252	252	252	252	252	252	252	252	165
torque I _{2B} (max. 1000 cycles per hour)	in.lb	2230	2230	2230	2230	2230	2230	2230	2230	1456
Nominal torque at gear output T_{2N} (At n_{1N})	Nm	170	170	170	170	170	170	170	170	110
	in.lb	1505	1505	1505	1505	1505	1505	1505	1505	974
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	2000	2000	2000	2000	2000	2000	2000	2700	2700
Max. drive speed in $n_{1\text{Max}}$	min ⁻¹	2900								



Т	Technical specifications for SP ⁺ 100, 2-stage											
Ratio		16	20	25	28	35	40	50	70	100		
Average no-load running	Nm	1.5	1.2	1.1	0.9	0.8	0.7	0.6	0.5	0.5		
torque T ₀₁₂ (At n ₁ =3000 min⁻¹ and 20 °C gearhead temperature) ^b	in.lb/ arcmin	13.3	10.6	9.7	8	7.1	6.2	5.3	4.4	4.4		
Max. torsional backlash \mathbf{j}_{t}	arcmin			Sta	ndard :	≤ 5 / Re	educed	≤ 3				
Torsional rigidity C _{t12}	Nm/ arcmin		31									
	in.lb/ arcmin	274										
Max. axial force F _{2AMax} ^b	Ν		3950									
	lb _f					889						
Max. radial force	Ν					4400						
F _{2RMax}	lb _f		990									
Max. tilting moment	Nm		340									
M _{2KMax}	in.lb	3009										
Life L _h	h	See chapter 7.1.6 "Replacing the gearhead"										
Weight incl. standard	kg					7.9						
adapter plate m	lb _m					17.5						
Noise level L _{PA} (At i=100 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)					≤ 60						
Max. permissible	°C					+90						
housing temperature	F					194						
Ambient temperature	°C		S	ee cha	pter 6.	1 "Note	during	startu	р"			
	F											
Paint					Blue	e RAL 5	5002					
Direction of rotation			C	rive ar	nd gear	output	equidi	rectiona	al			
Protection class (w/o connection to motor)		IP 65										
Mass moment of inertia	kgcm ²	0.64	0.54	0.52	0.43	0.43	0.38	0.38	0.37	0.37		
Bore diameters of the clamping hub: 14 mm	10 ⁻³ in.lb.s ²	$\begin{bmatrix} 3 \\ 0.57 \end{bmatrix} \begin{bmatrix} 0.47 \\ 0.46 \end{bmatrix} \begin{bmatrix} 0.38 \\ 0.38 \end{bmatrix} \begin{bmatrix} 0.38 \\ 0.34 \end{bmatrix} \begin{bmatrix} 0.33 \\ 0.33 \end{bmatrix} \begin{bmatrix} 0.33 \\ 0.33 \end{bmatrix}$							0.33			

Technical specifications for SP ⁺ 100, 2-stage										
Ratio		16	20	25	28	35	40	50	70	100
Mass moment of inertia	kgcm ²	0.81	0.7	0.68	0.6	0.59	0.55	0.54	0.54	0.54
J ₁ referring to the drive; Bore diameters of the clamping hub: 19 mm	10 ⁻³ in.lb.s ²	0.72	0.62	0.61	0.53	0.52	0.48	0.48	0.48	0.47
Mass moment of inertia J_1 referring to the drive; Bore diameters of the clamping hub: 24 mm	kgcm ²	2.18	2.07	2.05	1.97	1.96	1.92	1.91	1.91	1.91
	10 ⁻³ in.lb.s ²	1.93	1.83	1.82	1.74	1.74	1.7	1.69	1.69	1.69
^a At higher ambient temper reduce the medium drive s	atures, lov peeds n _{1N}	ver the by 20%	speed: %	s and, i	n the c	ase of	mounti	ng posi	tion V1	,

^b No-load running torques diminish during operation

^c Based on the shaft or flange center at the gear output

Tbl-21: SP⁺ 100, 2–stage: Technical specifications for use in areas with explosion hazards

9.5.4 Technical specifications for SP⁺ 140 for use in areas with explosion hazards

Technical specifications for SP ⁺ 140. 1-stage										
Ratio		3	4	5	7	10				
Max. Acceleration torque T _{2B}	Nm	273	528	528	528	371				
(max. 1000 cycles per hour)	in.lb	2416.05	4672.8	4672.8	4672.8	3283.35				
Nominal torque at gear output T_{2N}	Nm	215	360	360	360	215				
(At n _{1N})	in.lb	1902.75	3186	3186	3186	1902.75				
Permissible medium drive speed in n_{1N}	min ⁻¹	1150	1200	1200	1600	1700				
(At T _{2N} and 20°C ambient temperature) ^a										
Max. drive speed in n _{1Max}	min ⁻¹	2500								
Average no-load running torque T ₀₁₂	Nm	7.6	5.8	4.7	3.4	2.5				
(At n ₁ =3000 min⁻ ' and 20 °C gearhead temperature) ^b	in.lb/arcmin	67	51	42	30	22				
Max. torsional backlash j _t	arcmin	Standard ≤ 3 / Reduced ≤ 1								
Torsional rigidity C _{t12}	Nm/arcmin			53						
	in.lb/arcmin			469						
Max. axial force F _{2AMax} ^b	Ν			6900						
	lb _f			1553						
Max. radial force F _{2RMax} ^b	N			6600						
	lb _f			1485						
Max. tilting moment M _{2KMax}	Nm	660								
	in.lb	5841								
Life L _h	h	See chapter 7.1.6 "Replacing the gearhead"								
Weight incl. standard adapter plate m	kg			17.2						
	lb _m			38						

Γ

Technical	specifications	for SP ⁺ 140.	1-stage

		140.1	Slage				
Ratio		3	4	5	7	10	
Noise level L _{PA} (At i=10 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)		·	≤ 65			
Max. permissible housing temperature	۵°	+90					
	F	194					
Ambient temperature	°C	See chapter 6.1 "Note during startup"					
	F						
Paint		Blue RAL 5002					
Direction of rotation		Drive	and gea	r output	equidire	ctional	
Protection class (w/o connection to motor)				IP 65			
Mass moment of inertia J_1 referring to the	kgcm ²	10.7	7.82	6.79	5.84	5.28	
drive; Bore diameters of the clamping hub: 24 mm	10 ⁻³ in.lb.s ²	9.45	6.92	6.01	5.17	4.67	
Mass moment of inertia J_1 referring to the	kgcm ²	13.8	11	10	9.01	8.44	
32 mm	10 ⁻³ in.lb.s ²	12.3	9.72	8.81	7.97	7.47	
Mass moment of inertia J_1 referring to the	kgcm ²	14.9	12.1	11	10.1	9.51	
drive; Bore diameters of the clamping hub: 38 mm	10 ⁻³ in.lb.s ²	13.2	10.7	9.76	8.92	8.42	
Mass moment of inertia J_1 referring to the	kgcm ²	29.5	26.7	25.6	24.7	24.2	
drive; Bore diameters of the clamping hub: 48 mm	10 ⁻³ in.lb.s ²	26.1	23.6	22.7	21.9	21.4	
 ^a At higher ambient temperatures, lower the the medium drive speeds n_{1N} by 20% ^b No-load running torques diminish during c 	speeds and, in topperation	the case	of moun	iting pos	ition V1,	reduce	

^c Based on the shaft or flange center at the gear output

Tbl-22: SP⁺ 140, 1-stage: Technical specifications for use in areas with explosion hazards

Technical specifications for SP ⁺ 140, 2-stage										
Ratio		16	20	25	28	35	40	50	70	100
Max. Acceleration	Nm	528	528	528	528	528	528	528	528	371
cycles per hour)	in.lb	4673	4673	4673	4673	4673	4673	4673	4673	3283
Nominal torque at gear	Nm	360	360	360	360	360	360	360	360	215
output I _{2N} (At n _{1N})	in.lb	3186	3186	3186	3186	3186	3186	3186	3186	1903
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	1900	1900	1900	1900	1900	1900	1900	2100	2500
Max. drive speed in	min ⁻¹					2500				
n _{1Max}										
Average no-load running	Nm	3.3	2.7	2.4	1.9	1.8	1.4	1.3	1.2	1.1
min ⁻¹ and 20 °C gearhead temperature) ^b	in.lb/ arcmin	29.2	23.9	21.2	16.8	15.9	12.4	11.5	10.6	9.7



	Technical s	specific	cations	s for SI	P ⁺ 140,	2-stag	je			
Ratio		16	20	25	28	35	40	50	70	100
Max. torsional backlash j _t	arcmin	Standard \leq 5 / Reduced \leq 3								
Torsional rigidity C _{t12}	Nm/arcmin					53				
	in.lb/ arcmin		469							
Max. axial force	Ν					6900				
F _{2AMax}	lb _f		1553							
Max. radial force	N					6600				
F _{2RMax} ~	lb _f		1485							
Max. tilting moment	Nm		660							
M _{2KMax}	in.lb	5841								
Life L _h	h		See chapter 7.1.6 "Replacing the gearhead"							
Weight incl. standard	kg	17								
adapter plate m	lb _m		37.6							
Noise level L_{PA} (At i=100 and n_1 =3000 min ⁻¹ w/o load)	dB(A)	≤ 63								
Max. permissible	°C					+90				
housing temperature	F	194								
Ambient temperature	°C	See chapter 6.1 "Note during startup"								
	F									
Paint					Blue	RAL 5	5002			
Direction of rotation			C	rive an	nd gear	output	equidi	rectiona	al	
Protection class (w/o connection to motor)						IP 65				
Mass moment of inertia	kgcm ²	2.50	2.01	1.97	1.65	1.63	1.4	1.39	1.38	1.38
J ₁ referring to the drive; Bore diameters of the clamping hub: 19 mm	10 ⁻³ in.lb.s ²	2.21	1.78	1.75	1.46	1.44	1.24	1.23	1.22	1.22
Mass moment of inertia	kgcm ²	3.19	2.71	2.67	2.34	2.32	2.1	2.08	2.08	2.07
J ₁ referring to the drive; Bore diameters of the clamping hub: 24 mm	10 ⁻³ in.lb.s ²	2.82	2.4	2.36	2.07	2.05	1.85	1.85	1.84	1.83
Mass moment of inertia J_1 referring to the drive;	kgcm ²	10.2 5	9.77	9.73	9.41	9.39	9.16	9.15	9.14	9.14
Bore diameters of the clamping hub: 38 mm	10 ⁻³ in.lb.s ²	9.07	8.65	8.61	8.33	8.31	8.11	8.1	8.09	8.09
^a At higher ambient temp reduce the medium drive	eratures, lov speeds n _{1N}	ver the by 20%	speed %	s and, i	in the c	ase of	mounti	ng pos	ition V1	,

^b No-load running torques diminish during operation

^c Based on the shaft or flange center at the gear output

Tbl-23: SP⁺ 140, 2-stage: Technical specifications for use in areas with explosion hazards



9.5.5 Technical specifications for SP⁺ 180 for use in areas with explosion hazards

Technical specifi	cations for SP	+180. 1-	stage				
Ratio		3	4	5	7	10	
Max. Acceleration torque T _{2B}	Nm	679	968	968	968	679	
(max. 1000 cycles per hour)	in.lb	6009	8567	8567	8567	6009	
Nominal torque at gear output T _{2N}	Nm	550	550	550	550	550	
(At n _{1N})	in.lb	4868	4868	4868	4868	4868	
Permissible medium drive speed in n_{1N}	min ⁻¹	800	850	850	1400	1500	
(At T _{2N} and 20°C ambient temperature) ^a							
Max. drive speed in n _{1Max}	min ⁻¹			2000			
Average no-load running torque T ₀₁₂ (At	Nm	14	11	9	6.8	5	
temperature) ^b	in.lb/arcmin	123.9	97.4	79.7	60.2	44.3	
Max. torsional backlash j _t	arcmin	Standard \leq 3 / Reduced \leq 1					
Torsional rigidity C _{t12}	Nm/arcmin			175			
	in.lb/arcmin			1549			
Max. axial force F _{2AMax} ^b	N			9900			
	lb _f			2228			
Max. radial force F _{2RMax} ^b	N			10290			
	lb _f			2315			
Max. tilting moment M _{2KMax}	Nm	1120					
	in.lb			9912			
Life L _h	h	See	chapter 7 g	7.1.6 "Ro earhead	eplacing 1"	the	
Weight incl. standard adapter plate m	kg			34			
	lb _m			75.1			
Noise level L _{PA} (At i=10 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)			≤ 66			
Max. permissible housing temperature	°C			+90			
	F		194				
Ambient temperature	°C	See ch	apter 6.	1 "Note	during s	tartup"	
	F]					
Paint			Blu	e RAL 5	002		
Direction of rotation		Drive a	and gea	r output	equidire	ctional	
Protection class (w/o connection to motor)				IP 65			

Technical specifications for SP*180. 1-stage						
Ratio		3	4	5	7	10
Mass moment of inertia J_1 referring to the	kgcm ²	50.8	33.9	27.9	22.2	19.2
38 mm	10 ⁻³ in.lb.s ²	45	30	24.7	19.7	17
Mass moment of inertia J_1 referring to the	kgcm ²	58.2	41.2	35.3	29.6	26.5
48 mm	10 ⁻³ in.lb.s ²	51.5	36.5	31.2	26.2	23.5
^a At higher ambient temperatures, lower the reduce the medium drive speeds n _{1N} by 20 ⁹ ^b No-load running torgues diminish during o	speeds and, in % peration	the cas	e of mo	unting p	osition V	'1,

Tbl-24: SP⁺ 180, 1-stage: Technical specifications for use in areas with explosion hazards

^c Based on the shaft or flange center at the gear output

	Technical s	chnical specifications for SP ⁺ 180, 2-stage								
Ratio		16	16 20 25 28 35 40 50 70 10							
Max. Acceleration	Nm	968	968	968	968	968	968	968	968	679
torque T_{2B} (max. 1000 cycles per hour)	in.lb	8567	8567	8567	8567	8567	8567	8567	8567	6009
Nominal torque at gear	Nm	550								
output 1 _{2N} (At n _{1N})	in.lb	4868								
Permissible medium drive speed in n_{1N} (At T_{2N} and 20°C ambient temperature) ^a	min ⁻¹	1750	1750	1750	1750	1750	1750	1750	2100	2100
Max. drive speed in n _{1Max}	min ⁻¹	2300								
Average no-load running	Nm	5.3	4.3	3.9	3.1	2.8	2.3	2.1	1.9	1.7
torque T_{012} (At n_1 =3000 min ⁻¹ and 20 °C gearhead temperature) ^b	in.lb/ arcmin	46.9	38.1	34.5	27.4	24.8	20.4	18.6	16.8	15
Max. torsional backlash j _t	arcmin	Standard ≤ 5 / Reduced ≤ 3								
Torsional rigidity C _{t12}	Nm/arcmin					175				
	in.lb/ arcmin					1549				
Max. axial force	N					9900				
F _{2AMax}	lb _f					2228				
Max. radial force	N					10290				
F _{2RMax}	lb _f					2315				
Max. tilting moment	Nm					1120				
M _{2KMax}	in.lb					9912				
Life L _h	h		See	chapte	7.1.6	"Repla	cing the	e gearh	nead"	
Weight incl. standard	kg					36.4				
adapter plate m	Ib _m					80.4				



Technical specifications for SP ⁺ 180, 2-stage											
Ratio		16	16 20 25 28 35 40 50 70 100								
Noise level L _{PA} (At i=100 and n ₁ =3000 min ⁻¹ w/o load)	dB(A)	≤ 66									
Max. permissible	°C	+90									
housing temperature	F	194									
Ambient temperature	°C	See chapter 6.1 "Note during startup"									
	F										
Paint			Blue RAL 5002								
Direction of rotation		Drive and gear output equidirectional									
Protection class (w/o connection to motor)			IP 65								
Mass moment of	kgcm ²	9.27	7.72	7.48	6.32	6.2	5.51	5.45	5.39	5.36	
the drive; Bore diameters of the clamping hub: 24 mm	10 ⁻³ in.lb.s ²	8.2	6.83	6.62	5.59	5.49	4.88	4.82	4.77	4.74	
Mass moment of	kgcm ²	12.4	10.9	10.6	9.48	9.36	8.67	8.61	8.55	8.52	
inertia J ₁ referring to the drive; Bore diameters of the clamping hub: 32 mm	10 ⁻³ in.lb.s ²	11	9.63	9.42	8.39	8.28	7.67	7.62	7.57	7.54	
Mass moment of	kgcm ²	13.5	12	11.7	10.6	10.4	9.74	9.68	9.63	9.6	
the drive; Bore diameters of the clamping hub: 38 mm	10 ⁻³ in.lb.s ²	12	10.6	10.4	9.34	9.23	8.62	8.57	8.52	8.49	
Mass moment of	kgcm ²	28.1	26.6	26.3	25.2	25.1	24.4	24.3	24.3	24.3	
inertia J ₁ referring to the drive; Bore diameters of the clamping hub: 48 mm	10 ⁻³ in.lb.s ²	24.9	23.5	23.3	22.3	22.2	21.6	21.5	21.5	21.5	
^a At higher ambient temperatures, lower the speeds and, in the case of mounting position V1, reduce the medium drive speeds n _{1N} by 20% ^b No-load running torques diminish during operation ^c Based on the shaft or flange center at the gear output											

Tbl-25: SP⁺ 180, 2-stage: Technical specifications for use in areas with explosion hazards

9.6 Declaration of Conformity



EG-Konformitätserklärung EC-Declaration of Conformity

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iali: inio-alpha@wittenstein.de
verantwortung, daß die Erzeugnisse ansibility, that the products
arme Planetengetriebe mit ein- und zweistufiger Übersetzung
acklash Planetary Gear Reducer with one- and two-stage ratio
SP* 075, SP* 100, SP* 140, SP* 180
on (Ölschmierung, für Zyklusbetrieb)
n (Oll lubrication, for Cycle Operation)
erungen der folgenden EN-Normen of the following EN standards
Nicht-elektrische Geräte für den Einsatz in explosionsgefährdete Bereichen - Teil 1: Grundlagen und Anforderungen
Non-electrical equipment for potentially explosive atmospheres Part 1: Basic method and requirements
Nicht-elektrische Geräte für den Einsatz in explosionsgefährdete Bereichen - Teil 5: Schutz durch Konstruktive Sicherheit "c"
Non-electrical equipment intended for use in potentially explosive atmospheres Part 5: Protection by constructional safety "c"
Nicht-elektrische Geräte für den Einsatz in explosionsgefährdete Bereichen - Teil 8: Schutz durch Flüssigkeitskapselung k
Non-electrical equipment for potentially explosive atmospheres Part 8: Protection by liquid immersion "k"
NEAP

Ausführung sind Geräte im Sinne des Artikels 1 (3) a) der EG-Richtlinie 94/9/EG und erfüllen die grundlegenden Sicherheits- und Gesundheitsanforderungen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der RL 94/9/EG. and agree with the test documents. Planetary gear reducers in highly explosive versions are devices in terms of Article 1 (3) a) of the EU directive 94/9/EC and fulfil the basic safety and health requirements for use according to regulations in explosive areas in accordance with supplement II of directive 94/9/EC.

Kennzeichnung / Marking:

Il 2G ck IIC T3 X und / and II 2D ck 150 ℃ X

Die explosionsgeschützt ausgeführten Planetengetriebe tragen das CE-Zeichen. The explosion-proof versions of planetary gear reducers carry the CE symbol.

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Die zugehörige Betriebsanleitung (Dok.-Nr. 2022-D014984) enthält wichtige sicherheitstechnische Hinweise und Vorschriften für die Inbetriebnahme, Umgang und Wartung der SP* - Getriebe. The respective operating manual (Document No. 2022-D014984) contains important safety-related information and regulations for start-up, handling and maintenance of the SP^{*} gear reducer.

Das Verfahren der Konformitätsbewertung wurde gemäß Artikel 8 (1) b) ii) der EG-Richtlinie 94/9/EG durchgeführt. Die technischen Unterlagen gemäß Anhang VIII Nummer 3 der EG-Richtlinie sind bei der benannten Stelle hinterlegt:

The procedure of the conformity assessment was carried out according to Article 8 (1) b) ii) of the EU-guideline 94/9/EC. The technical documents according to Attachment VIII, No. 3 of the EU-guideline have been deposited at the appointed location:

Anschrift / Address

Physikalisch-Technische Bundesanstalt Fachbereich 3.3 Bundesallee 100 D-38116 Braunschweig

Igersheim, 01.07.2008

Ort und Datum der Ausstellung Place and Date of Issue

Franz Eisele Konstruktionsleiter / Design Manager

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Document No.: 2097-D015119 Rev.: 03

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alpha

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