WITTENSTEIN alpha

premo

SP Line / TP Line / XP Line

Operating Manual

4022-D045530

Revision: 02

WITTENSTEIN alpha GmbH
Walter-Wittenstein-Straße 1
D-97999 Igersheim
Germany

Consulting hotline for startup:
+49 7931 493-14800

Customer Service department

		✉	🕻
Deutschland	WITTENSTEIN alpha GmbH	service@wittenstein-alpha.de	+49 7931 493-14900
Benelux	WITTENSTEIN BVBA	service@wittenstein.biz	+32 9 326 73 80
Brasil	WITTENSTEIN do Brasil	vendas@wittenstein.com.br	+55 15 3411 6454
中国	威腾斯坦（杭州）实业有限公司	service@wittenstein.cn	+86 571 8869 5856
Österreich	WITTENSTEIN GmbH	office@wittenstein.at	+43 2256 65632-0
Danmark	WITTENSTEIN AB	info@wittenstein.dk	+45 4027 4151
France	WITTENSTEIN sarl	info@wittenstein.fr	+33 134 17 90 95
Great Britain	WITTENSTEIN Ltd.	sales.uk@wittenstein.co.uk	+44 1782 286 427
Italia	WITTENSTEIN S.P.A.	info@wittenstein.it	+39 02 241357-1
日本	ヴィッテンシュタイン株式会社	sales@wittenstein.jp	+81-3-6680-2835
North America	WITTENSTEIN holding Corp.	technicalsupport@wittenstein-us.com	+1 630-540-5300
España	WITTENSTEIN S.L.U.	info@wittenstein.es	+34 93 479 1305
Sverige	WITTENSTEIN AB	info@wittenstein.se	+46 40-26 50 10
Schweiz	WITTENSTEIN AG Schweiz	sales@wittenstein.ch	+41 81 300 10 30
台湾	威騰斯坦有限公司	info@wittenstein.tw	+886 3 287 0191
Türkiye	WITTENSTEIN Güç Aktarma Sistemleri Tic. Ltd. Şti.	info@wittenstein.com.tr	+90 216 709 21 23

Contents

1 About this manual

These instructions contain information necessary for the safe operation of the premo servo actuator, referred to as the servo actuator in the following.

If this manual is supplied with an amendment (e.g. for special applications), then the information in the amendment is valid. Contradictory specifications in this manual thereby become void.

In case of questions on the special applications, please contact **WITTENSTEIN alpha GmbH**.

The operator must ensure that these instructions are read through by all persons assigned to install, operate, or maintain the servo actuator, and that they fully comprehend them.

Store these instructions within reach of the servo actuator.

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:

	⚠ DANGER **This signal word indicates an imminent danger that will cause serious injuries or even death.**
	⚠ WARNING **This signal word indicates a potential hazard that could cause serious injuries and even death.**
	⚠ CAUTION **This signal word indicates a potential hazard that could cause minor or serious injuries.**
	NOTICE **This signal word indicates a potential hazard that could lead to material damage.**
	A note without signal word draws your attention to application tips or especially important information when handling the servo actuator.

1.2 Safety symbols

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


General danger


Hot surface


Suspended loads


Danger of being pulled in


Electric voltage


Flammable

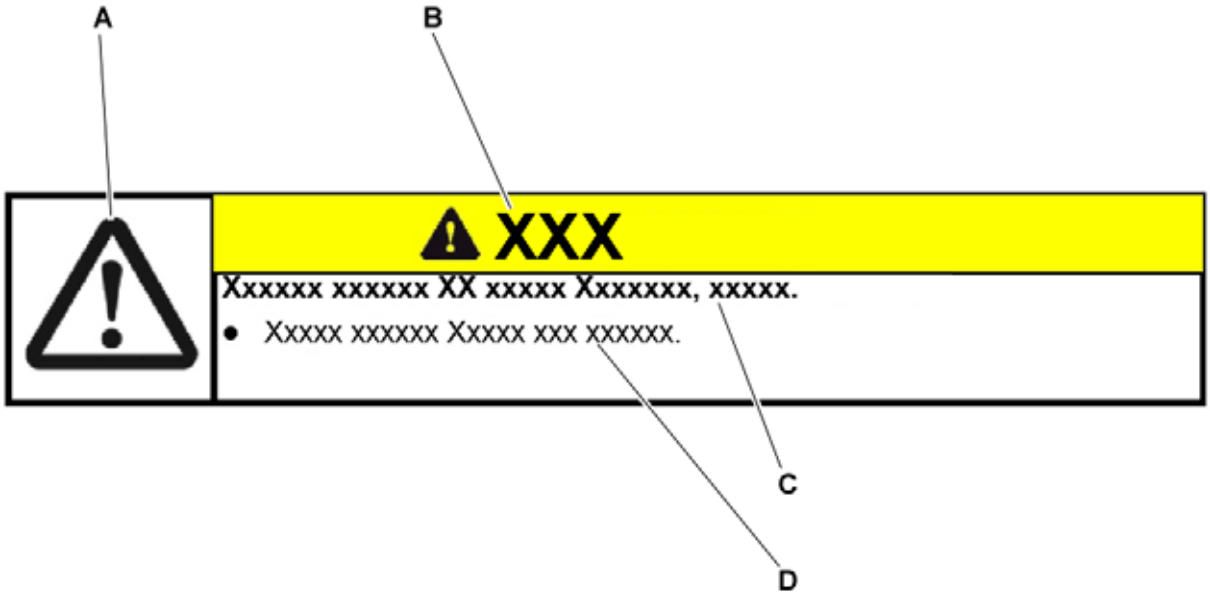

Harmful to the environment


Information


Component sensitive to electrostatic discharge

1.3 Design of the safety instructions

The safety instructions of these instructions 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

ⓘ Provides additional information on handling

2 Safety

This operating manual, especially the safety instructions and the rules and regulations valid for the operating site, must be observed by all persons working with the servo actuator.

In addition to the safety instructions in this manual, also observe any (legal and otherwise) applicable environmental and accident prevention rules and regulations (e.g. personal safety equipment).

2.1 EU Low Voltage Directive

The servo actuator has been constructed in accordance with the directive 2014/35/EU. Observe applicable regulations for electrical installation (e.g. wire gauge, fuses).

It is the responsibility of the manufacturer of the plant to ensure all requirements for the entire system are fulfilled.

2.2 Dangers

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

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

- Read the general safety instructions before beginning work (see Chapter 2.7 "General safety instructions").

2.3 Personnel

Only technicians who have read and understood this operating manual may perform work on the servo actuator. Based on their training and experience, technicians must be able to evaluate the tasks assigned to them, in order to recognize and avoid risks.

2.4 Intended use

The servo actuator is designed to be installed in or connected to the following machines, incomplete machines or equipment:

- Stationary large-scale plant,
- Stationary industrial tools,
- Movable machines, not intended for road use and only provided for professional (industrial) use

In particular the following points must be observed:

- The servo actuator must be controlled by a servo controller.
- The servo actuator must not be used in applications with special environmental conditions e.g. vacuum, potentially explosive atmospheres, clean room or areas with radioactive contamination.
- Additional points must be observed for use in the food industry or the pharmaceutical industry:
  - The servo actuator may only be used next to or under the foodstuff/product area.
  - Observe also 7.4 "Information on the lubricant used".
- For risk-free operation, required safety devices have to be present, properly installed, and fully functional. They may not be removed, changed, bridged, or rendered ineffective.
- In case of an emergency shutdown, power failure and or damage to the electrical equipment, the servo actuator must be
  - switched off immediately,
  - secured against uncontrolled re-activation,
  - secured against uncontrolled after-running.
- The optionally installed brake is simply a holding brake and may only be utilized in emergency stop situations for braking the running servo actuator.

2.5 Reasonably foreseeable misuse

Any use that deviates from the approved technical data (e.g. speed, force, torque, temperature) is not use as intended and is therefore not permitted.

In particular the following applications are not permitted:

- Operation of the servo actuator, without properly installing it in or connecting it to other machines or other partly completed machines or equipment.
- Operation of the servo actuators in a defective state
- Operation of the servo actuator, without determining that the machine in which it is to be installed complies with the provisions of the Machinery Directive 2006/42/EC.
- Operation of the servo actuator in a potentially explosive environment
- Assembly of the servo actuator without prior acknowledgment of the operating / assembly manual
- Operation of the servo actuator without legible warning and information signs
- Use of improper lubricants
- Use of unsuitable servo controllers
- Use in improper installation, operating, performance and ambient conditions
- Assembly of the servo actuator by insufficiently competent personnel

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 (e.g. test run without secure attachment)
- Operation of the servo actuator when safety devices and equipment are defective
- Operation of the servo actuator without lubricant
- Operation of a heavily soiled servo actuator
- Modifications or reconstructions that have been carried out without the approval of **WITTENSTEIN alpha GmbH**

2.7 General safety instructions

⚠ DANGER

Faulty electrical connections or not approved, current-carrying components can cause serious injuries and even death.

- Have all electrical connection work performed by qualified technicians only.
- Immediately replace damaged cables or plugs.

⚠ WARNING

During generator operation, voltage is induced. This can lead to lethal current pulses.

- Ensure that no plugs and connections are laying open during generator operation.

⚠ WARNING

Objects flung out by rotating components can cause serious injuries.

- Remove objects and tools from the servo actuator before putting it into operation.

⚠ WARNING

Rotating components on the servo actuator can pull in parts of the body and cause serious injuries and even death.

- Keep a sufficient distance to rotating machinery while the servo actuator is running.
- Secure the machine against restarting and unintentional movements during assembly and maintenance work (e.g. uncontrolled lowering of lifting axes).

⚠ WARNING

A wrong direction of rotation or direction of movement may result in serious injury or death.

The direction of rotation or movement may differ from the standard IEC 60034–8.

- Before and during startup, ensure that the servo actuator has the correct direction of rotation or movement.
- Be sure to avoid collision (caused e.g. by crashing against an end stop).
- With the danger area secured, check the direction of rotation or movement in a slow motion, ideally by limiting the current and torque.

⚠ WARNING

A damaged servo actuator can cause accidents with the risk of injury.

- Never operate a servo actuator that has been overloaded due to misuse or a machine crash (see Chapter 2.5 "Reasonably foreseeable misuse").
- Replace the affected servo actuators, even if no external damage is visible.

⚠ CAUTION

Hot servo actuator housing (up to 125 °C) can cause serious burns.

- Touch the servo actuator housing only when wearing protective gloves or after the servo actuator has been idle for some time.

NOTICE

Loose or overloaded screw connections can damage the servo actuator.

- Always use a calibrated torque wrench to tighten and check all screw connections for which a tightening torque has been specified.

⚠ WARNING

Lubricants are flammable.

- Do not spray with water to extinguish.
- Suitable extinguishing agents are powder, foam, water mist and carbon dioxide.
- Observe the safety instructions of the lubricant manufacturer (see Chapter 7.4 "Information on the lubricant used").

⚠ CAUTION

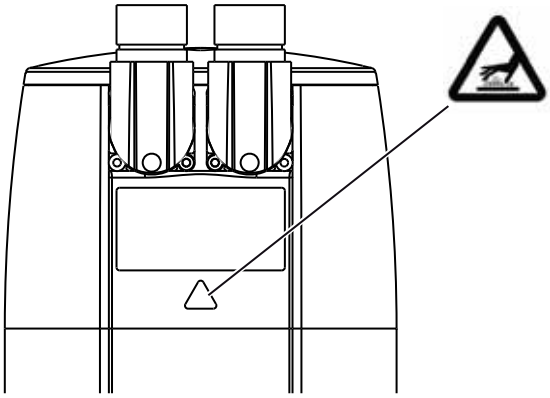
Solvents and lubricants can cause skin irritations.

- Avoid direct skin contact.

Solvents and lubricants can pollute soil and water.

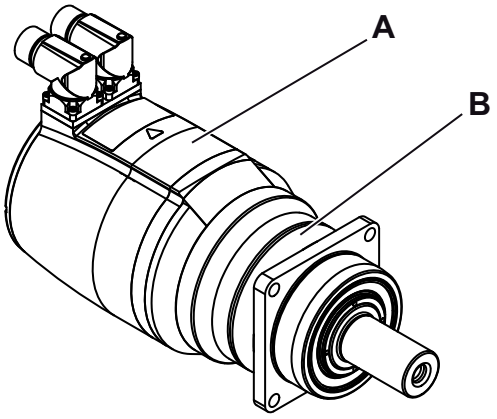
- Use and dispose of cleaning solvents and lubricants properly.

2.8 Safety signs



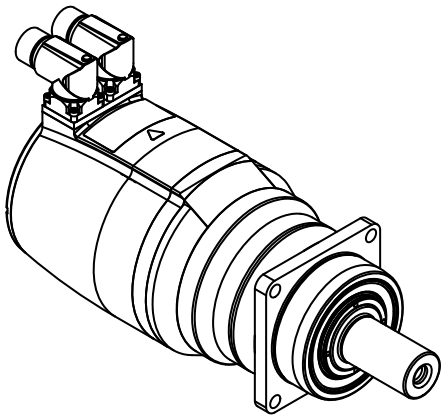
There is a safety sign on the servo actuator housing that warns against hot surfaces. This safety sign may **not** be removed.

3 Description of the servo actuator



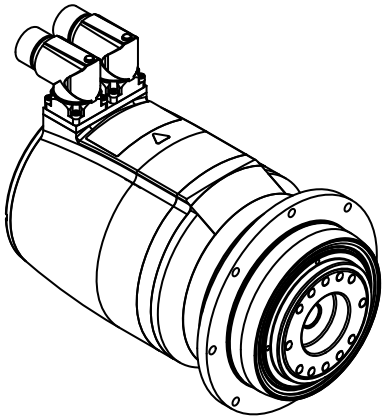
The servo actuator is a combination of a low-backlash planetary gearbox (B) and an AC servomotor (A).

The AC servomotor is a brushless 3-phase synchronous motor with excitation by means of permanent magnets located on the rotor. A resolver or optical encoder takes care of the commutation or speed regulation. An optional permanent-magnet holding brake is integrated into the motor.



The standard manufactured versions of the **premo SP line** and the **premo XP line** output shaft are as follows:

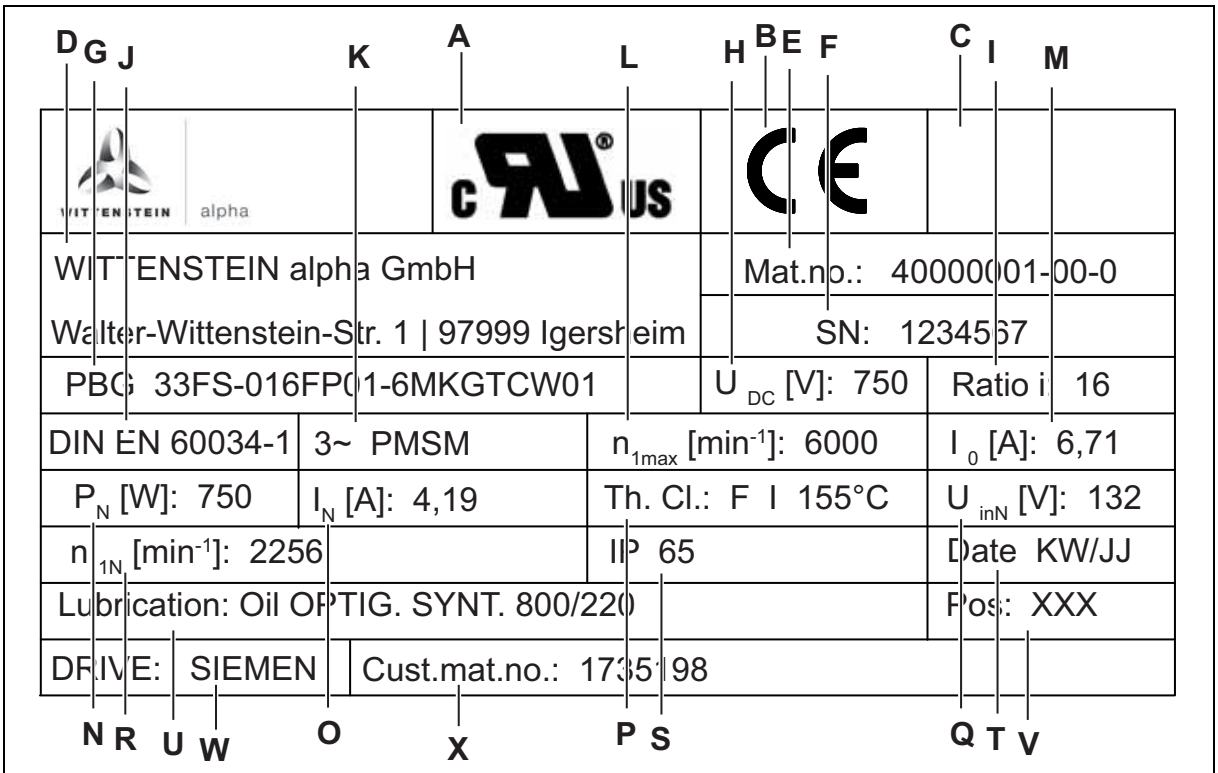
- Smooth output shaft
- Grooved output shaft
- Involute gearing



The **premo TP line** output shaft is constructed as an output flange.

3.1 Name plate

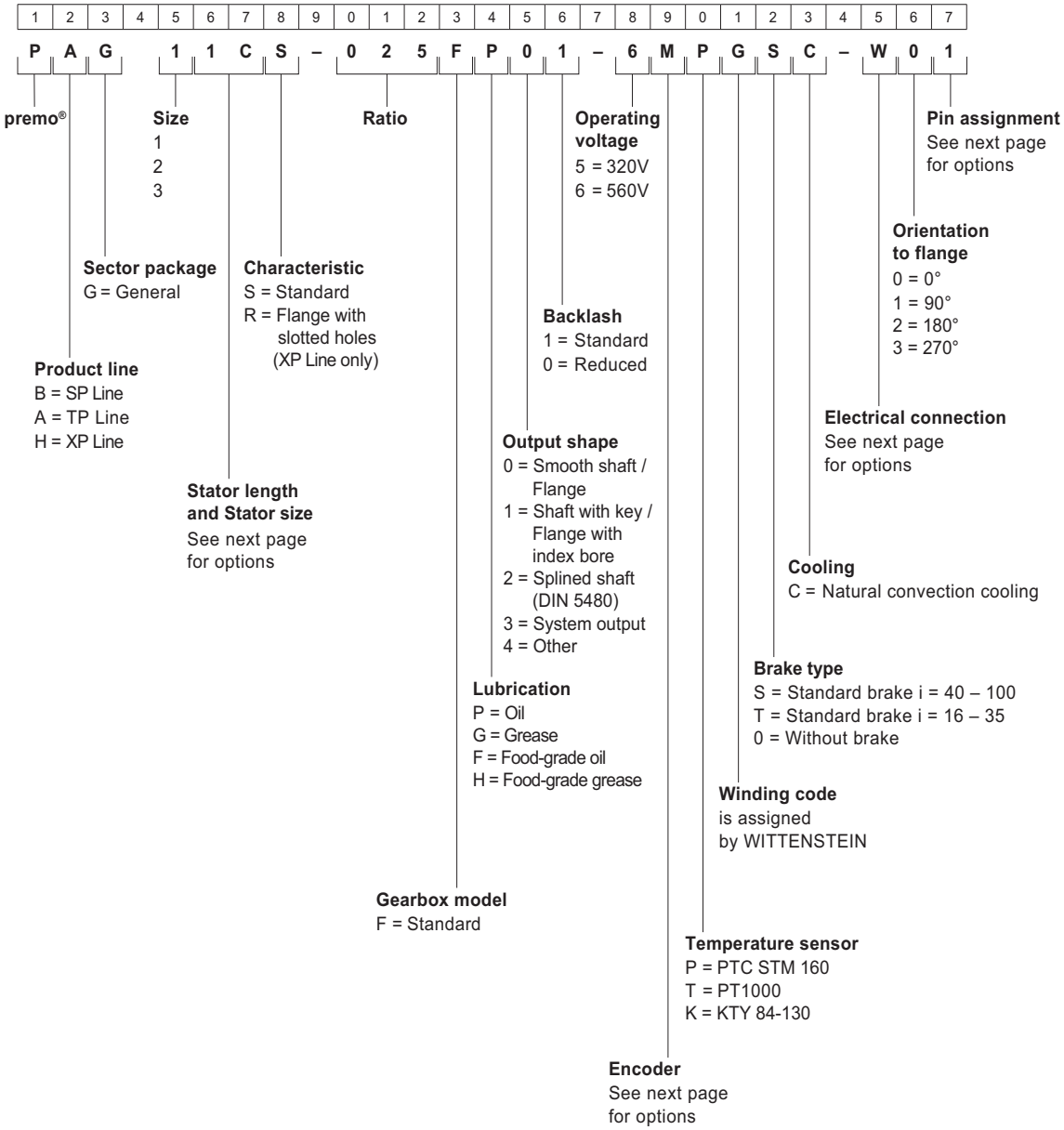
The name plate is attached to the servo actuator housing.



	Designation		Designation
A	UL identification "cURus"	**M**	Continuous stall current of the motor
B	CE identification	**N**	Nominal output
C	Placeholder: QR code	**O**	Nominal current of actuator
D	Address of manufacturer	**P**	Insulating material class / max. winding temperature
E	Material number / article code	**Q**	Induced voltage for nominal speed
F	Serial number	**R**	Nominal input speed
G	Ordering code (see 3.2 "Ordering code")	**S**	Protection class
H	Operating voltage	**T**	Production date
I	Gear ratio	**U**	Lubricant
J	Rating according to standard	**V**	Mounting position
K	Motor type	**W**	Servo converter
L	Max. input speed	**X**	Customer material number

Tbl-1: Name plate

3.2 Ordering code



Electrical connection options

R	Angled integral socket, 1-cab
W	Angled integral socket, 2-cab
S	Straight integral socket, 1-cab
G	Straight integral socket, 2-cab

Pin assignment options

1	WITTENSTEIN alpha-Standard Temp. sensor in signal cable
2	Siemens-compatible
4	WITTENSTEIN alpha-Standard Temp. sensor in power cable
5	Rockwell-compatible
6	B&R-compatible
8	Schneider-compatible
9	Beckhoff-compatible

Encoder options

R	Resolver, 2-pin
S	EnDat 2.1 absolute, singleturn
M	EnDat 2.1 absolute, multiturn
F	EnDat 2.2 absolute, singleturn
W	EnDat 2.2 absolute, multiturn
N	HIPERFACE® absolute, singleturn
K	HIPERFACE® absolute, multiturn
G	HIPERFACE DSL* Safety absolute, singleturn
H	HIPERFACE DSL* Safety absolute, multiturn
L	DRIVE-CliQ absolute, singleturn
D	DRIVE-CliQ absolute, multiturn
E	Rockwell absolute, singleturn
V	Rockwell absolute, multiturn
J	Rockwell DSL absolute, singleturn
P	Rockwell DSL absolute, multiturn

Stator length and stator size options

	Ratio 16 to 35	**Ratio 40 to 100**
Size1	2C	1C
Size2	2D	1D
Size3	3F	1F

3.3 Performance statistics

Refer to Chapter 9.4 "Technical specifications" for the maximum permitted speeds and torques.

3.4 Weight

The standard weights of the servo actuators (with resolver / encoder) are specified in the tables "Tbl-2", "Tbl-3" and "Tbl-4". Depending on the design, the actual weight can deviate by up to 20 %.

3.4.1 Weight of premo SP line

Weight [kg]				
Size of premo SP line		**Size 1**	**Size 2**	**Size 3**
Without brake	**i = 16 – 35**	3.6	5.6	11.7
	i = 40 – 100	3.2	5.1	10.0
With brake	**i = 16 – 35**	4.1	6.5	13.4
	i = 40 – 100	3.5	5.5	10.6

Tbl-2: Weight of premo SP line [kg]

3.4.2 Weight of premo TP line

Weight [kg]				
Size of premo TP line		**Size 1**	**Size 2**	**Size 3**
Without brake	**i = 16 – 35**	3.1	5.6	10.5
	i = 40 – 100	2.7	5.1	8.8
With brake	**i = 16 – 35**	3.6	6.5	12.2
	i = 40 – 100	3.0	5.5	9.4

Tbl-3: Weight of premo TP line [kg]

3.4.3 Weight of premo XP line

Weight [kg]				
Size of premo XP line		**Size 1**	**Size 2**	**Size 3**
Without brake	**i = 16 – 35**	3.3	5.5	11.4
	i = 40 – 100	2.9	5.0	9.7
With brake	**i = 16 – 35**	3.8	6.4	13.1
	i = 40 – 100	3.2	5.4	10.3

Tbl-4: Weight of premo XP line [kg]

4 Transport and storage

4.1 Scope of delivery

- Check the completeness of the delivery against the delivery note.

  ⓘ Missing parts or damage must be notified immediately in writing to the carrier, the insurance company, or **WITTENSTEIN alpha GmbH**.

4.2 Packaging

The servo actuator is delivered packed in foil and cardboard boxes.

- Dispose of the packaging materials at the recycling sites intended for this purpose. Observe the applicable national regulations concerning disposal.

4.3 Transport

⚠ WARNING

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

- Do not stand under suspended loads.
- Secure the servo actuator with suitable fasteners (e.g. belts) before transport.

NOTICE

Hard knocks, because of falling or hard dropping, can damage the servo actuator.

- Only use hoisting equipment and lifting accessories with sufficient capacity.
- Never exceed the maximum permissible load for hoisting equipment.
- Lower the servo actuator slowly.

Specifications on the weights, refer to Chapter 3.4 "Weight".

Ambient temperatures between -20° C and +50° C are permissible for transport only.

Transport of servo actuators up to and including size 3

No special method is specified for transporting the servo actuator.

Lifting at the electrical connections or the output shaft / output flange is not permitted.

4.4 Storage

Store the servo actuator in horizontal position and dry surroundings at a temperature of 0°C to + 30°C in the original packaging. Store the servo actuator for a maximum of 2 years.

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

5 Assembly

- Read the general safety instructions before beginning work (see Chapter 2.7 "General safety instructions").

5.1 Preparations

NOTICE

Many electronic components are sensitive to electrostatic discharge (ESD). This particularly concerns integrated circuits (IC), semiconductors, resistors with a tolerance of less than one percent as well as transistors and other components such as encoders.

- Observe the directives concerning ESD protection.

NOTICE

Pressurized air can damage the servo actuator seals.

- Do not use pressurized air to clean the servo actuator.

- Clean/de-grease the output shaft /output flange of the servo actuator with a clean, lint-free cloth moistened with a suitable grease-dissolving but non-aggressive cleaning agent.
- 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 Mounting the servo actuator onto a machine

The servo actuator is compliant for every mounting position; the lubricant quantity, however, is dependent on the mounting position. The mounting position and the lubricant that has been filled in is indicated on the identification plate (see Chapter 3.1 "Name plate").

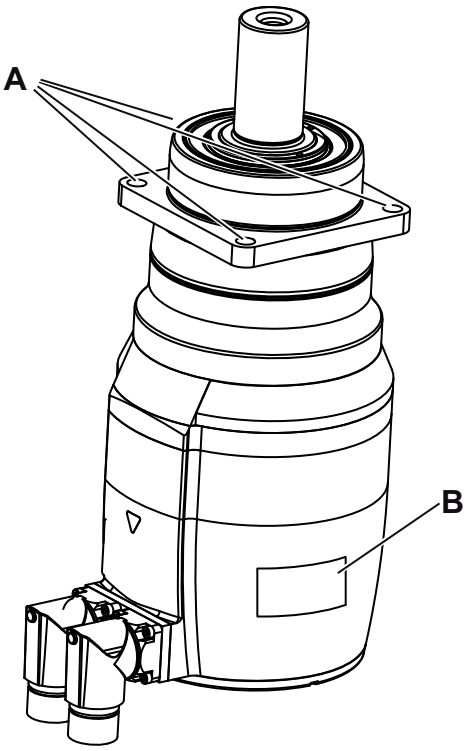
- Mount the servo actuator only in the specified mounting position.

- Observe the safety and processing instructions for the threadlocker to be used.

5.2.1 Mounting premo SP line on a machine

premo SP line and **premo XP line** are equipped with a square flange with round through-holes for mounting on a machine.

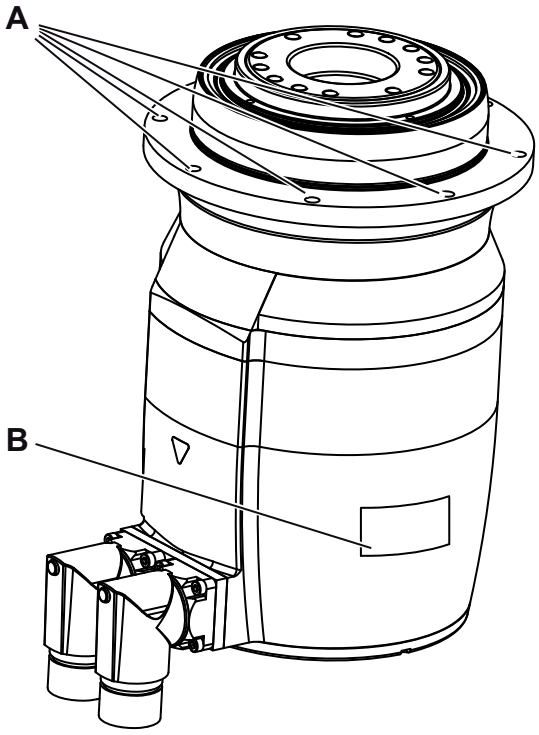
Alternatively **premo XP line** can have slotted holes, see Chapter 5.2.3 "Mounting premo XP line with slotted holes on a machine (optional)".



- Coat the fastening screws with a threadlocker (e.g. Loctite® 243).
- Fasten the servo actuator to the machine with the fastening screws through the through-holes (A).
  - ⓘ Mount the servo actuator in such a way that the name plate (B) remains legible.
  - ⓘ Do not use any washers (e.g. plain washers, tooth-lock washers).
  - ⓘ For appropriate screw sizes and tightening torques, see Chapter 9.1 "Specifications for mounting on a machine", Tables "Tbl-11" and "Tbl-13".

5.2.2 Mounting premo TP line on a machine

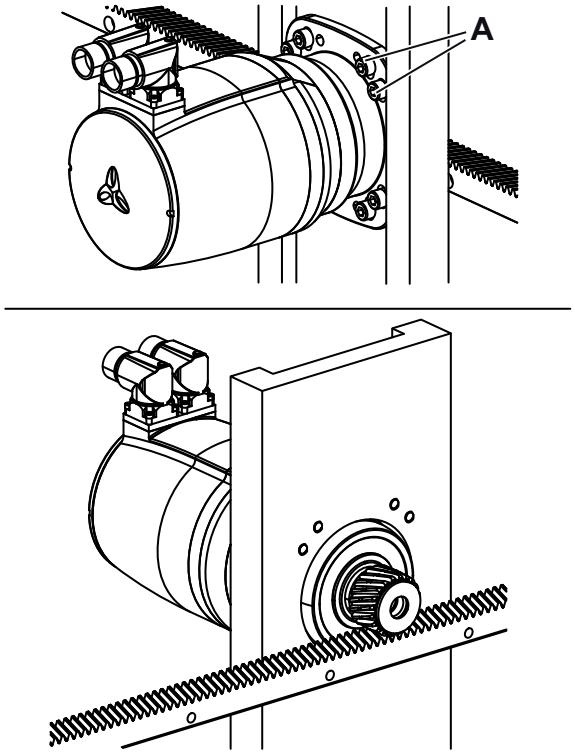
premo TP line is equipped with a circular flange with round through-holes for mounting on a machine.



- Coat the fastening screws with a threadlocker (e.g. Loctite® 243).
- Fasten the servo actuator to the machine with the fastening screws through the through-holes (A).
  - ⓘ Mount the servo actuator in such a way that the name plate (B) remains legible.
  - ⓘ Do not use any washers (e.g. plain washers, tooth-lock washers).
  - ⓘ For appropriate screw sizes and tightening torques, see Chapter 9.1 "Specifications for mounting on a machine", Table "Tbl-12".

5.2.3 Mounting premo XP line with slotted holes on a machine (optional)

For adjusting the gearing backlash between output pinion and toothed rack / counter-wheel, **premo XP line** features slotted holes and guides on the sides as an option. An additional adjustment device is no longer necessary. The ground side surfaces can also be used as a torque support.



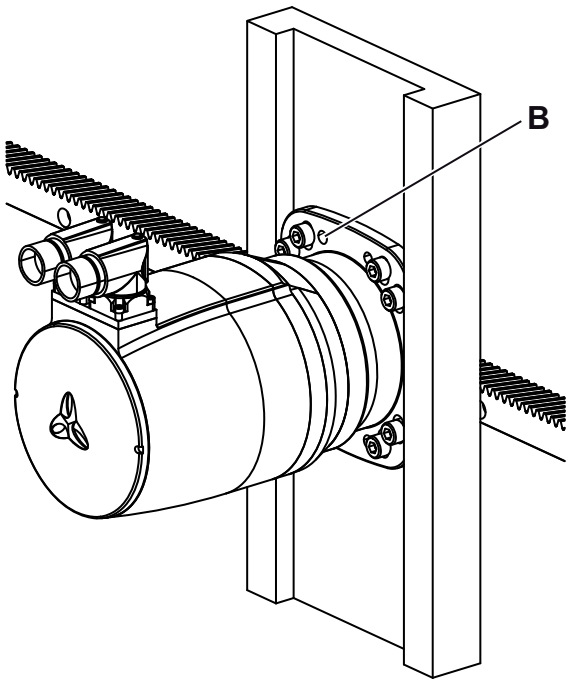
- Center the servo actuator by the ground side surfaces in the sled.
- Adjust gearing backlash between output pinion and toothed rack / counter-wheel.
  - ⓘ For the proper setting of the gearing backlash, you will find further information in the "alpha rack & pinion system" manual.
- Use only the washers included with the delivery for fastening the gearbox to the machine (see Table "Tbl-5").
- Slide the washers onto the fastening screws.
- Smear threadlocker (e.g. Loctite 243) onto the fastening screws.
- Fasten the servo actuator to the machine with the fastening screws through the slotted holes (A).
  - ⓘ Mount the servo actuator in such a way that the name plate remains legible.
  - ⓘ For appropriate screw sizes and tightening torques, see Chapter 9.1 "Specifications for mounting on a machine", Table "Tbl-13".
  - ⓘ Optionally, you can fixate the servo actuator to the machine additionally with cylinder pins. Further information can be found in section "Pinning the mounted and aligned servo actuator (optional)".

Size of premo XP line	Size 1	Size 2	Size 3
Outer diameter [mm]	–	14	16
Clamping length [mm]	–	5	6

Tbl-5: Dimensions of the washers

Pinning the mounted and aligned servo actuator (optional)

There are bore holes (B) on the housing for pinning the servo actuator to the machine.



- Drill pin holes into the machine base according to the bores (B) of the housing.
- Ream the bores to the corresponding fit size for the cylinder pins.

  ⓘ For specifications on the cylinder pins, refer to Table "Tbl-6".
- Fixate the servo actuator with the cylinder pins.

Pin holes in gear housing	
Size	**Quantity x cylinder pin with interior thread DIN 7979 DIN EN ISO 8735 Form A**
Size 1	–
Size 2	2 x 6 m6
Size 3	2 x 8 m6

Tbl-6: Pin holes

5.3 Components mounted on the output side

NOTICE

Distortions during assembly can damage the servo actuator.

- Mount gearwheels and toothed belt pulleys onto the output shaft / output flange without forcing.
- Never attempt to assemble by force or hammering!
- Only use suitable tools and devices for assembly.

ⓘ The prescribed screw sizes and tightening torques for the output flange can be found in Chapter 9.2 "Specifications for mounting on the output side", Table "Tbl-14".

5.4 Installing electrical connections

⚠ DANGER

Electrically live components may result in electric shocks if touched and can cause serious injuries and even death.

- Observe the five safety rules of electrical engineering before starting electrical installation work:
  - Disconnect.
  - Secure against being switched on again.
  - Check that there is no voltage.
  - Ground and short-circuit.
  - Cover neighboring and electrified parts.
- Check that protective caps are on the plugs. If protective caps are missing, check the plugs for damage and soiling.

⚠ DANGER

Electric operation in moist areas may result in electric shocks and can cause serious injuries and even death.

- Carry out the electrical assembly only in dry areas.

⚠ WARNING

During generator operation, voltage is induced. This can lead to lethal current pulses.

- Ensure that no plugs and connections are exposed during generator operation.

The cables of all servo actuators need to be laid out in such a way that a minimum bending radius of 10 x diameter is kept. Torsional load of the cables should be avoided.

ⓘ In actuators of the respective series, connectors with bayonet coupling are used. These are connectors with an additional vibration O-ring.

- When using M23 screw counter plugs, the O-ring remains in place to protect against loosening due to vibration on the mounting socket.
- When using **counter plugs with bayonet coupling** the O-ring must be **removed**.
- The maximum line length without disconnection points is 50 m. Observe also the maximum permissible line lengths of the servo converter being used.

6 Startup and operation

6.1 Safety instructions and operating conditions

- Read the general safety instructions before beginning work (see Chapter 2.7 "General safety instructions").

ⓘ Wearing hearing protection in the vicinity of the servo actuator is recommended.

	Improper use can cause damage to the servo actuator. ● Ensure that - The **ambient temperature** does not drop below 0 °C or exceed +40 °C, - The **surface temperature on the gearbox** does not exceed +90°C, - The **surface temperature on the engine** does not exceed +115°C, - The **installation altitude** is not above 1000 m NHN. ● For other conditions of use, consult our Customer Service department. ● Use the sensor only up to its maximum limit values, see Chapter 9.4 "Technical specifications". ● Only use the servo actuator in a clean, dust-free and dry environment. ● Operate the servo actuator only in the mounting position that is specified on the identification plate.

6.2 Data for the electrical startup

The specified data is intended for the electrical startup.

	**NOTICE** **The servo controllers of the different manufacturers generally use an individual annotation of the data.** **If the data is disregarded, the drive and/or the servo controller may be damaged.** ● Observe the listed units **precisely** and check their conformance with the units of the servo controller. ● If the units differ, make the necessary adjustment accordingly.

ⓘ In some servo controllers, there is a dependence between the individual parameters. We would be glad to assist you in finding the correct entries.

ⓘ We provide adjusted and certified quick start guides for several servo controllers. In these guides you will find the adapted parameter lists for the relevant servo converters.

- For further information, please visit our website at http://wittenstein-alpha.de or contact our Customer Service: service@wittenstein.de

This data reflects the technical characteristics and the limit values of the standard engines of the premo series in general units. Possible restrictions due to the gearbox can be found in the data sheet of your servo actuator.

- Select the data for the premo version you are using.
  - Chapter 9.4.1 "Motor specifications, premo 320 V"
  - Chapter 9.4.2 "Motor specifications, premo 560 V"
- Select the appropriate product size of the desired servo controller in regard to the application data.

7 Maintenance and disposal

- Read the general safety instructions before beginning work (see Chapter 2.7 "General safety instructions").

⚠ WARNING

The permanent magnets of the stator send a strong magnetic field, which becomes active during the disassembling of the servo actuator.

- Observe the general safety instructions (e.g. for pacemaker patients) for working in strong magnetic fields.

7.1 Maintenance work

The partial or complete disassembly of the actuator into its individual parts for maintenance or repair work is not permissible.

- In case of a malfunction or failure, please contact Customer Service.

7.1.1 Refreshment of holding brake

The holding torques of the holding brakes used in the actuators are influenced by various factors, e.g. oxidation of abraded particles, flattening of friction surfaces due to frequent application of the brakes in the same position or air gap changes due to wear. This can lead to a tolerance in the holding torque of - 50 % to + 100 %.

The specified holding torques apply under optimal conditions, without damaging influences. The deterioration of the holding torque can be reduced by refreshing the brakes periodically.

For critical applications we recommend dimensioning for an adequately large holding torque to take account of these factors. Our internal technical service would be glad to help you with the appropriate dimensioning.

A maintenance interval of 4 weeks is recommended for common industrial applications.

For your dimensioning, observe the effective torques during running-in.

Recommended brake refreshment cycle, premo				
Ordering code: PxG xxxx-xxxxxxx-xxxxXxxxx-xxx (X= S or T)				
	Unit	PxG 1	PxG 2	PxG 3
Slipping speed	rpm	100		
Duration for brake deenergized	sec	0,5		
Duration for brake energized	sec	0,5		
Number of cycles	–	5		

Tbl-7: Recommended brake refreshment cycle, premo

7.1.2 Visual inspection

- Check the entire servo actuator and all cables for exterior damage.
- The radial shaft seals are subject to wear. Therefore, also check the servo actuator for leakage during each visual inspection (lubricant leaks).
  - ⓘ You can find more general information on radial shaft seals on our partner's Internet site at http://www.simrit.de.
  - ⓘ Check the mounting position, so that no foreign medium (e.g. oil) has collected on the output flange.
- Check whether the safety signs (see Chapter 2.8 "Safety signs") and the type plate (see Chapter 3.1 "Name plate") are mounted and legible.

7.1.3 Checking the tightening torques

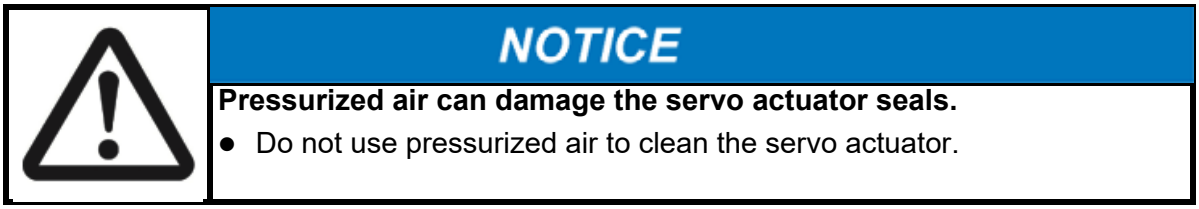
- Check the tightening torque of the fastening screws on the servo actuator housing and at the output flange.
  - ⓘ The prescribed tightening torques can be found in Chapter 9.1 "Specifications for mounting on a machine", Tables "Tbl-11", "Tbl-12"and "Tbl-13", and in Chapter 9.2 "Specifications for mounting on the output side", Table "Tbl-14".
- If, while checking the tightening torque, you discover that a screw can be further tightened, follow the instructions in "Remounting the screw".

Remounting the screw

	● Make sure that it is possible to remount the screw on the gearbox without damaging the entire machine.

- Loosen the screw.
- Remove the glue residue from the threaded bore and the screw.
- De-grease the screw.
- Coat the screw with a threadlocker (e.g. Loctite® 243).
- Insert the screw and tighten it with the specified torque.

7.1.4 Cleaning



- Clean the servo actuator using a clean, lint-free cloth.
- If necessary, use a suitable fat dissolving but non-aggressive cleaning agent.

7.2 Startup after maintenance work

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

7.3 Maintenance schedule

Maintenance work	At startup	After the first 500 operating hours or 3 months	Every 4 weeks	Yearly
Refreshment of holding brake			X	
Visual inspection and cleaning	X	X		X
Checking the tightening torques	X	X		X

Tbl-8: Maintenance schedule

7.4 Information on the lubricant used

All servo actuators are permanently lubricated by the manufacturer with synthetic gear oil (polyglycols) of viscosity class ISO VG100, ISO VG220 or with a high-performance lubricant (see type plate). All bearings are lubricated for life at the factory.

The manufacturer listed below will provide any further information on the lubricants:

Standard lubricants	Lubricants for the food industry (NSF-H1 registered)
Castrol Industrie GmbH, Mönchengladbach Tel.: + 49 2161 909-30 www.castrol.com	Klüber Lubrication München KG, Munich Tel.: + 49 89 7876–0 www.klueber.com

Tbl-9: Lubricant manufacturers

7.5 Disposal

Consult our Customer Service Department for supplementary information on disassembly and disposal of the servo actuator.

- Dispose of the servo actuator at the recycling sites intended for this purpose.
  ⓘ Observe the locally valid regulations for disposals.

8 Malfunctions

NOTICE

Changed operational behavior can be an indication of existing damage to the servo actuator, or cause damage to the servo actuator.

- Do not put the servo actuator back into operation until the cause of the malfunction has been rectified.

Rectifying of malfunctions may only be done by specially trained technicians.

To facilitate troubleshooting and the optimization of controller settings, it is useful to record the current over a full cycle (a servo controller function) and make it available as a file.

Fault	Possible cause	Solution
Increased operating temperature	Selected construction too weak for task, nominal operating exceeded.	Check the technical specifications.
	Motor is heating the gearbox.	Check the controller's settings.
	Ambient temperature too high.	Ensure adequate cooling.
Increased operating noises	Damaged bearings	Consult our Customer Service department.
	Damaged gear teeth	
Loss of lubricant	Lubricant quantity too high	Wipe off discharged lubricant and continue to watch the gearbox. Lubricant discharge should stop after a short time.
	Seals not tight	Consult our Customer Service department.
Motor does not start	Power supply interrupted	Check the connections
	Wiring of motor and / or encoder not correct	Check the wiring of the motor phases and the motor encoder
	Blown fuse	Check for errors and replace the fuse
	Incorrect controller parameters	Check that the motor parameters are suitable for the implemented servo actuator
	Motor protection has been triggered	Check for errors. Check whether the motor protection setting is correct.
Wrong direction of rotation	Wrong set value specification for the servo controller	Check servo controller/converter. Check the set value specifications and the polarities
Motor is droning and has a high power consumption	Drive is blocked	Check the drive
	Error in the encoder line	Check the encoder line
	Incorrect controller parameters	Check that the motor parameters are suitable for the implemented servo actuator
	Brake does not release	(see fault "Brake does not release")

Fault	Possible cause	Solution
Brake does not release	Voltage drop along the supply line > 10%	Ensure that the supply voltage is correct. Check the cable cross-section.
	Incorrect brake connection	Check the connection for correct polarity and voltage
	Short circuit in the coil or at body of brake coil	Consult our Customer Service department.
Holding brake slips	Stopping torque of the brake exceeded	Check the construction plan. Carry out a refreshment.
Acceleration times are not met	Load is too high	Check the dimensioning
	Power limiting active	Check the controller parameters
Position error	Shielding of the encoder line insufficient	Inspect the shielding of the connection cables
	Disturbing pulse from the brake, protective circuit of the brake missing or defective	Check the protective circuit (e.g. Varistor) of the brake on the converter
	Mechanical coupling between the motor shaft and encoder defective	Consult our Customer Service department.

Tbl-10: Malfunctions

9 Appendix

In case of questions on the special applications, please contact **WITTENSTEIN alpha GmbH**.

9.1 Specifications for mounting on a machine

9.1.1 Specifications for mounting premo SP line

Through-holes in servo actuator housing of premo SP line				
Size	**Hole circle Ø [mm]**	**Quantity x diameter [ ] x [mm]**	**For screw size / property class**	**Tightening torque [Nm]**
Size 1	68	4 x 5.5	M5 / 12.9	9.0
Size 2	85	4 x 6.6	M6 / 12.9	15.4
Size 3	120	4 x 9.0	M8 / 12.9	37.3

Tbl-11: Specifications for mounting on a machine, premo SP line

9.1.2 Specifications for mounting premo TP line

Through-holes in servo actuator housing of premo TP line				
Size	**Hole circle Ø [mm]**	**Quantity x diameter [ ] x [mm]**	**For screw size / property class**	**Tightening torque [Nm]**
Size 1	79	8 x 4.5	M4 / 12.9	4.55
Size 2	109	8 x 5.5	M5 / 12.9	9.0
Size 3	135	8 x 5.5	M5 / 12.9	9.0

Tbl-12: Specifications for mounting on a machine, premo TP line

9.1.3 Specifications for mounting premo XP line

Through-holes / slotted holes in servo actuator housing of premo XP line					
Size	**Hole circle Ø [mm]**		**Quantity x diameter []x [mm]**	**For screw size / property class**	**Tightening torque [Nm]**
	Through-holes	**Slotted holes**			
Size 1	70	–	8 x 5.5	M5 /12.9	9.0
Size 2	90	95	8 x 6.6	M6 /12.9	15.4
Size 3	120	120	8 x 9.0	M8 /12.9	37.5
–:= on request					

Tbl-13: Specifications for mounting on a machine, premo XP line

9.2 Specifications for mounting on the output side

9.2.1 Thread in output flange, premo TP line

Type/Size	Hole circle Ø [mm]	Quantity x Thread x Depth [ ] x [mm] x [mm]	Tightening torque [Nm] Property class 12.9
Size 1	31.5	8 x M5 x 7	9.0
Size 2	50.0	8 x M6 x 10	15.4
Size 3	63.0	12 x M6 x 12	15.4

Tbl-14: Thread in output flange, premo TP line

9.3 Tightening torques for common thread sizes in general mechanical engineering

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

- Calculation in accordance with VDI 2230 (February 2003 version)
- Friction value for thread and contact surfaces μ=0.10
- Utilization of the yield stress 90%
- Torque tools type II classes A and D in accordance with ISO 6789

The settings are values rounded to usual commercial scale gradations or setting possibilities.

- Use the **exact** values in this table to set your tools.

	Tightening torque [Nm] with thread												
Property class screw / nut	**M3**	**M4**	**M5**	**M6**	**M8**	**M10**	**M12**	**M14**	**M16**	**M18**	**M20**	**M22**	**M24**
8.8 / 8	1.15	2.64	5.2	9.0	21.5	42.5	73.5	118	180	258	362	495	625
10.9 / 10	1.68	3.88	7.6	13.2	32.0	62.5	108	173	264	368	520	700	890
12.9 / 12	1.97	4.55	9.0	15.4	37.5	73.5	126	202	310	430	605	820	1040

Tbl-15: Tightening torques for set screws and nuts

9.4 Technical specifications

9.4.1 Motor specifications, premo 320 V

This chapter gives you the technical data of the engine being used. The complete technical data of the servo actuators can be found in the data sheet of the actuator. The permissible output specifications of the actuator are influenced by the gearbox and lubricant being used. We would be glad to provide you with the data sheet, please contact us at: service@wittenstein.de

Ordering code PxG x*XX*x-xxxxxxx-xxxxxxxxx-xxx (*XX* = stator)							
	Unit	**Stator 1C**	**Stator 2C**	**Stator 1D**	**Stator 2D**	**Stator 1F**	**Stator 3F**
Operating voltage U_D	V_{DC}	320	320	320	320	320	320
Torque constant K_t	Nm/A_{eff}	0.35	0.39	0.41	0.52	0.51	0.54
Voltage constant K_e	V_{eff}/krpm	21.0	23.7	25.0	31.6	31.1	32.5
Ambient temperature θ_u	°C	40	40	40	40	40	40
Max. winding temperature θ_{max}	°C	140	140	140	140	140	140
Heat transfer resistance R_{th}	K/W	1.19	0.94	0.98	0.81	0.71	0.54
Thermal time constants τ_{th}	min	12.0	15.7	13.0	17.4	24.0	33.2
Maximum power P_{max}	kW	0.90	1.88	1.38	2.49	2.75	8.98
Maximum torque T_{max}	Nm	1.40	2.84	2.76	5.53	6.09	16.7
Maximum current I_{max}	A_{eff}	4.36	7.74	7.71	12.0	13.3	34.4
Continuous stall torque T_0	Nm	0.60	1.17	1.09	2.11	2.46	6.38
Continuous stall current I_0	A_{eff}	1.73	2.96	2.74	4.04	4.80	12.2
No-load speed n_0	rpm	10530	9330	8855	7023	7166	6908
Connection resistance R_{tt}	Ohm	15.1	5.70	7.48	3.72	3.23	0.53
Connection inductance L_{tt}	mH	10.4	6.12	10.2	7.43	6.97	2.25
Electrical time constant τ_e	ms	0.69	1.08	1.36	2.00	2.16	4.25
Pole pair number p		4	4	4	4	4	4
Moment of inertia without brake J	$kgcm^2$	0.22	0.35	0.46	0.83	1.57	4.13
Moment of inertia with brake J	$kgcm^2$	0.23	0.45	0.52	1.08	1.68	5.34

Tbl-16: Motor specifications, premo 320 V

9.4.2 Motor specifications, premo 560 V

This chapter gives you the technical data of the engine being used. The complete technical data of the servo actuators can be found in the data sheet of the actuator. The permissible output specifications of the actuator are influenced by the gearbox and lubricant being used. We would be glad to provide you with the data sheet, please contact us at: service@wittenstein.de

Ordering code PxG x*XX*x-xxxxxxx-xxxxxxxxx-xxx (*XX* = stator)							
	Unit	**Stator 1C**	**Stator 2C**	**Stator 1D**	**Stator 2D**	**Stator 1F**	**Stator 3F**
Operating voltage U_D [1)]	V_{DC}	560	560	560	560	560	560
Torque constant K_t	Nm/A_{eff}	0.60	0.68	0.72	0.91	0.89	0.93
Voltage constant K_e	$V_{eff}/krpm$	36.4	41.1	43.3	54.8	53.8	56.3
Ambient temperature θ_u	°C	40	40	40	40	40	40
Max. winding temperature θ_{max}	°C	140	140	140	140	140	140
Heat transfer resistance R_{th}	K/W	1.19	0.94	0.98	0.81	0.71	0.54
Thermal time constants τ_{th}	min	12.0	15.7	13.0	17.4	24.0	33.2
Maximum power P_{max}	kW	0.90	1.88	1.38	2.49	2.75	8.98
Maximum torque T_{max}	Nm	1.40	2.84	2.76	5.53	6.09	16.7
Maximum current I_{max}	A_{eff}	2.52	4.47	4.45	6.94	7.70	19.8
Continuous stall torque T_0	Nm	0.60	1.17	1.09	2.11	2.46	6.38
Continuous stall current I_0	A_{eff}	1.00	1.71	1.58	2.33	2.77	7.05
No-load speed n_0	rpm	10530	9330	8855	7023	7166	6908
Connection resistance R_{tt}	Ohm	45.3	17.1	22.4	11.2	9.69	1.59
Connection inductance L_{tt}	mH	31.3	18.4	30.6	22.3	20.9	6.75
Electrical time constant τ_e	ms	0.69	1.08	1.36	2.00	2.16	4.25
Pole pair number p		4	4	4	4	4	4
Moment of inertia without brake J	$kgcm^2$	0.22	0.35	0.46	0.83	1.57	4.13
Moment of inertia with brake J	$kgcm^2$	0.23	0.45	0.52	1.08	1.68	5.34
[1)] Operation of the actuator is reliable up to a maximum nominal intermediate circuit voltage of 750 V.							

Tbl-17: Motor specifications, premo 560 V

9.4.3 Technical specifications for resolver

Resolver	
Ordering code PxG xxxx-xxxxxxx-xRxxxxxxx-xxx	
Size	Size 15
Type	TS2620N21E11
Pole pair number	1
Input voltage	$7V_{eff}$ 10kHz
Transmission ratio	0,5±5%
Fault	± 10'max
Zero voltage	$20mV_{eff}$ max
Phase shift	0° nominal
Impedance ZR0	70 + j 100 ohm
Impedance ZS0	180 + j 300 ohm
Impedance ZSS	175 + j 257 ohm
Max. operating temperature	155 °C

Tbl-18: Technical specifications for resolver

9.4.4 Technical specifications of Hiperface absolute encoder Singleturn

Hiperface absolute encoder Singleturn	
Ordering code PxG xxxx-xxxxxxx-xNxxxxxxx-xxx	
Type	SKS36S
Operating voltage	7-12 V
Interface	Hiperface
Number of SinCos periods per revolution	128
Resolution per revolution	4096 (12 bit)
Number of Multiturn revolutions	–
SIL level	SIL2

Tbl-19: Technical specifications of Hiperface absolute encoder Singleturn

9.4.5 Technical specifications of Hiperface absolute encoder Multiturn

Hiperface absolute encoder Multiturn	
Ordering code PxG xxxx-xxxxxxx-xKxxxxxxx-xxx	
Type	SKM36S
Operating voltage	7-12 V
Interface	Hiperface
Number of SinCos periods per revolution	128
Resolution per revolution	4096 (12 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	SIL2

Tbl-20: Technical specifications of Hiperface absolute encoder Multiturn

9.4.6 Technical specifications of Hiperface DSL absolute encoder Singleturn

Hiperface DSL absolute encoder Singleturn	
Ordering code PxG xxxx-xxxxxxx-xGxxxxxxx-xxx	
Type	EKS36
Operating voltage	7-12 V
Interface	Hiperface DSL
Number of SinCos periods per revolution	–
Resolution per revolution	1.048.576 (20 bit)
Number of Multiturn revolutions	–
SIL level	SIL2

Tbl-21: Technical specifications of Hiperface DSL absolute encoder Singleturn

9.4.7 Technical specifications of Hiperface DSL absolute encoder Multiturn

Hiperface DSL absolute encoder Multiturn	
Ordering code PxG xxxx-xxxxxxx-xHxxxxxxx-xxx	
Type	EKM36
Operating voltage	7-12 V
Interface	Hiperface DSL
Number of SinCos periods per revolution	–
Resolution per revolution	1.048.576 (20 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	SIL2

Tbl-22: Technical specifications of Hiperface DSL absolute encoder Multiturn

9.4.8 Technical specifications of EnDat 2.1 absolute encoder Singleturn

EnDat 2.1 absolute encoder Singleturn	
Ordering code PxG xxxx-xxxxxxx-xSxxxxxxx-xxx	
Type	ECN 1113
Operating voltage	3.6-14 V
Interface	Endat 2.2 / EnDat01
Number of SinCos periods per revolution	512
Resolution per revolution	8192 (13 bit)
Number of Multiturn revolutions	–
SIL level	–

Tbl-23: Technical specifications of EnDat 2.1 absolute encoder Singleturn

9.4.9 Technical specifications of EnDat 2.1 absolute encoder Multiturn

EnDat 2.1 absolute encoder Multiturn	
Ordering code PxG xxxx-xxxxxxx-xMxxxxxxx-xxx	
Type	EQN 1125
Operating voltage	3.6-14 V
Interface	Endat 2.2 / EnDat01
Number of SinCos periods per revolution	512
Resolution per revolution	8192 (13 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	–

Tbl-24: Technical specifications of EnDat 2.1 absolute encoder Multiturn

9.4.10 Technical specifications of EnDat 2.2 absolute encoder Singleturn

EnDat 2.2 absolute encoder Singleturn	
Ordering code PxG xxxx-xxxxxxx-xFxxxxxxx-xxx	
Type	ECN 1123
Operating voltage	3.6-14 V
Interface	Endat 2.2 / EnDat22
Number of SinCos periods per revolution	–
Resolution per revolution	8.388.608 (23 bit)
Number of Multiturn revolutions	–
SIL level	SIL2

Tbl-25: Technical specifications of EnDat 2.2 absolute encoder Singleturn

9.4.11 Technical specifications of EnDat 2.2 absolute encoder Multiturn

EnDat 2.2 absolute encoder Multiturn	
Ordering code PxG xxxx-xxxxxxx-xWxxxxxxx-xxx	
Type	EQN 1135
Operating voltage	3.6-14 V
Interface	Endat 2.2 / EnDat22
Number of SinCos periods per revolution	–
Resolution per revolution	8.388.608 (23 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	SIL2

Tbl-26: Technical specifications of EnDat 2.2 absolute encoder Multiturn

9.4.12 Technical specifications of DRIVE-CLiQ absolute encoder Singleturn

DRIVE-CLiQ absolute encoder Singleturn	
Ordering code PxG xxxx-xxxxxxx-xLxxxxxxx-xxx	
Type	ECN 1324S
Operating voltage	10 - 36 V
Interface	DRIVE-CLiQ
Number of SinCos periods per revolution	–
Resolution per revolution	16.777.216 (24 bit)
Number of Multiturn revolutions	–
SIL level	SIL2

Tbl-27: Technical specifications of DRIVE-CLiQ absolute encoder Singleturn

9.4.13 Technical specifications of DRIVE-CLiQ absolute encoder Multiturn

DRIVE-CLiQ absolute encoder Multiturn	
Ordering code PxG xxxx-xxxxxxx-xDxxxxxxx-xxx	
Type	EQN 1336S
Operating voltage	10 - 36 V
Interface	DRIVE-CLiQ
Number of SinCos periods per revolution	–
Resolution per revolution	16.777.216 (24 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	SIL2

Tbl-28: Technical specifications of DRIVE-CLiQ absolute encoder Multiturn

9.4.14 Technical specifications of Hiperface absolute encoder Singleturn (compatible with Rockwell)

Hiperface absolute encoder Singleturn (compatible with Rockwell)	
Ordering code PxG xxxx-xxxxxxx-xExxxxxxx-xxx	
Type	SKS36S
Operating voltage	7 – 12 V
Interface	Hiperface
Number of SinCos periods per revolution	128
Resolution per revolution	4096 (12 bit)
Number of Multiturn revolutions	–
SIL level	SIL2

Tbl-29: Technical specifications of Hiperface absolute encoder Singleturn (compatible with Rockwell)

9.4.15 Technical specifications of Hiperface absolute encoder Multiturn (compatible with Rockwell)

Hiperface absolute encoder Multiturn (compatible with Rockwell)	
Ordering code PxG xxxx-xxxxxxx-xVxxxxxxx-xxx	
Type	SKM36S
Operating voltage	7 – 12 V
Interface	Hiperface
Number of SinCos periods per revolution	128
Resolution per revolution	4096 (12 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	SIL2

Tbl-30: Technical specifications of Hiperface absolute encoder Multiturn (compatible with Rockwell)

9.4.16 Technical specifications of Hiperface DSL absolute encoder Singleturn (compatible with Rockwell)

Hiperface DSL absolute encoder Singleturn (compatible with Rockwell)	
Ordering code PxG xxxx-xxxxxxx-xJxxxxxxx-xxx	
Type	EKS36
Operating voltage	7-12 V
Interface	HiperfaceDSL
Number of SinCos periods per revolution	–
Resolution per revolution	1.048.576 (20 bit)
Number of Multiturn revolutions	–
SIL level	SIL2

Tbl-31: Technical specifications of Hiperface DSL absolute encoder Singleturn (compatible with Rockwell)

9.4.17 Technical specifications of Hiperface DSL absolute encoder Multiturn (compatible with Rockwell)

Hiperface DSL absolute encoder Multiturn (compatible with Rockwell)	
Ordering code PxG xxxx-xxxxxxx-xPxxxxxxx-xxx	
Type	EKM36
Operating voltage	7-12 V
Interface	HiperfaceDSL
Number of SinCos periods per revolution	–
Resolution per revolution	1.048.576 (20 bit)
Number of Multiturn revolutions	4096 (12 bit)
SIL level	SIL2

Tbl-32: Technical specifications of Hiperface DSL absolute encoder Multiturn (compatible with Rockwell)

9.4.18 Technical specifications Heidenhain Incremental

Heidenhain Incremental	
Ordering code PxG xxxx-xxxxxxx-xlxxxxxxx-xxx	
Type	ERN 1185
Operating voltage	5 V
Interface	Incremental interface
Number of SinCos periods per revolution	2048
Resolution per revolution	–
Number of Multiturn revolutions	–
SIL level	–

Tbl-33: Technical specifications Heidenhain Incremental

9.4.19 Technical specifications temperature sensors KTY and PT 1000

Type	**KTY 84-130**	**PT 1000**
Ordering code:	**PxG xxxx-xxxxxxx-xxKxxxxxx-xxx**	**PxG xxxx-xxxxxxx-xxTxxxxxx-xxx**
Temperature [°C]	**Resistance, type [kohm]**	**Resistance, type [Ohm]**
-30	0.391	882.11
-20	0.424	921.57
-10	0.460	960.86
0	0.498	1000
10	0.538	1039.03
20	0.581	1077.94
25	0.603	1097.4
30	0.626	1116.73
40	0.672	1155.41
50	0.722	1193.97
60	0.773	1232.42
70	0.826	1270.75
80	0.882	1308.97
90	0.940	1347.07
100	1.000	1385.06
110	1.062	1422.93
120	1.127	1460.68
130	1.194	1498.32
140	1.262	1535.84
150	1.334	1573.25
160	1.407	1610.54

Type	KTY 84-130	PT 1000
Ordering code:	PxG xxxx-xxxxxxx-xxKxxxxxx-xxx	PxG xxxx-xxxxxxx-xxTxxxxxx-xxx
Temperature [°C]	Resistance, type [kohm]	Resistance, type [Ohm]
170	1.482	1647.72
180	1.560	1684.78
190	1.640	1721.73
200	1.722	1758.56

Tbl-34: Technical specifications of KTY, NTC and PT 1000 temperature sensors

9.4.20 Technical specifications of PTC temperature sensor

PTC STM 160	
Ordering code: PxG xxxx-xxxxxxx-xxPxxxxxx-xxx	
Deactivation in case of fault	
Characteristic line in accordance with DIN 44081/44082	
Temperature [°C]	Resistance [ohm]
< 140	20 - 250
140 - 155	250 - 550
155 - 165	550 - 1330
165 - 175	1330 - 4000
> 175	> 4000

Tbl-35: Technical specifications of PTC temperature sensor

9.4.21 Technical specifications of premo brake

⚠ WARNING

The holding brake used is not a safety brake and is not suitable for personal protection or as a service brake.

The brakes installed in the actuators work on the basis of a permanent magnetic circuit. When the power is off, the brake pads make contact and a holding torque is built up. When the power is on the permanent magnetic field is compensated and the friction surfaces separate without residual torque.

The brakes used are designed as holding brakes. The intended use is in applications where no dynamic braking procedures must be initiated by the brakes in fault/free operation.

In emergency stop situations a dynamic braking procedure could be necessary. Observe the effective torques in the braking procedure for your dimensioning.

The reduction of kinetic energy in dynamic braking procedures increases the abrasive wear on the brake pads, which can change the magnetic circuit within the brake. This can change opening and closing times and can result in the brake no longer reaching the specified holding torque or no longer closing.

For additional information about dynamic braking in emergency stop situations, please contact our sales department.

Observe the instructions given in Chapter 7.1.1 "Refreshment of holding brake" for fault free operation.

		PxG 1		PxG 2		PxG 3	
Ratio		**16 – 35**	**40 – 100**	**16 – 35**	**40 – 100**	**16 – 35**	**40 – 100**
	Unit						
Static holding torque at 120°C	Nm	1.30	0.52	2.34	1.30	7.28	2.34
Dynamic braking torque	Nm	–	–	–	–	–	–
Supply voltage	V DC	24	24	24	24	24	24
Current at rated rated voltage and 20 °C	A DC	0.46	0.42	0.50	0.46	0.71	0.50
Linking time	msec	≤ 8	≤ 10	≤ 20	≤ 8	–	≤ 20
Separation time	msec	≤ 35	≤ 18	≤ 50	≤ 35	≤ 60	≤ 50

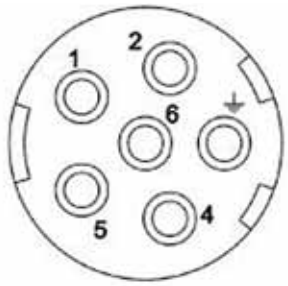
Tbl-36: Technical specifications of premo brake

The listed opening and closing times are noted without the use of an additional wiring of the brake.

ⓘ To avoid interfering signals from the switching of the brake, in general an additional wiring, e.g. in form of a varistor, should be added. Observe the requirements for this of the applied servo controller manufacturer.

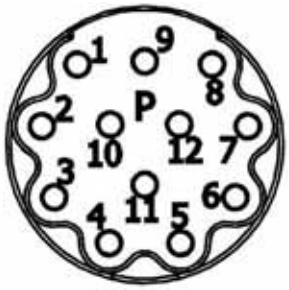
9.4.22 Pin assignment 1

Design with resolver — output (pin assignment 1)

Intercontec mounting socket, series production 923, 6-pin, contact pin Ø 2mm		
View of plug side of actuator	**Pin**	**Function**
	1	W
	2	U
	⏚	Earth conductor
	4	V
	5	Brake + (optional)
	6	Brake – (optional)

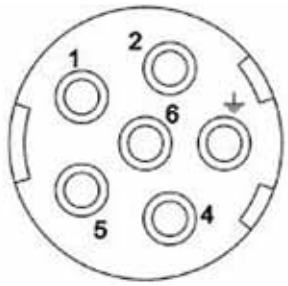
Tbl-37: Design with resolver — output (pin assignment 1)

Option "R" — signal (pin assignment 1)

Intercontec mounting socket, series production 623, 12-pin P, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	Cos/S1
	2	Cos-low/S3
	3	Sin/S2
	4	Sin-low/S4
	5	Temp +
	6	Temp -
	7	Ref/R1
	8	Ref-low/R2
	9	Screen
	10	n.c.
	11	n.c.
	12	n.c.

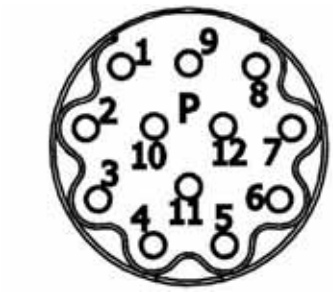
Tbl-38: Option "R" – signal (pin assignment 1)

Design with optical encoder — output (pin assignment 1)

Intercontec mounting socket, series production 923, 6-pin, contact pin Ø 2mm		
View of plug side of actuator	**Pin**	**Function**
	1	U
	2	V
	⏚	Earth conductor
	4	Brake + (optional)
	5	Brake – (optional)
	6	W

Tbl-39: Design with optical encoder — output (pin assignment 1)

Option "N" and "K" — signal (pin assignment 1)

Intercontec mounting socket, series production 623, 12-pin P, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	REFCOS
	2	Data +
	3	Temp +
	4	Temp -
	5	SIN
	6	REFSIN
	7	Data -
	8	COS
	9	n.c.
	10	GND
	11	n.c.
	12	7 – 12 V

Tbl-40: Option "N" and "K" — signal (pin assignment 1)

Option "S" and "M" — signal (pin assignment 1)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	A
	2	A*
	3	data
	4	n.c.
	5	clock
	6	n.c.
	7	M- Encoder (0V)
	8	Temp +
	9	Temp -
	10	P- Encoder (U_P)
	11	B
	12	B*
	13	data*
	14	clock*
	15	M- Sense (0V- Sense / Sensor 0V)
	16	P- Sense (5V-Sense / Sensor U_P)
	17	n.c.

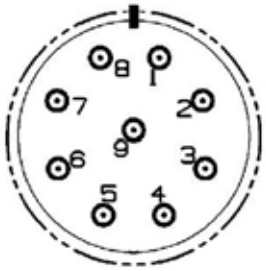
Tbl-41: Option "S" and "M" — signal (pin assignment 1)

Option "F" and "W" — signal (pin assignment 1)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	n.c.
	2	n.c.
	3	data
	4	n.c.
	5	clock
	6	n.c.
	7	M- Encoder (0V)
	8	n.c.
	9	n.c.
	10	P- Encoder (U_P)
	11	n.c.
	12	n.c.
	13	data*
	14	clock*
	15	M- Sense (0V- Sense / Sensor 0V)
	16	P- Sense (5V-Sense / Sensor U_P)

Tbl-42: Option "F" and "W" — signal (pin assignment 1)

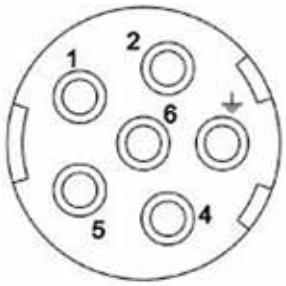
Option "L" and "D" — signal (pin assignment 1)

Intercontec mounting socket, series production 623, 8+1-pin E, contact pin 8 x Ø 1mm + 1 x Ø 2mm		
View of plug side of actuator	**Pin**	**Function**
	1	TXP
	2	TXN
	3	n.c.
	4	0 V
	5	RXP
	6	RXN
	7	n.c.
	8	Up
	9	n.c.

Tbl-43: Option "L" and "D" — signal (pin assignment 1)

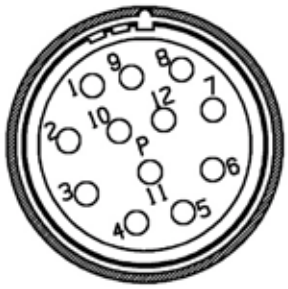
9.4.23 Pin assignment 2

Design with resolver and EnDat encoder — output (pin assignment 2)

Intercontec mounting socket, series production 923, 6-pin, contact pin Ø 2mm		
View of plug side of actuator	**Pin**	**Function**
	1	U
	2	V
	⏚	Earth conductor
	4	Brake + (optional)
	5	Brake – (optional)
	6	W

Tbl-44: Design with resolver and EnDat encoder — output size 1 (pin assignment 2)

Option "R" — signal (pin assignment 2)

Intercontec mounting socket, series production 623, 12-pin P, 20° coded, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	Sin/S2
	2	Sin-low/S4
	3	n.c.
	4	n.c.
	5	n.c.
	6	n.c.
	7	Ref-low/R2
	8	Temp +
	9	Temp –
	10	Ref/R1
	11	Cos/S1
	12	Cos-low/S3

Tbl-45: Option "R" — signal (pin assignment 2)

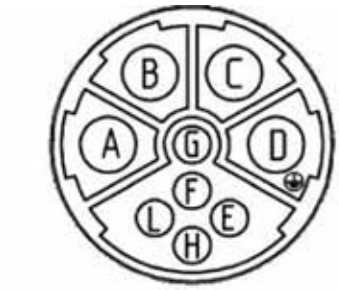
Option "S" and "M" — signal (pin assignment 2)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	A
	2	A*
	3	data
	4	n.c.
	5	clock
	6	n.c.
	7	M- Encoder (0V)
	8	Temp +
	9	Temp -
	10	P- Encoder (U_P)
	11	B
	12	B*
	13	data*
	14	clock*
	15	M- Sense (0V- Sense / Sensor 0V)
	16	P- Sense (5V-Sense / Sensor U_P)
	17	n.c.

Tbl-46: Option "S" and "M" — signal (pin assignment 2)

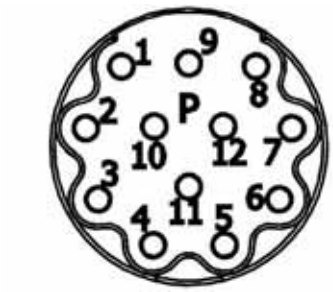
9.4.24 Pin assignment 4

Design with resolver, EnDat- and Hiperface encoder — output (pin assignment 4)

Intercontec mounting socket, series production 923, 9-pin E, contact pin 4x2mm + 5x1mm		
View of plug side of actuator	**Pin**	**Function**
	A	U
	B	V
	C	W
	D (⏚)	Earth conductor
	E	Temp +
	F	Brake + (optional)
	G	Brake – (optional)
	H	Temp -
	L	n.c.

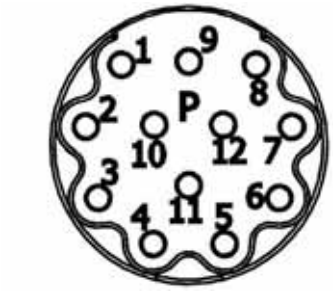
Tbl-47: Design with resolver, EnDat- and Hiperface encoder — output (pin assignment 4)

Option "R" — signal (pin assignment 4)

Intercontec mounting socket, series production 623, 12-pin P, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	Cos/S1
	2	Cos-low/S3
	3	Sin/S2
	4	Sin-low/S4
	5	n.c.
	6	n.c.
	7	Ref/R1
	8	Ref-low/R2
	9	Screen
	10	n.c.
	11	n.c.
	12	n.c.

Tbl-48: Option "R" — signal (pin assignment 4)

Option "N" and "K" — signal (pin assignment 4)

Intercontec mounting socket, series production 623, 12-pin P, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	REFCOS
	2	Data +
	3	n.c.
	4	n.c.
	5	SIN
	6	REFSIN
	7	Data -
	8	COS
	9	n.c.
	10	GND
	11	n.c.
	12	7 – 12 V

Tbl-49: Option "N" and "K" — signal (pin assignment 4)

Option "S" and "M" — signal (pin assignment 4)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	A
	2	A*
	3	data
	4	n.c.
	5	clock
	6	n.c.
	7	M- Encoder (0V)
	8	n.c.
	9	n.c.
	10	P- Encoder (U_P)
	11	B
	12	B*
	13	data*
	14	clock*
	15	M- Sense (0V- Sense / Sensor 0V)
	16	P- Sense (5V-Sense / Sensor U_P)
	17	n.c.

Tbl-50: Option "S" and "M" — signal (pin assignment 4)

Option "F" and "W" — signal (pin assignment 4)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	n.c.
	2	n.c.
	3	data
	4	n.c.
	5	clock
	6	n.c.
	7	M- Encoder (0V)
	8	n.c.
	9	n.c.
	10	P- Encoder (U_P)
	11	n.c.
	12	n.c.
	13	data*
	14	clock*
	15	M- Sense (0V- Sense / Sensor 0V)
	16	P- Sense (5V-Sense / Sensor U_P)
	17	n.c.

Tbl-51: Option "F" and "W" — signal (pin assignment 4)

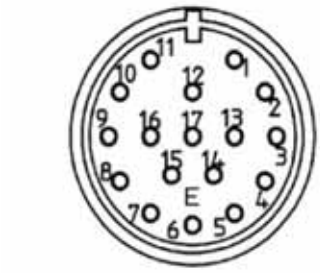
9.4.25 Pin assignment 5

Design with optical encoder — output (pin assignment 5)

Intercontec mounting socket, series production 923, 9-pin E, contact pin 4x2mm + 5x1mm		
View of plug side of actuator	**Pin**	**Function**
	A	U
	B	V
	C	W
	D (⏚)	Earth conductor
	E	n.c.
	F	Brake + (optional)
	G	Brake – (optional)
	H	n.c.
	L	n.c.

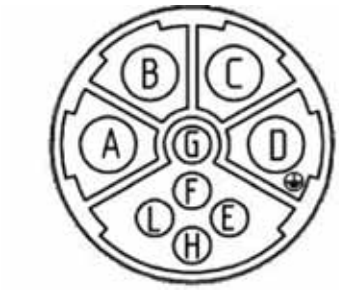
Tbl-52: Design with optical encoder — output (pin assignment 5)

Option "E" and "V" — signal (pin assignment 5)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	SIN +
	2	SIN -
	3	COS +
	4	COS -
	5	Data +
	6	Data -
	7	n.c.
	8	n.c.
	9	n.c.
	10	n.c.
	11	+9 VDC
	12	Common
	13	Temp +
	14	Temp -
	15	n.c.
	16	n.c.
	17	n.c.

Tbl-53: Option "E" and "V" — signal (pin assignment 5)

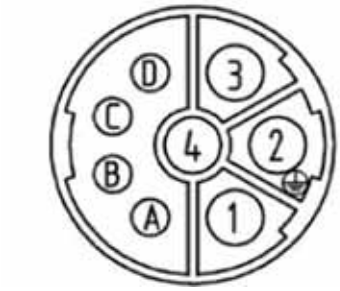
Option "J" and "P" — output/signal (pin assignment 5)

Intercontec mounting socket, series production 923, 9-pin E, contact pin 4x2mm + 5x1mm		
View of plug side of actuator	**Pin**	**Function**
	A	U
	B	V
	C	W
	D (⏚)	Earth conductor
	E	Us / DSL +
	F	Brake + (optional)
	G	Brake – (optional)
	H	GND / DSL -
	L	n.c.

Tbl-54: Option "J" and "P" — output/signal (pin assignment 5)

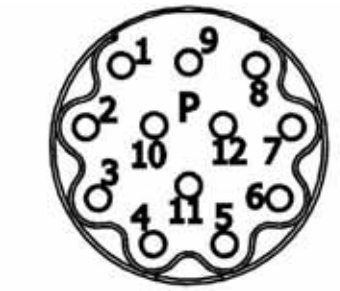
9.4.26 Pin assignment 6

Design with resolver and optical encoder — output (pin assignment 6)

Intercontec mounting socket, series production 923, 8-pin E, contact pin 4x2mm + 4x1mm		
View of plug side of actuator	**Pin**	**Function**
	1	U
	2 (⏚)	Earth conductor
	3	W
	4	V
	A	Temp +
	B	Temp -
	C	Brake + (optional)
	D	Brake - (optional)

Tbl-55: Design with resolver and optical encoder — output (pin assignment 6)

Option "R" — signal (pin assignment 6)

Intercontec mounting socket, series production 623, 12-pin P, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	n.c.
	2	n.c.
	3	Sin-low/S4
	4	Cos/S1
	5	Ref-low/R2
	6	n.c.
	7	Sin/S2
	8	Cos-low/S3
	9	Ref/R1
	10	n.c.
	11	n.c.
	12	n.c.

Tbl-56: Option "R" — signal (pin assignment 6)

Option "S" and "M" — signal (pin assignment 6)

Intercontec mounting socket, series production 623, 17-pin E, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	P- Sense (5V-Sense / Sensor U_P)
	2	n.c.
	3	n.c.
	4	M- Sense (0V- Sense / Sensor 0V)
	5	n.c.
	6	n.c.
	7	P- Encoder (U_P)
	8	clock
	9	clock*
	10	M- Encoder (0V)
	11	n.c.
	12	B
	13	B*
	14	data
	15	A
	16	A*
	17	data*

Tbl-57: Option "S" and "M" — signal (pin assignment 6)

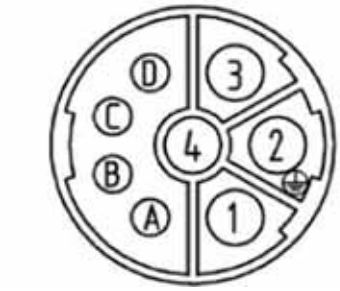
Option "F" and "W" — output/signal (pin assignment 6)

Intercontec mounting socket, series production 723, 13-pin E, Contact pin 5 x Ø 2mm + 2 x Ø 1mm + 6 x Ø 0.34mm		
View of plug side of actuator	**Pin**	**Function**
	1	P- Encoder (U_P)
	2	M- Encoder (0V)
	3	data
	4	data*
	5	clock
	6	clock*
	7	Brake + (optional)
	8	Brake - (optional)
	A	U
	B	V
	C	W
	D	n.c.
	E	Earth conductor

Tbl-58: Option "F" and "W" — output/signal (pin assignment 6)

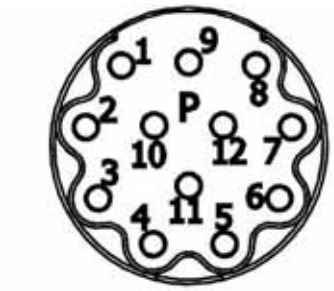
9.4.27 Pin assignment 8

Design with optical encoder — output (pin assignment 8)

Intercontec mounting socket, series production 923, 8-pin E, contact pin 4x2mm + 4x1mm		
View of plug side of actuator	**Pin**	**Function**
	A	Brake + (optional)
	B	Brake - (optional)
	C	Temp +
	D	Temp -
	1	W
	2	Earth conductor
	3	U
	4	V

Tbl-59: Design with optical encoder — output (pin assignment 8)

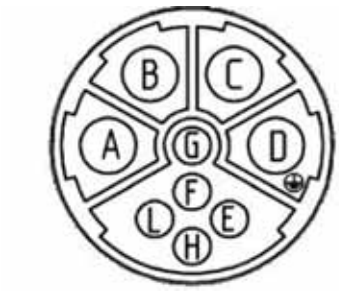
Option "N" and "K" — signal (pin assignment 8)

Intercontec mounting socket, series production 623, 12-pin P, contact pin Ø 1mm		
View of plug side of actuator	**Pin**	**Function**
	1	REFCOS
	2	Data +
	3	n.c.
	4	n.c.
	5	SIN
	6	REFSIN
	7	Data -
	8	COS
	9	n.c.
	10	GND
	11	n.c.
	12	7 – 12 V

Tbl-60: Option "N" and "K" — signal (pin assignment 8)

9.4.28 Pin assignment 9

Option "G" and "H" — output/signal (pin assignment 9)

Intercontec mounting socket, series production 923, 9-pin E, contact pin 4x2mm + 5x1mm		
View of plug side of actuator	**Pin**	**Function**
	A	U
	B	V
	C	W
	D (⏚)	Earth conductor
	E	GND / DSL -
	F	Screen
	G	Brake + (optional)
	H	Us / DSL +
	L	Brake - (optional)

Tbl-61: Option "G" and "H" — output/signal (pin assignment 9)

9.4.29 Cable setup / Cable cross-section

For ambient temperatures up to +40°C, the following applies for cables according to to DIN EN 60204-1, Table 6 for installation type C:

Continuous stall current	Cable
0 – 15 Aeff	4 x 1.5 mm^2 & 2 x 0.75 mm^2
15 – 21 Aeff	4 x 2.5 mm^2 & 2 x 1 mm^2
21 – 36 Aeff	4 x 6 mm^2 & 2 x 1.5 mm^2
36 – 50 Aeff	4 x 10 mm^2 & 2 x 1.5 mm^2
50 – 66 Aeff	4 x 16 mm^2 & 2 x 1.5 mm^2

Tbl-62: Cable setup / Cable cross-section

NOTICE

The maximum cable length must not exceed 50 m.

Revision history

Revision	Date	Comment	Chapter
01	31.01.17	New version	All
02	02.01.19	Product lines, Safety information, Technical specification, Plug connection	2, 3, 5, 9

WITTENSTEIN alpha GmbH · Walter-Wittenstein-Straße 1 · 97999 Igersheim · Germany
Tel. +49 7931 493-12900 · info@wittenstein.de

WITTENSTEIN – one with the future

www.wittenstein-alpha.de