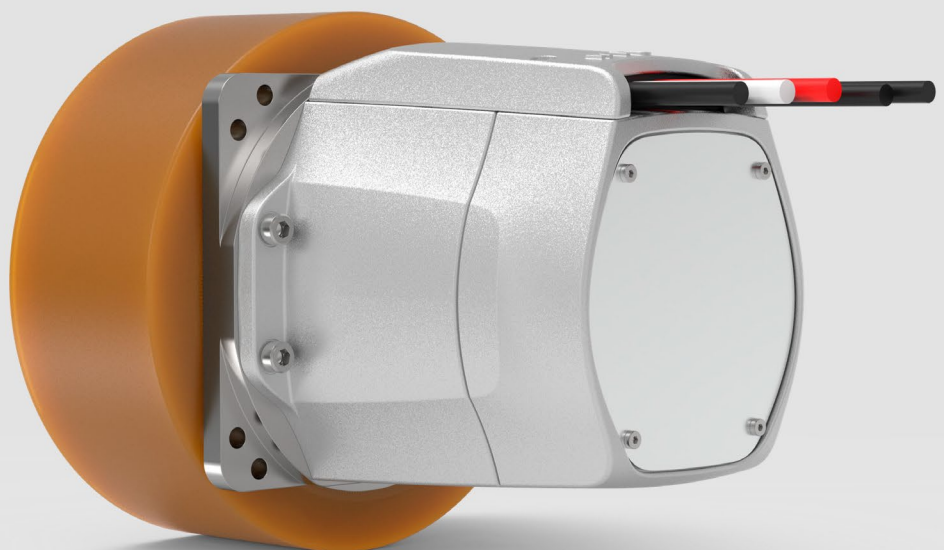


Project specifications

cyber[®] TAS actuator 2



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1 About this manual

This operating manual contains necessary information for safe operation of the cyber® TAS actuator 2.

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

The owner must ensure that this operating manual is read and fully understood by all persons assigned to install, operate, or maintain the drive actuator.

Store the manual within reach of the drive actuator.

Inform colleagues who work in the area around the machine about the safety instructions and warnings so that no one sustains injuries.

The original was prepared in German, all other language versions are translations of the original instructions.

1.1 Scope of delivery

- Check the completeness of the delivery against the delivery note.
- ① Immediately notify the carrier, the insurance company, or **WITTENSTEIN cyber motor GmbH** in writing of any missing parts or damage.

1.2 Signal words

	⚠ 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 property damage.

1.3 Safety symbols

The following safety symbols are used to indicate hazards, things that are forbidden and important information:



General danger



Hot surface



Suspended loads



Entanglement



Electric voltage



Information



Electrostatically sensitive device

1.4 Structure of warning instructions

Safety information in this manual has been structured according to the following template:

	<p>⚠ DANGER</p>
	<p>Type and source of danger! Explanation of the source of danger.</p> <ul style="list-style-type: none"> • Protective measures to avoid the danger.

1.5 Information symbols and cross references

The following information symbols are used:

- Indicates an action to be performed
- ➞ Indicates the results of an action
- ① Provides additional handling information
- Marks a list

A cross reference refers to the chapter number and the header of the target section (e.g. 2.4 "Intended use").

A cross reference to a table refers to the table number (e.g. Table "Tbl - 1").

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

2.1 Dangers

The drive 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 drive 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 2.6 "General safety instructions").

2.2 Guarantee and liability

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

- Ignoring the information on transport and storage.
- Improper use (misuse).
- Improper or not carried out maintenance and repairs.
- Improper assembly/disassembly or improper operation (e.g. test run without secure attachment)
- Operation of the drive actuator with defective safety devices or equipment
- Operation of a heavily soiled drive actuator
- Modifications or conversions that have been undertaken without written approval of **WITTENSTEIN cyber motor GmbH**.

2.3 Personnel

Only sufficiently qualified personnel who have read and understood this operating manual may carry out work on the drive actuator.

2.4 Intended use

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

- Movable machines, not intended for road use and only provided for professional (industrial) use.

In particular the following points must be observed:

- The drive actuator must be controlled by a servo drive.
- The drive actuator must not be used in applications with special environmental conditions e.g. vacuum, potentially explosive atmospheres, in food production, clean room or areas with radioactive contamination.
- Safety equipment required for a risk-free operation must be present, properly installed, and fully functional. It must not be removed, changed, bypassed, or rendered ineffective.

In case of an emergency shutdown, power failure and or damage to the electrical equipment, the drive actuator must be:

- Switched off immediately.
- Secured against uncontrolled switching back on.
- secured against uncontrolled after-running.
- The installed brake may only be utilized in emergency stop situations for braking the running drive 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 drive actuator without properly installing it in or connecting it to other machines or other partly completed machinery or equipment.
- Operation of the drive actuator in a defective state.
- Operation of the drive 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 drive actuator in a potentially explosive environment.
- Assembly of the drive actuator without prior acknowledgment of the operating manual / project specifications.
- Operation of the drive actuator without legible warning and information signs.
- Use of improper lubricants.
- Use of unsuitable servo drives.
- Use in improper installation, operating, performance and ambient conditions.
- Assembly of the drive actuator by insufficiently competent personnel.

2.6 General safety instructions

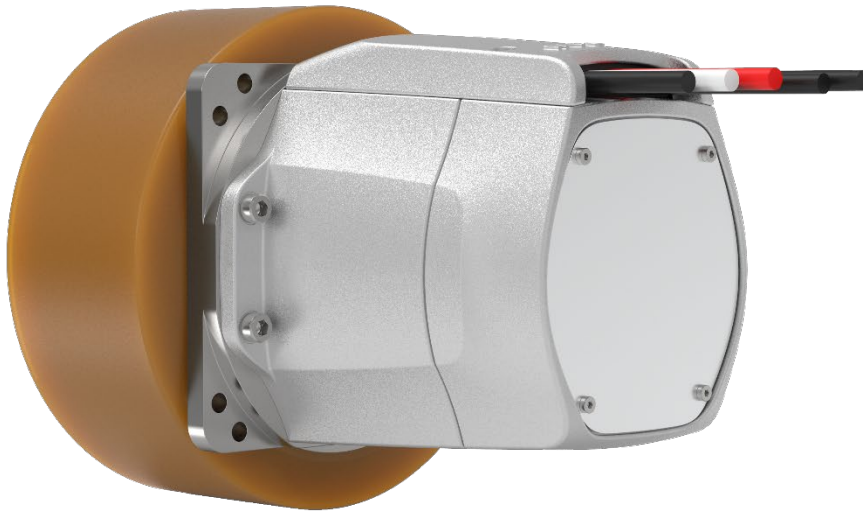
	<div data-bbox="662 244 935 293">⚠ DANGER</div> <p>Danger from contact with live parts! Faulty electrical connections or unapproved, current-carrying components can cause serious injuries and even death</p> <ul style="list-style-type: none">• Have all electrical connection work performed by qualified technicians only.• Carry out connection work only under dry conditions and with suitable tools.
	<div data-bbox="662 620 935 669">⚠ DANGER</div> <p>Danger from rotation of the electric machine without safety equipment! Rotating components on the drive actuator can pull in parts of the body and cause serious injuries and even death.</p> <ul style="list-style-type: none">• Before startup, make sure that all safety equipment on customer machinery is in place in accordance with applicable standards and directives.
	<div data-bbox="662 996 954 1046">⚠ WARNING</div> <p>Danger from parts being thrown around! Objects flung out by rotating components can cause serious injuries.</p> <ul style="list-style-type: none">• Remove objects and tools from the drive actuator before putting it into operation.
	<div data-bbox="662 1301 951 1350">⚠ CAUTION</div> <p>Danger of burns due to hot motor housing! The drive can become hot during operation.</p> <ul style="list-style-type: none">• Take suitable protective measures to prevent contact with the device.• If contact with the device cannot be avoided by means of suitable protective measures, an appropriate warning label of hot surfaces must be applied.

3 Description of the drive actuator

3.1 General

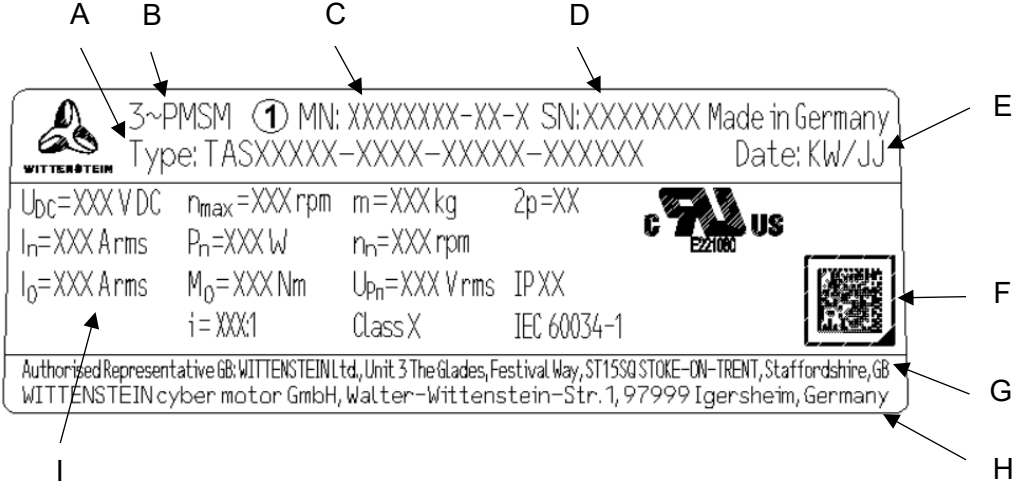
The TAS drive actuator is a combination of a low-backlash planetary gearbox, a synchronous servo motor, a brake and an encoder with functional safety. Details of the dimensions and performance data can be found in the dimensional drawing and the actuator curve.

- ① The documents are available in our download portal (<https://wittenstein.partcommunity.com/>) or from our sales department.



3.2 Name plate

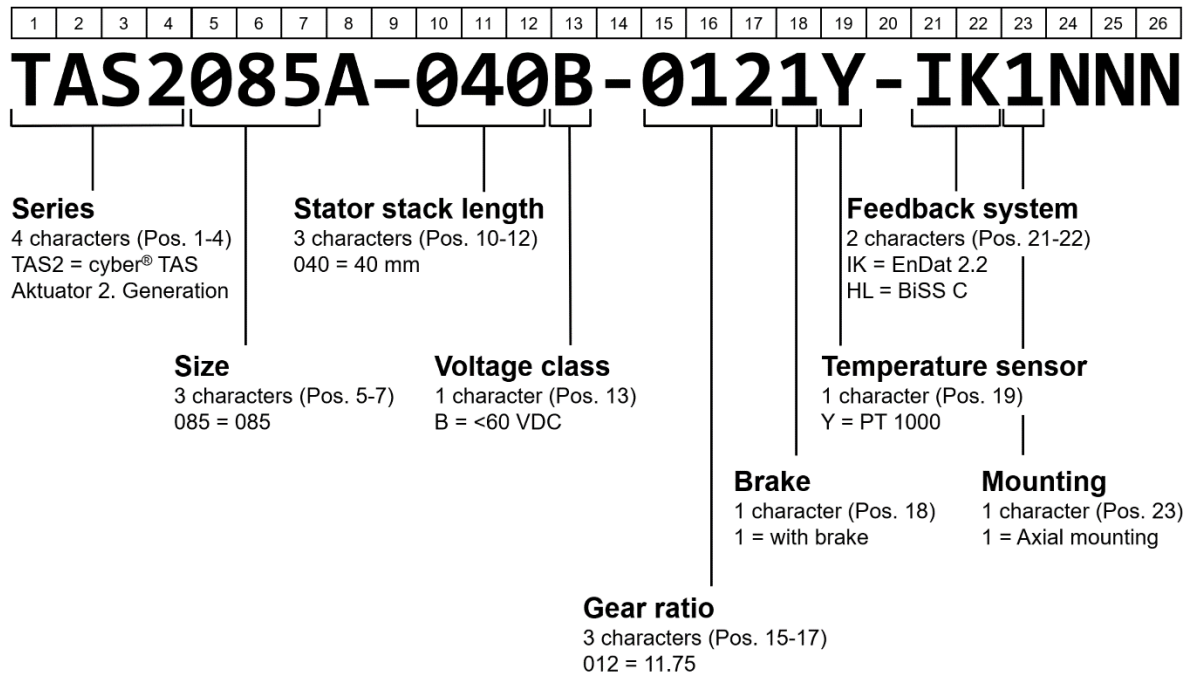
The name plate is attached to the housing of the drive actuator. The name plate shown contains sample values.

			
	Designation		Designation
A	Ordering code (see 3.3 "Ordering code")	F	DMC code
B	Motor type 3-phase / PM synchronous machine	G	Authorized representative for the UK market
C	Material number (MN)	H	Manufacturer address
D	Serial number	I	Technical data [UDC = DC bus voltage; n _{max} = No-load speed; m = Weight; I _n = Rated current; P _n = Rated power; n _n = Rated speed; I ₀ = Continuous stall current; M ₀ = Continuous stall torque; U _{Pn} = Ind. terminal voltage; I = Ratio; Class = Insulation class; IP = Protection class; 2p = Number of poles]
E	Date of manufacture		

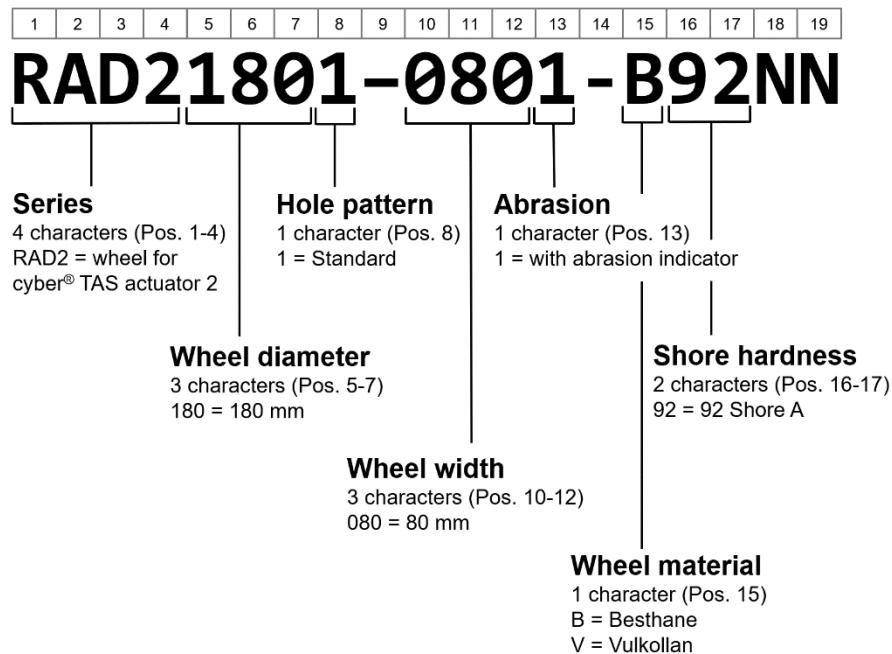
Tbl - 1 Name plate TAS actuator 2

3.3 Ordering code

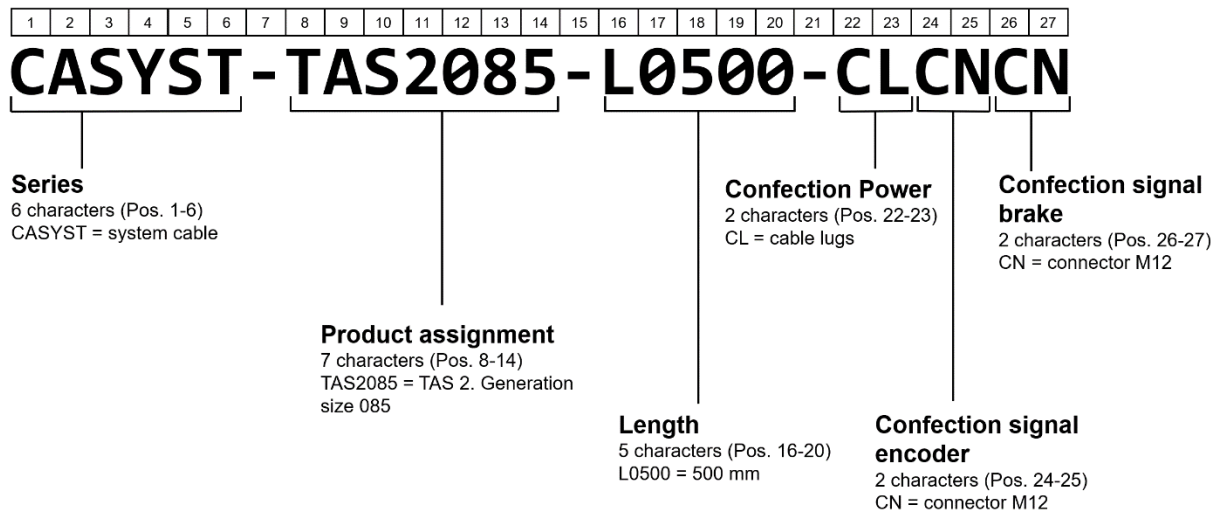
The ordering code of the drive actuator is composed as follows:



The ordering code of the wheel is composed as follows:



The ordering code of the cables is composed as follows:



3.4 Performance data

For reliable operation, we recommend following the specifications in our technical data sheet. In addition, we are happy to provide support in achieving the targeted dimensioning of the overall drive train. Further information can be found in chapter 9.3 "Technical data".

3.5 Weight

The following table shows the weights [kg]. The actual weight may deviate by up to 10% due to variations in components.

Size \ Package	With wheel	Without wheel
TAS 2 085X-040	14.9	11.5

Tbl - 2 Weight in kg


4 Transport and storage

4.1 Packaging

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

- Dispose of the packaging materials at the recycling sites intended for this purpose.
- ① Please observe the valid national regulations for waste disposal.

4.2 Transport

	<div style="background-color: #0070C0; color: white; text-align: center; padding: 5px;">NOTICE</div> <p>Risk of damage to the drive actuator! Hard knocks, for instance because of falling or hard dropping, can damage the drive actuator.</p> <ul style="list-style-type: none"> • Only use hoisting equipment and lifting accessories with sufficient capacity. • Do not exceed the maximum permissible load of the hoisting equipment. • Lower the drive actuator slowly.
---	--

	<div style="background-color: #FF0000; color: white; text-align: center; padding: 5px;">⚠ DANGER</div> <p>Danger due to suspended loads! Suspended loads can fall and can cause serious injuries and even death.</p> <ul style="list-style-type: none"> • Do not stand under suspended loads.
---	--

4.3 Storage

- Store the drive actuator in horizontal position and dry surroundings at a temperature of 0 °C to + 30 °C in the original packaging.
 - Store the drive actuator for a maximum of 5 years.
- ① For storage logistics, we recommend the "first in – first out" method.

4.3.1 Short period of storage

A short storage period is storage of the drive actuator for a period of from a few minutes up to 12 months.

Over this period, store the drive actuator in horizontal position and at a temperature of +5 °C to +40 °C in the original packaging. The surroundings must be dry, free of dust and not subject to vibrations; it must have a low air humidity and low temperature gradients, so that no condensation occurs on the drive actuator (see chapter 6.1 "Safety instructions and operating conditions"). The storage area must also not be subject to aggressive media, such as exhausts from vehicles or gases, mist, aerosols of acids, alkaline solutions or salts.

4.3.2 Long-term storage

Long-term storage includes periods from 1 year to 5 years.

After long-term storage, running-in of the drive actuator is absolutely essential (see chapter 4.4 "Running-in after long-term storage").

The basic precondition for long-term storage is a closed, dry, dust-free storage room not subject to vibrations and not subject to aggressive media, such as exhausts from vehicles or gases, mist, acidic aerosols, aerosols of acids, alkaline solutions or salts.

The drive actuators must be stored in a horizontal position.

The following conditions must be fulfilled:

- Minimum air temperature of + 5 °C.
- Maximum air temperature of + 25 °C.
- Maximum relative humidity of 65%.
- Maximum absolute air humidity of 10 g/m³.
- Maximum temperature change speed of 0.1 °C/min.
- Minimum air pressure of 70 kPa.
- Maximum air pressure of 106 kPa.
- No direct sunlight. Maximum total solar irradiance of 50 W/m².
- No biological environmental influences.
- No chemically active environmental influences.

Temperature and air humidity must be permanently monitored. This may be done by a data logger. The measurements must not be more than 1 hour apart. At least 2 measuring points must be selected: The highest point and the deepest point close to the exterior wall at which the drive actuator can be stored.

4.4 Running-in after long-term storage

After long-term storage, running in of the drive actuator in accordance with the following defined requirement is mandatory. Otherwise the drive actuator may be damaged after a short period of operation. If the running-in procedure after long-term storage is not carried out with the drive actuator, the actuator's guarantee is void (see chapter 2.2 "Guarantee and liability").


The following running-in procedure after long-term storage must be carried out on drive electronics with speed regulation while the drive actuator is not subject to load and the axial direction is horizontal. Ensure the drive actuator is adequately secured. Cooling is not required:

- | | | |
|------------------------------|---------------------|----------------|
| 1. Clockwise rotation | with 10% n_{\max} | for 10 minutes |
| 2. Counterclockwise rotation | with 10% n_{\max} | for 10 minutes |
| 3. Clockwise rotation | with 25% n_{\max} | for 6 minutes |
| 4. Counterclockwise rotation | with 25% n_{\max} | for 6 minutes |
| 5. Clockwise rotation | with 50% n_{\max} | for 3 minutes |
| 6. Counterclockwise rotation | with 50% n_{\max} | for 3 minutes |
| 7. Clockwise rotation | with n_{\max} | for 3 minutes |
| 8. Counterclockwise rotation | with n_{\max} | for 3 minutes |

5 Assembly

- Read the general safety instructions before beginning to work (see chapter 2.6 "General safety instructions").


5.1 Preparations

	NOTICE
	<p>Impairment due to electrostatic discharge! Many electronic components are sensitive to electrostatic discharge (ESD). This particularly concerns integrated circuits (IC), semiconductors, resistors with a tolerance of no more than one percent as well as transistors and other components such as encoders.</p> <ul style="list-style-type: none"> • Work only at ESD-compliant work sites. • Always wear a tested anti-static wrist band, a protective coat and suitable shoes or overshoes. • Never touch the components by their connectors or feed lines. • Avoid the use of plastic tools and plastic component parts.

	NOTICE
	<p>Damage due to compressed air! Compressed air can damage the drive seals of the drive actuator.</p> <ul style="list-style-type: none"> • Do not use compressed air to clean the drive actuator.

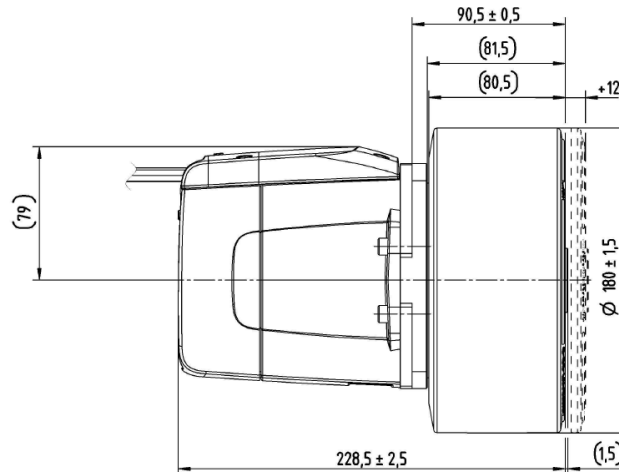
- Clean/de-grease the connection flange of the drive actuator with a clean, lint-free cloth and a grease-dissolving, non-aggressive cleaning agent.
- Dry all fitting surfaces to neighboring components to achieve the proper friction values for the screw connections.
- In addition, check the fitting surfaces for damage and impurities.

5.2 General information on the installation/mounting of the drive actuator

	<p>The drive actuator is intended to be mounted in a horizontal position. The quantity of lubricant has been determined for this mounting position.</p> <ul style="list-style-type: none"> • Mount the drive actuator only in the specified mounting position and with the recommended screw dimensions and strengths. • Observe the safety and processing instructions for the threadlocker to be used.
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5.2.1 Installation space of the drive actuator

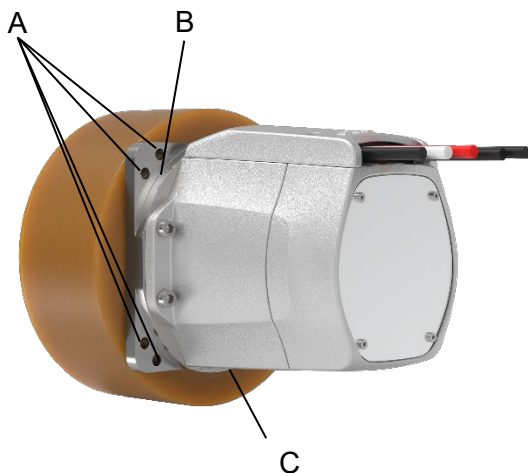
The following figure shows the outer dimensions of the drive actuator. The diameter, width and the wheel surface material can vary depending on the configuration. We recommend using a safety zone of 12 mm axial on the wheel side for our actuator. Thereby, a replacement with a planned and optimized version will be assured.



5.2.2 Installation/mounting of the drive actuator

For screwing the drive actuator into the application, we recommend screws of property class 10.9 using the maximum screw-in depth. 8 M8 screws are needed. The maximum screw-in depth of the threaded holes in the drive actuator must be used as much as possible. Dimensions can be taken from the dimension drawing.

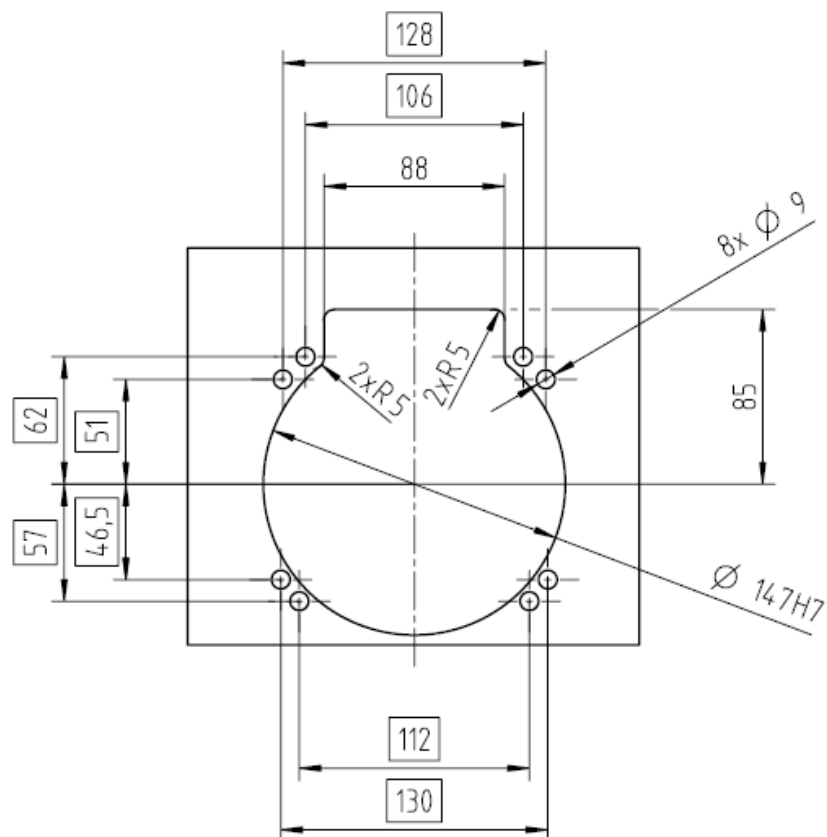
The payload of the drive must not exceed 750 kg. Depending on the wheel used, the payload may also be lower.




- Coat the fastening screws with a threadlocker (e.g. Loctite® 243).
- Fasten the drive actuator to the machine with the fastening screws through the 8 threaded holes (A) on the vehicle frame.
- ① The radial load must be supported via the centering diameter (B).
- Mount the drive actuator in such a way that the name plate (C) remains legible.

For the prescribed tightening torque, please refer to chapter 9.1 "Information on the attachment".

The interface on the vehicle frame basically looks like this:



5.3 Assembly and disassembly of the drive wheel

	NOTICE
	<p>Risk of damage to the drive actuator!</p> <p>Distortions during mounting can damage the drive actuator.</p> <ul style="list-style-type: none"> • Mount or remove the drive actuator onto the output flange without forcing. • Never attempt to assemble by force or hammering! • Only use suitable tools and equipment for assembly and removal.

- ① The specified screw sizes and tightening torques can be found in chapter 9.2 "Information on the attachment of the drive wheel".
- ① If the wheel is jammed on the drive actuator, the forcing threads provided in the wheel can be used to loosen the wheel.

Mounting the wheel


- Clean/degrease the contact positions of the drive actuator and the wheel with a clean, lint-free cloth moistened with a suitable grease-dissolving but non-aggressive cleaning agent.
- Dry all fitting surfaces to neighboring components to achieve the proper friction values for the screw connections.
- In addition, check the fitting surfaces for damage and impurities.
- Use a suitable threadlocker or screws with an appropriate thread coating.

Removing and remounting the wheel

- Loosen the screw fastening.
- If necessary, use the extraction threads provided in the wheel to loosen it.
- Remove the residue glue from the threaded hole and from the screw.
- De-grease the screw.
- Coat the screw with a threadlocker (e.g. Loctite® 243).
- Screw in the screws.
- Tighten the screws crosswise with the specified tightening torque.


5.4 Mounting a third-party drive wheel

If it is intended to install a third-party drive wheel to the drive actuator, or to replace the pre-assembled drive wheel with a third-party drive wheel, the following information must be observed.


	NOTICE
	<p>Impairment of the functional capability! Wheel geometries and contours affect the functionality and performance data of the drive actuator.</p> <ul style="list-style-type: none"> - Altered force and torque conditions may occur that affect the drive actuator. - Changing the wheel surface leads to different friction values. - The wheel material and geometries affect the permitted load of the wheel, which may affect the limitation of the overall drive.

① If you have any technical questions, please address them to the specified contacts.

5.5 Installing the electrical connections

	⚠ DANGER
	<p>Danger from live parts! Electrically live parts may result in electric shocks if touched and can cause serious injuries and even death.</p> <ul style="list-style-type: none"> • Observe the five safety rules of electrical engineering before starting electrical installation work: <ul style="list-style-type: none"> - Switch off the power supply. - Secure against being switched on again. - Check that there is no voltage. - Ground and short-circuit. - Cover neighboring and electrified parts. • Check whether there are protective caps on the plugs. If protective caps are missing, check the plugs for damage and soiling.

	⚠ DANGER
	<p>Danger due to moisture! Electrical work performed in damp areas may result in electric shocks and can cause serious injuries and even death.</p> <ul style="list-style-type: none"> • Carry out the electrical assembly only in dry areas.


	<p>The cables of all drive actuators need to be laid out in such a way that the admissible bending radius is complied with. The admissible bending radii can be found in the dimensional drawing. Torsional load of the cables should be avoided.</p>
---	--

Ensure that the motor phases are correctly assigned to the control unit. When looking at the output side, the drive (incl. gearbox) rotates clockwise with the phase sequence U-V-W.

6 Startup and operation


6.1 Safety instructions and operating conditions

- Read the general safety instructions before beginning to work (see chapter 2.6 "General safety instructions").

	<h2 style="margin: 0;">NOTICE</h2>
	<p>Damage of the drive actuator! Improper use can cause damage to the drive actuator.</p> <ul style="list-style-type: none"> • Ensure that <ul style="list-style-type: none"> - The ambient temperature does not drop below 0 °C or exceed, +40 °C and - The operating surface temperature does not exceed +90 °C. • For other conditions of use, consult our Customer Service department. • Use the drive actuator only up to its maximum limit values, see chapter 9.3 "Technical data" and actuator curve. • Use the drive actuator only in a clean, dust-free, dry environment that is free of condensation. • Only operate the drive actuator firmly mounted in the intended mounting position. • Ensure that the drive actuator is adequately thermally connected to achieve low heat transfer resistance.

6.2 Data for electrical startup

The specified data is intended for the electrical startup.

	<h2 style="margin: 0;">NOTICE</h2>
	<p>Damage to the drive and/or servo controller! The servo controllers of the different manufacturers generally have proprietary data specifications.</p> <p>If the data is disregarded, the drive and/or the servo controller may be damaged.</p> <ul style="list-style-type: none"> • Observe the listed units precisely and check their conformance with the units of the servo controller. • If the units differ, make the necessary adjustments accordingly.

- ① In some servo controllers, there are dependencies between individual parameters. We will gladly help you to find the correct entries.
- ① We provide adjusted and certified Quick Start Guides for several servo controllers. In addition to parameters, these instructions also provide material numbers of pre-manufactured cable sets and an assignment of the drive actuators to the servo drive product sizes.

6.3 Startup of the brake

To make sure the brake is functioning, the brake must be inspected during startup.

- If the regulating device has a function for integrated testing of the brake torque during secure limited movement and secure limited speed, then use this function and observe the instructions from the regulating device's manufacturer.

If no such function is present, we recommend that the user proceed as follows:

- Limit the permitted range of movement and the maximum speed using the parameters in the regulating device so that no danger to persons or property can arise from movement of the axle.
- Calculate the required current of the motor I_{M4Pmin} required to achieve the holding torque with the torque constants, and limit the maximum current of the regulating device to this value.
- Apply current to the motor with the brake applied, gradually increasing the current to I_{M4Pmin} . During this, the motor must not move. Observe the permitted time for applying current of I_{M4Pmin} to the motor.
- If movement does occur, the user should ideally switch off the current supply automatically to avoid uncontrolled movement of the axle.
- If the brake torque M_{4Pmin} is not reached, perform the brake running-in (see chapter 7.1.1 "Running-in of the brake after maintenance", table 3)
- Check the brake torque again after running-in.

If the brake torque specified in the brake's technical data is reached, then the brake is ready for operation.


If the brake torque specified in the brake's technical data is not reached, then:

- Repeat the running-in procedure.
- ① The running-in process may only be repeated twice during a testing procedure for the brake torque.

If after the third running-in process, the brake torque is still not reached, the brake is **not functional**:

- Do **not** start up the drive. Contact our sales department.
- ① Always provide the ordering code and serial number.

6.4 Brake operation

	<p style="text-align: center;">NOTICE</p> <p>Damage to the drive and/or servo controller! When operating the drive with an external servo drive, a protective circuit may be necessary to protect the brake's power supply from overvoltage.</p> <p>Failure to do so may cause the drive and/or the servo controller to be damaged.</p> <ul style="list-style-type: none"> • Observe the requirements of the servo controller for the protective circuit of the brake supply.
---	---


- ① The technical data of the brake can be found in chapter 9.3.2 "Technical data of the brake".

6.5 Brake release in a defective vehicle


If a vehicle has to be towed due to a malfunction (e.g. battery empty), the brake on the drive must first be released. For this purpose, the connector (brake + temperature sensor) must be disconnected and connected to a 24 V DC voltage source at the pins of the brake. The corresponding pin assignment can be found in the dimensional drawing.

7 Maintenance and disposal

- Read the general safety instructions before beginning to work (see chapter 2.6 "General safety instructions").

	⚠ WARNING
	<p>Danger due to magnetic field! The permanent magnets of the rotor emit a strong magnetic field which becomes active during disassembly of the drive actuator.</p> <ul style="list-style-type: none"> Observe the general safety instructions (e.g. for pacemaker patients) for working in strong magnetic fields.

7.1 Maintenance

	<p>The partial or complete disassembly of the drive actuator into its individual parts for maintenance or repair work is not permitted.</p> <ul style="list-style-type: none"> In case of a malfunction or failure, please contact the Customer Service department.
---	---

7.1.1 Running-in of the brake after maintenance

The brake torque of the brake used is affected by various factors, such as oxidation, the flattening of friction surfaces or changes to the air gap. This behavior can cause fluctuation of up to $\pm 40\%$ in the brake torque.

To counteract these influences and reliably attain the specified brake torque, the brake should be applied regularly. If for example the drive cycle does not provide for a planned brake, and the brake will only be applied in the case of an emergency stop, regular application of the brake is not assured. In this case it is highly recommended that a so-called brake refreshment be carried out every four weeks.

The following cycle is recommended:

Recommended brake refreshment cycle		
Slipping speed	rpm	300
Duration, brake de-energized	s	1
Duration, brake energized	s	3
Number of clockwise cycles		8
Number of counterclockwise cycles		8

Tbl - 3 Running-in of the brake

7.1.2 Visual inspection

- Check the entire drive actuator and all cables for exterior damage.
- The radial shaft seals are wear parts. Check the drive actuator during every visual inspection for leaks (lubricant leaks).
- ① For further general information on radial shaft seals, visit our partner website <http://www.simrit.de>.
- ① Liquid foreign media in contact with the output sealing ring for extended periods of time can reach the interior of the drive actuator. It is therefore necessary to ensure that the drive actuator fitted in the vehicle is not standing or operated in liquids (e.g. deep water puddles or similar).
- Check whether the safety signs (see chapter 1.3 "Safety symbols") and the name plate (see chapter 3.2 "Name plate") are mounted and legible.
- Inspect the drive wheel for cracks or ruptures in the surface material and for wear. Wittenstein wheels include a marking for the permissible wear. For wheels with 180 mm outer diameter, this marking is at a diameter of 165 mm. As soon as the wear mark touches the ground, the wheel should be replaced.
- ① The drive wheel may be replaced as a spare part. Additional information can be obtained from our Customer Service department.


7.1.3 Checking the tightening torques

- Check the tightening torque of the fastening screws on the frame connection and the drive wheel.
- ① The specified tightening torques can be found in chapter 9.1 "Information on the attachment " and 9.2 "Information on the attachment of the drive wheel".
- If, while checking the tightening torque, a screw that can be further tightened is discovered, follow the instructions in "Remounting the screw".

Remounting the screw

- Loosen the screw.
- Remove the residue glue from the threaded hole and from 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 tightening torque.

7.1.4 Cleaning

	<div style="background-color: #0070C0; color: white; text-align: center; padding: 5px;">NOTICE</div> <p>Damage to the drive actuator due to excessive pressure! Compressed air can damage the drive seals of the drive actuator.</p> <ul style="list-style-type: none"> • Do not use compressed air to clean the drive actuator.
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- Clean the drive actuator using a clean, lint-free cloth.
- If necessary, use a grease-dissolving, non-aggressive cleaning agent.

Startup after maintenance work

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


7.2 Maintenance schedule

Maintenance	Scope of the work	At startup	Every 4 weeks	After 500 operating hours or 3 months	Annually
Visual inspection and cleaning	Check the drive actuator for any damage, excessive soiling or other anomalies which were not present in the condition as delivered.	X		X	
Checking the tightening torques	All screw connections between the drive actuator and the vehicle/frame/interfaces, as well as the drive wheel.	X		X	
Visual inspection of the wheel	Investigate the drive wheel for impurities, cracks, ruptures, wear, deformation, swelling etc.	X		X	
Brake refreshment with function check	Recommended refreshment cycle of the brake: <ul style="list-style-type: none"> - Slipping speed: 300 min⁻¹ - Duration for brake de-energized: 1 s - Duration for brake energized: 3 s - Number of cycles in clockwise direction: 8 - Number of cycles counterclockwise: 8 		X ₁		
Brake function check	Opening and closing the brake e.g. by deactivating the servo drive.	At least twice daily			
Inspection of the brake torque	Measuring the brake torque or inspecting the brake functionality.	At least once a day			

TbI - 4 Maintenance schedule

¹ Applies if the target drive cycle does not provide for this kind of braking

7.3 Information about the lubricant


	A change of lubricant in drive actuators of this design is not necessary. The gearbox and the bearings are lubricated for life at the factory.
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7.4 Disposal

Consult our Customer Service department for supplementary information on decommissioning, disassembly and disposal of the drive actuator.

- Dispose of the drive actuator at the recycling sites intended for this purpose.
- ① Please observe the valid national regulations for waste disposal.

8 Malfunctions

	NOTICE
	<p>Danger due to machine damage! Changed operational behavior can be an indication of existing damage to the drive actuator, or cause damage to the drive actuator.</p> <ul style="list-style-type: none"> Do not put the drive actuator back into operation until the cause of the malfunction has been eliminated.

	<p>Malfunctions may only be rectified by specially trained technicians. To facilitate troubleshooting and the optimization of servo drive settings, it is useful to record the current over a full cycle (a servo drive function) and make it available as a file.</p>
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Fault	Possible cause	Remedy
Increased Operating temperature	Selected dimensioning too weak for task, nominal operating exceeded	Check the technical data.
	Motor heats the drive actuator	Check the settings of the servo drive.
	Ambient temperature too high	Ensure adequate cooling.
Increased operating noises	Damaged bearings	Consult our Customer Service department.
	Toothing damage	
Loss of lubricant	Seals not tight	Consult our Customer Service department.
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 does not start	Feed line interrupted	Check the connections.
	Wiring of motor and/or encoder not correct	Check the wiring of the motor phases and the motor encoder.
	Incorrect servo drive parameters	Check that the motor parameters are suitable in terms of the drive actuator used.
	Motor protection has been triggered	Check for faults. Check whether the motor protection setting is correct.
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 servo drive parameters	Check that the motor parameters are suitable in terms of the drive actuator used.
	Brake does not release	See error: "Brake does not release".

Fault	Possible cause	Remedy
Changed operating behavior	Existing damage to the drive	Consult our Customer Service department for maintenance.
Brake does not release or does not release completely	Voltage drop along the feed 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.
	Friction partners are adhering due to long downtimes and high temperatures	Consult our Customer Service department.
	Brake worn	Consult our Customer Service department.
Acceleration times are not met	Load is too high	Check the dimensioning.
	Power limiting active	Check the servo drive 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.

Tbl - 5 Malfunctions

9 Appendix

9.1 Information on the attachment

Size	Thread x lead	Quantity x thread x depth [] x [mm] x [mm]	Tightening torque [Nm] for screw strength class 10.9 recommended for safety
TAS 2 085	M8 x 1.25	8 x M8 x 9	31.9

TbI - 6 Attachment of drive actuator

- ① It is recommended to use the entire thread length if possible, so as to create a secure screw connection.

9.2 Information on the attachment of the drive wheel

When mounting/changing the drive wheel, we recommend observing the following specifications:

Size	Hole circle Ø [mm]	Quantity x thread x screw depth [] x [mm] x [mm]	Tightening torque [Nm] for screw strength class 12.9 recommended for safety
TAS 2 085	120	9 x M6 x 10	15.4

TbI - 7 Attachment of drive wheel

- ① It is recommended to use the entire thread length if possible, so as to create a secure screw connection.

9.3 Technical data

9.3.1 Technical data of the motor feedback

As motor feedback on commutation, a Encoder is used in the drive actuator with the following technical data:

Drive actuator	TAS2xx...-IKxxxx	TAS2xx...-HLxxxx
Interface	EnDat 2.2	BiSS C
Position values/U	524288 (19 bit)	16384 (14 Bit)
Clock frequency:	≤ 16 MHz	≤ 5 MHz
System accuracy	± 90 "	± 18 '
Supply voltage	DC 3.6 V to 14 V	DC 4.5 V to 5.5 V
Max. operating temperature	115 °C	105 °C
Other	Functional Safety, Interface EnDat FS (SIL2, PLd)	-

Tbl - 8 Technical data of the motor feedback

9.3.2 Technical data of the brake

The brakes fitted in the drive actuators are electromagnetically activated two-disc spring brakes. The brake force is produced by the springs and raised by electromagnetic force. In a de-energized state, the two friction surfaces are pressed onto countersurfaces by springs, producing a brake torque. By placing voltage on the excitation winding, the magnetic rotor is moved by the resulting force. This movement is directed against the pressure force of the springs. In this way, the friction and counter-surfaces are released from each other, leading to cancellation of the brake torque.

Observe the instructions given in chapter 7.1.1 "Running-in of the brake after maintenance" for fault free operation.

TAS 2 085	Brake
Type	Spring-applied brake
Rated voltage	12 V (±10%)
Rated overexcitation voltage	24 V (±10%)
Rated power	9 W
Overexcitation rating	36 W
Rated current	0.75 A
Overexcitation time	300 ms to 500 ms
Closing time	12 VDC: 80 ms 24 VDC: 100 ms
Opening time	110 ms
Nominal torque	6 Nm

Tbl - 9 Technical data of the brake

Revision history

Revision	Date	Comment	Chapter
01	03/31/2023	New version	All
02	07/10/2024	Various adjustments	All

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cyber motor

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