

Operating Manual

V-Drive Advanced / Value / Basic



Revision history

Revision	Date	Comment	Chapter
01	22.03.17	New version	All
02	02.05.17	Bleed screw	6
03	15.11.17	Material number for bleed screw	6
04	06.12.17	Tightening torque	9.1
04a	10.09.18	Translation ventilation screw	6

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1 About this manual

These instructions contain necessary information for the safe operation of the servo worm gear V-Drive Advanced / V-Drive Value / V-Drive Basic, referred to as gearbox 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 obsolete.

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

Store these instructions within reach of the gearbox.

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

1.2 Safety symbols

The following safety symbols are used to bring your attention to dangers, prohibitions, and important information:



General danger



Hot surface



Suspended loads



Danger of being pulled in



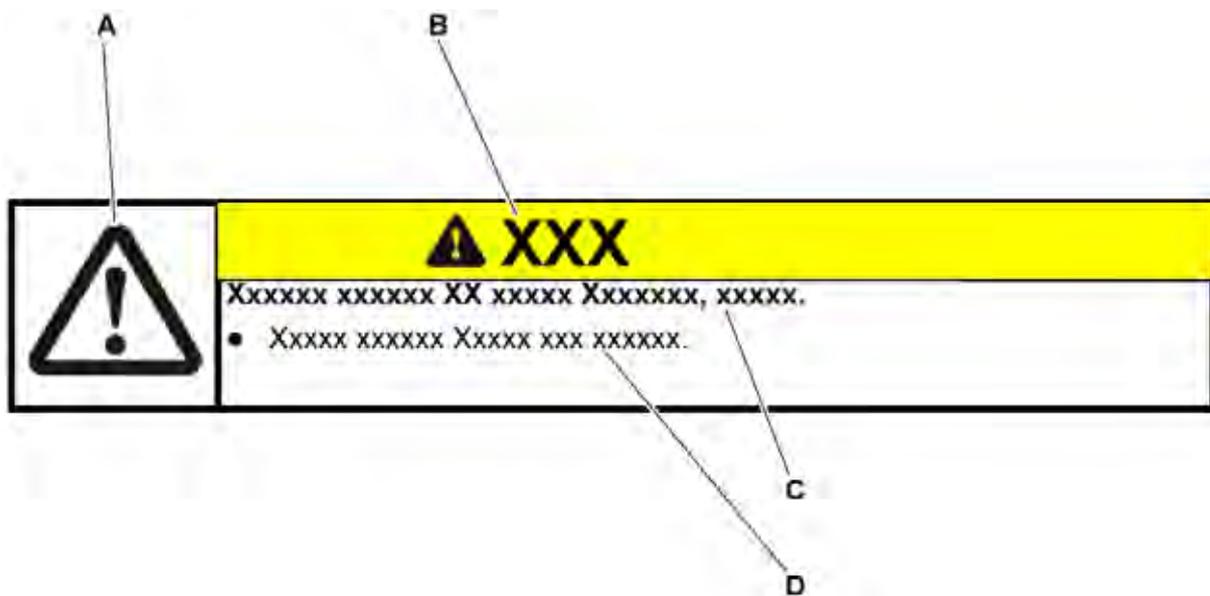
Environment protection



Information

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
- ① Provides additional information on handling

2 Safety

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

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 EC directives

2.1.1 Machinery directive

The gearbox is considered a "machine component" and is therefore not subject to the EC Machinery Directive 2006/42/EC.

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

2.1.2 RoHS

The homogeneous materials used in the gearbox fall below the amounts of hazardous materials limited by directive 2011/65/EU Annex II.

- Lead (0.1%)
- Mercury (0.1%)
- Cadmium (0.01%)
- Hexavalent chromium (0.1%)
- Polybrominated biphenyls (PBB) (0.1%)
- Polybrominated diphenyl ether (PBDE) (0.1%)

Installation of the gearbox therefore has no effect on the restriction of using certain hazardous materials in electrical and electronic equipment as required in the directive.

2.2 Dangers

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

To avoid danger to the operator or damage to the machine, the gearbox 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 persons who have read and understood these instructions may carry out work on the gearbox.

2.4 Intended use

The gearbox serves to convert torques and speeds. It is suitable for all industrial applications.

The gearbox may not be operated in areas with explosion hazards. In food processing, the gearbox may be used only next to or under the foodstuff area.

The gearbox must only be operated in mounting position as specified in the order.

The gearbox is intended for installation on motors that:

- Correspond to the design B5 (in the event of deviations, consult our Customer Service department [technical Customer Service department]).
- Have a radial and axial runout tolerance according to DIN EN 50347.
- Have a cylindrical shaft end with tolerance class h6 to k6.

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.

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 gearbox when safety devices and equipment are defective
- Operation of the gearbox without lubricant
- Operation of a heavily soiled gearbox
- Modifications or reconstructions that have been carried out without the approval of **WITTENSTEIN alpha GmbH**

2.7 General safety instructions

	<p style="text-align: center;">⚠ WARNING</p> <p>Objects flung out by rotating components can cause serious injuries.</p> <ul style="list-style-type: none"> • Remove objects and tools from the gearbox before putting it into operation. • Remove/Secure the shaft key (if available) if the gearbox is operated without attachments on the output/drive side.
	<p style="text-align: center;">⚠ WARNING</p> <p>Rotating components on the gearbox can pull in parts of the body and cause serious injuries and even death.</p> <ul style="list-style-type: none"> • Keep a sufficient distance to rotating machinery while the gearbox is running. • Secure the machine against restarting and unintentional movements during assembly and maintenance work (e.g. uncontrolled lowering of lifting axes).
	<p style="text-align: center;">⚠ WARNING</p> <p>A damaged gearbox can cause accidents and injury.</p> <ul style="list-style-type: none"> • Never use a gearbox that has been overloaded to due misuse or a machine crash (see chapter 2.5 "Reasonably foreseeable misuse"). • Replace the affected gearbox, even if no external damage is visible.
	<p style="text-align: center;">⚠ CAUTION</p> <p>Hot gearbox housing can cause serious burns.</p> <ul style="list-style-type: none"> • Touch the gearbox housing only when wearing protective gloves or after the gearbox has been at standstill for some time.

	<p style="text-align: center;">NOTICE</p> <p>Loose or overloaded screw connections can damage the gearbox.</p> <ul style="list-style-type: none"> • Use a calibrated torque wrench to tighten and check all screw connections for which a tightening torque has been specified.
	<p style="text-align: center;">⚠ WARNING</p> <p>Lubricants are flammable.</p> <ul style="list-style-type: none"> • 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 "Notes on the lubricant used").
	<p style="text-align: center;">⚠ CAUTION</p> <p>Solvents and lubricants can cause skin irritations.</p> <ul style="list-style-type: none"> • Avoid direct skin contact.
	<p>Solvents and lubricants can pollute soil and water.</p> <ul style="list-style-type: none"> • Use and dispose of cleaning solvents and lubricants properly.

3 Description of the gearbox

3.1 General information

The gearbox is a single- or multi-stage, low-backlash servo worm gear, which is manufactured as standard in the "M" version (motor installation).

Motor centering of the motor-mounted gearbox is performed:

- up to gearbox size 063 and a motor shaft diameter of 28 mm by the clamping hub (coupling)
- from gearbox size 080 and a motor shaft diameter of > 28 mm by the centering collar of the motor

A radial distortion of the motor is prevented.

Various types of motors can be accommodated using an adapter plate and a bushing.

The gearbox is equipped with an integrated linear length compensation to compensate for the expansion of the motor shaft when heated up.

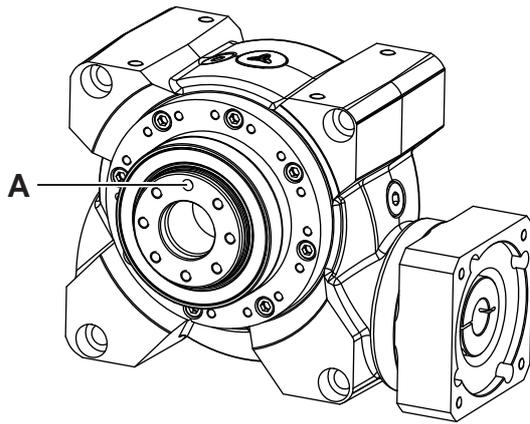
The gearbox is suitable for every mounting position; the lubricant quantity, however, is dependent on the mounting position.

An overview of the gearbox series:

- V-Drive Advanced (VT⁺, VH⁺, VS⁺)
- V-Drive Value (NVH, NVS)
- V-Drive Basic (CVH, CVS)

Special information on the various output version of the gearbox can be found in the following sections.

3.1.1 Flange hollow shaft on VT⁺

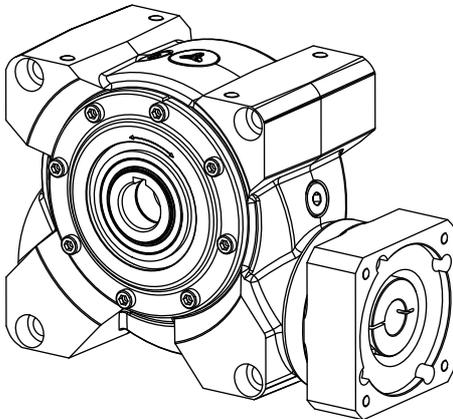


The large output flange has two centering mechanisms and a bore hole for an indexing pin (A) so that the gearbox (or the application) can be zeroed mechanically.

The hollow shaft is for conducting your media (e.g. cables).

On the back side of the output flange, the position and/or the speed of the load can be measured through the hollow shaft.

3.1.2 Hollow output shaft on VH⁺, NVH, CVH



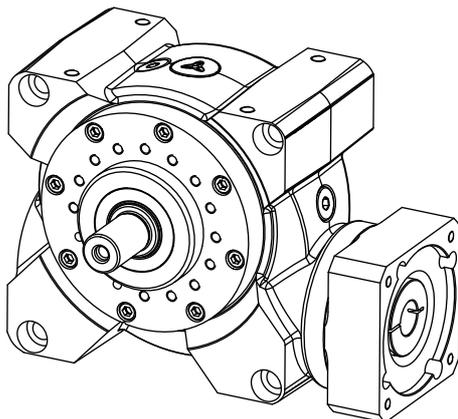
The standard manufactured versions of the hollow output shaft are as follows:

- Keyed hollow shaft on both sides
- Hollow shaft interface on both sides

For the load shaft, we recommend the tolerance h6 (EN ISO 286). The material should have a minimum yield stress of 385 N/mm².

For varying applications, the gearbox is available with one or with two clampable shaft ends. The machine shaft is connected to the gearbox by means of a shrink disk.

3.1.3 Output shaft (one side) on VS⁺



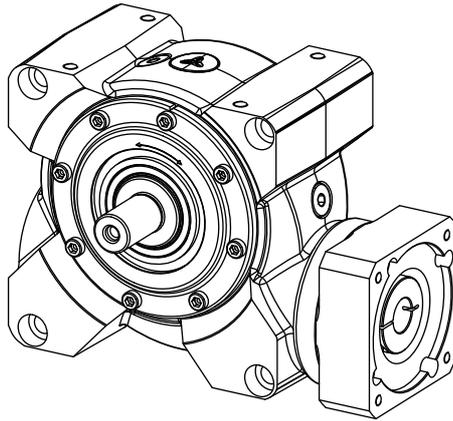
The standard manufactured versions of the output shaft are as follows:

- Smooth shaft
- Shaft with shaft key
- Splined shaft

The output shaft bearing is designed to withstand high tilting moments and axial forces.

① Information on the VS⁺ with output shaft on both sides can be found in chapter 3.1.4 "Output shaft on both sides on VS⁺, NVS, CVS".

3.1.4 Output shaft on both sides on VS⁺, NVS, CVS



The standard manufactured versions of the output shaft are as follows:

- Smooth shaft on both sides
- Shaft on both sides with shaft key

Optionally, the output shaft bearing can be designed to withstand high tilting moments and axial forces.

3.2 Identification plate

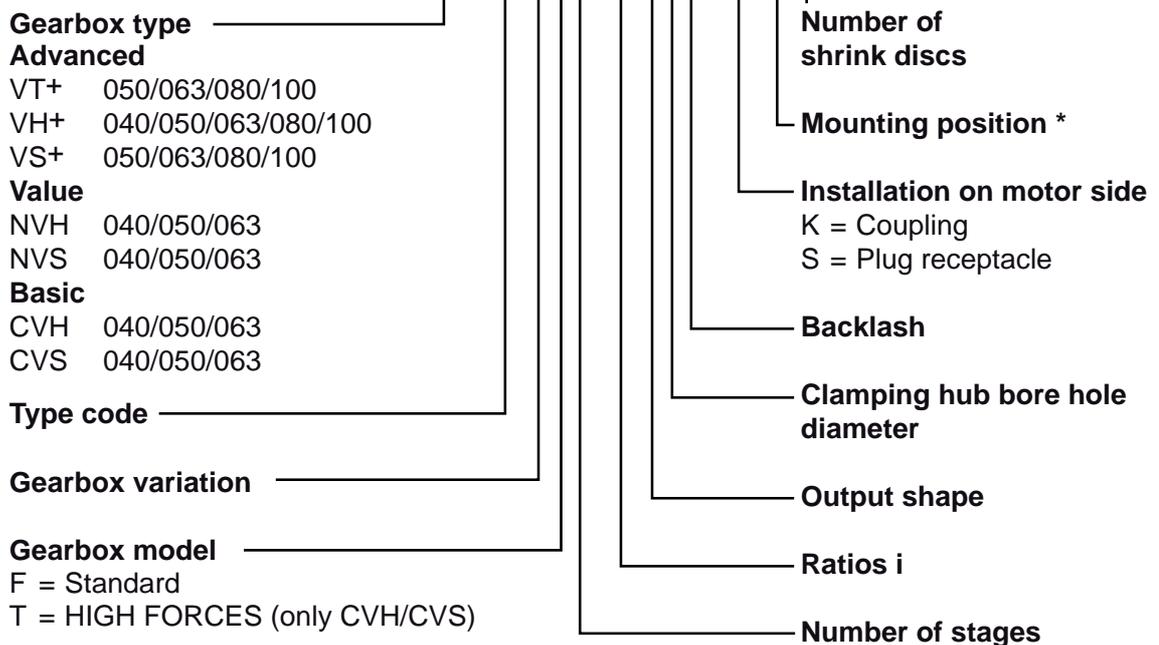
The type plate is attached to the gearbox housing as well input flange.

		Designation
	A	Ordering code (see Chapter 3.3 "Ordering code")
	B	Ratio
	C	Serial number
	D	Lubricant
	E	Production date

Tbl-1: Identification plate (sample values)

3.3 Ordering code

VH+ 050S-MF1- 7-6E1-1K-0E1

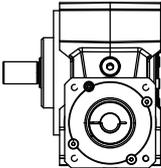
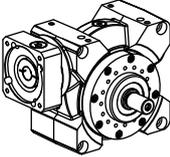
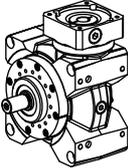
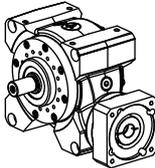
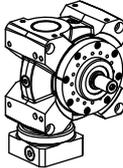
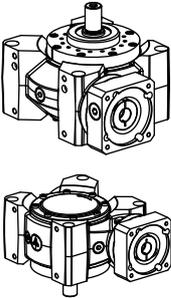
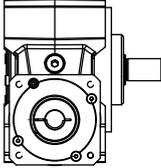
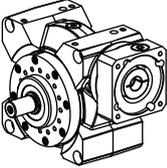
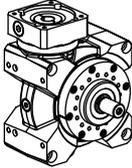
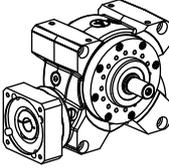
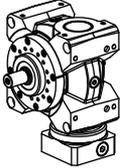
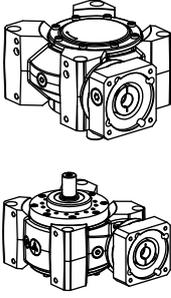
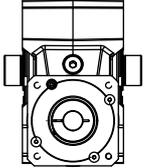
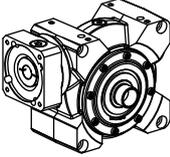
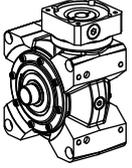
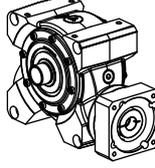
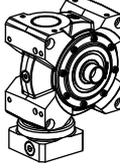
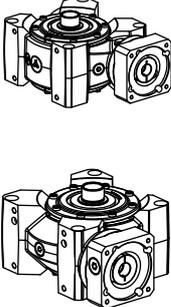


* Further information on the mounting position can be found in chapter 3.4 "Mounting positions". Refer to our catalog or our website at www.wittenstein-alpha.de for further information.

3.4 Mounting positions

The gearbox must only be operated in mounting position as specified in the order.

- ① The mounting position can be found on the identification plate (see Chapter 3.2 "Identification plate").

Output side	Ordering code: xxxxxxx-xxx-xxx-xx-AXx				
A	AC	AF	AD	AG	AE
View of the motor connection, output left 					
Output side	Ordering code: xxxxxxx-xxx-xxx-xx-BXx				
B	BC	BF	BD	BG	BE
View of the motor connection, output right 					
Output side	Ordering code: xxxxxxx-xxx-xxx-xx-0Xx				
0 (A + B)	0C	0F	0D	0G	0E
with output shaft on both sides 					

Tbl-2: Mounting positions

3.5 Performance data

For the maximum permitted speeds and torques, refer to

- our catalog,
- our website www.wittenstein-alpha.de,
- the respective customer-specific performance data (X093–D...).

	<p>Consult our Customer Service department if the gearbox is older than a year. You will then receive the valid performance data.</p>
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3.6 Weight

The tables "Tbl-3", "Tbl-4" and "Tbl-5" specify the standard gearbox weights with medium-sized adapter plate. If a different adapter plate is mounted, the actual weight can deviate by up to 10 %.

3.6.1 Weight V-Drive Advanced (VT⁺, VH⁺, VS⁺)

gearbox size VT ⁺	–	050	063	080	100
1-stage [kg]	–	9.0	15.0	32.0	63.0
2-stage [kg]	–	9.5	15.2	33.5	64.6
gearbox size VH ⁺	040	050	063	080	100
1-stage [kg]	5.0	8.0	13.0	27.0	51.0
2-stage [kg]	5.6	8.7	13.7	29.5	53.6
gearbox size VS ⁺	–	050	063	080	100
1-stage [kg]	–	9.0	16.0	33.0	62.0
2-stage [kg]	–	9.7	16.7	35.5	64.6

Tbl-3: Weight V-Drive Advanced

3.6.2 Weight V-Drive Value (NVH, NVS)

gearbox size NVH	040	050	063
1-stage [kg]	5.0	8.0	13.0
2-stage [kg]	5.6	8.7	13.7
gearbox size NVS	040	050	063
1-stage [kg]	5.0	8.0	13.0
2-stage [kg]	5.6	8.7	13.7

Tbl-4: Weight V-Drive Value

3.6.3 Weight V-Drive Basic (CVH, CVS)

gearbox size CVH	040	050	063
1-stage [kg]	4.5	8.0	13.0
gearbox size CVS	040	050	063
1-stage [kg]	4.5	8.0	13.0

Tbl-5: Weight V-Drive Basic

3.7 Noise emission

Depending on the gearbox type and product size, the continuous sound pressure level is up to 70 dB(A).

- ① For specifications on your particular product, refer to our catalog or our website at www.wittenstein-alpha.de or contact our Customer Service department.
- Observe the total noise pressure level of the machine.

4 Transport and storage

4.1 Scope of delivery

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

4.2 Packaging

The gearbox is delivered packed in foil and cardboard boxes.

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

4.3 Transport

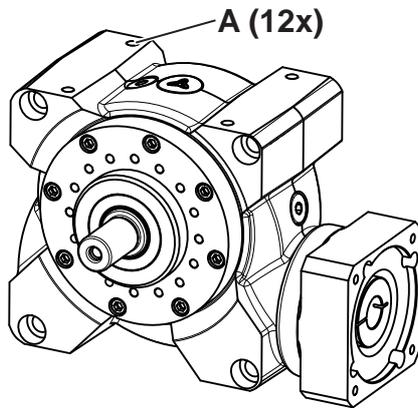
	<p style="text-align: center;">⚠ WARNING</p> <p>Suspended loads can fall and can cause serious injuries and even death.</p> <ul style="list-style-type: none"> • Do not stand under suspended loads. • Secure the gearbox before transport with suitable fasteners (e.g. belts).
	<p style="text-align: center;">NOTICE</p> <p>Hard knocks, because of falling or hard dropping, can damage the gearbox.</p> <ul style="list-style-type: none"> • Only use hoisting equipment and lifting accessories with sufficient capacity. • The maximum permissible lift capacity of a hoist may not be exceeded. • Lower the gearbox slowly.
	<p style="text-align: center;">NOTICE</p> <p>Applies only to gearboxes VT⁺:</p> <p>The hollow shaft is not suitable for the transmission of force. It can come to deformations or leakages.</p> <ul style="list-style-type: none"> • Only attach the lifting accessories (e.g. loops) to the outer side of the housing. • Never lift the gearbox by reaching into the openings of the hollow shaft.

For information on the weights, see Chapter 3.6 "Weight".

4.3.1 Transport of gearboxes up to and including gearbox size 063

No special transport mode is prescribed for transporting the gearbox.

4.3.2 Transport of gearboxes as of size 080



For gearboxes as of size 080, we recommend the use of hoisting equipment.

You can screw in eye bolts (e.g. acc. to DIN 580) in the threaded bores (A) in the housing. The eye bolts (at least 2) are used for attaching the gearbox securely to the hoisting equipment.

- ① For specifications on the threaded bores, refer to Chapter 9.2 "Specifications for mounting on a machine", Table "Tbl-22".

4.4 Storage

Store the gearbox in horizontal position and dry surroundings at a temperature of 0 °C to +40 °C in the original packaging. Store the gearbox for a maximum of 2 years. Consult our Customer Service department if the conditions are different.

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
	<p>Pressurized air can damage the gearbox seals.</p> <ul style="list-style-type: none"> • Do not use pressurized air to clean the gearbox.
	NOTICE
	<p>Directly sprayed cleaning agents can alter the frictional values of the clamping hub.</p> <ul style="list-style-type: none"> • Only spray cleaning agents onto a cloth for wiping off the clamping hub.
	<p>In rare situations, for a gearbox with grease lubrication, a leak can occur at the drive (seeping).</p> <p>To avoid seeping, we recommend that the surfaces between</p> <ul style="list-style-type: none"> - adapter plate and drive housing (gearbox) as well as - adapter plate and motor <p>be sealed with a surface sealing adhesive (e.g. Loctite® 573 or 574).</p> <ul style="list-style-type: none"> • For more information, please contact our Customer Service department.

	NOTICE
	<p>Operation without an adapter plate can lead to damage.</p> <ul style="list-style-type: none"> ● Only install your own adapter plate or replace an adapter plate according to the specifications of WITTENSTEIN alpha GmbH. Our customer service will provide you with disassembly instructions for this purpose. ● Operation without an adapter plate is prohibited.

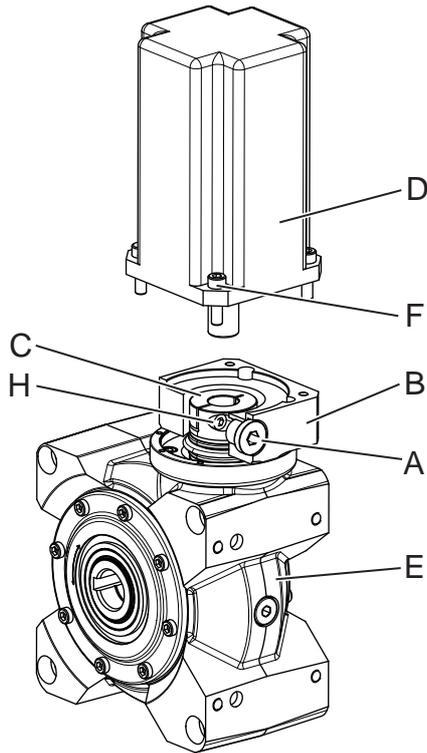
- Make sure that motor meets the specifications in Chapter 2.4 "Intended use".
- Clean/de-grease and dry the following components with a clean and lint-free cloth and grease-dissolving, non-aggressive cleaning agent:
 - All fitting surfaces to neighboring components
 - Centering
 - Motor shaft
 - The inner diameter of the clamping hub
 - The bushing, inside and out
- Dry all fitting surfaces to neighboring components in order to achieve the proper friction values of the screw connections.
- Check the fitting surfaces additionally for damage and impurities.
- Select screws for fastening the motor to the adapter plate according to the motor manufacturer's specifications. Observe the minimum screw depth as determined by the property class (see Table "Tbl-6").

Property class of the screws for fastening the motor	8.8	10.9
Minimum screw depth	1.5 x d	1.8 x d
d = Screw diameter		

Tbl-6: Minimum screw depth of the screws for fastening the motor to the adapter plate

5.2 Mounting the motor on the gearbox

	<ul style="list-style-type: none"> ● Observe the specifications and safety instructions of the motor manufacturer. ● Observe the safety and processing instructions for the threadlocker to be used.
--	--



- Ensure that the motor is mounted if possible in a vertical direction.
- If the motor shaft has a shaft key, remove the shaft key.
 - ① If recommended by the motor manufacturer, insert a half wedge.
- Remove the plug (A) from the mounting bore in the adapter plate (B).
- Turn the clamping hub (C) until the clamping bolt (H) can be reached by the mounting bore.
- Loosen the clamping bolt (H) of the clamping hub (C) by one revolution.
- Push the motor shaft into the clamping hub of the gearbox (E).
 - ① The motor shaft should slip in easily. If this is not the case, the clamping bolt needs to be loosened some more.
 - ① A slotted bushing has to be additionally installed for certain motor shaft diameters and applications.

- ① The slots of the bushing (if present) and clamping hub have to be aligned with the groove (if present) of the motor shaft, see Table "Tbl-7".
- ① No gap is permitted between motor (D) and the adapter plate (B).

		Designation
	H	Clamping bolt
	I	Clamping ring (part of the clamping hub)
	J	Bushing
	K	Keyed motor shaft
	L	Smooth motor shaft

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

- ① Motor centering of the motor-mounted gearbox is performed:
 - up to gearbox size 063 and a motor shaft diameter of 28 mm by the clamping hub (coupling)
 - from gearbox size 080 and a motor shaft diameter of > 28 mm by the centering collar of the motor
- Coat the four bolts (F) with a threadlocker (e.g., Loctite[®] 243).
- Fasten the motor (D) onto the adapter plate (B) with the four screws. Evenly tighten the screws crosswise with increasing torque.
- Tighten the clamping bolt (H) of the clamping hub.
 - ① For screw sizes and prescribed tightening torques, see Chapter 9.1 "Specifications for mounting on a motor", Tables "Tbl-19", "Tbl-20" and "Tbl-21".
- Screw in plug (A) of the adapter plate (B).
 - ① For the screw size and specified tightening torque, see Table "Tbl-8".

Width across flats [mm]	5	8	10	12
Tightening torque [Nm]	10	35	50	70

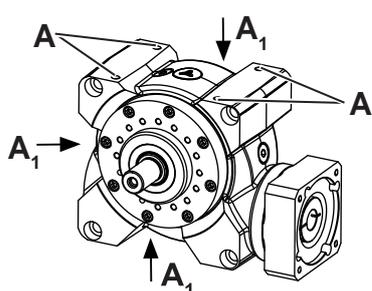
Tbl-8: Tightening torques for the plug

5.3 Mounting the gearbox on a machine

i	<p>The gearbox is suitable for every mounting position; the lubricant quantity, however, is dependent on the mounting position.</p> <p>The mounting position and the lubricant that has been filled in are indicated on the identification plate (see Chapter 3.2 "Identification plate").</p> <ul style="list-style-type: none"> ● Mount the gearbox only in the specified mounting position.
	<ul style="list-style-type: none"> ● Observe the safety and processing instructions for the threadlocker to be used.

① There are different possibilities for attaching the gearbox to a machine:

- by four threaded bores (A) of a surface (A₁)

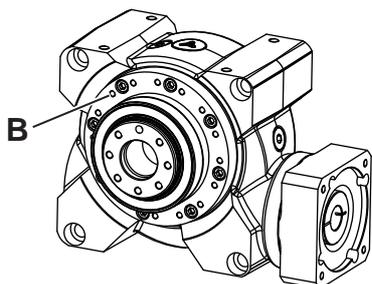


In the housing, there are four threaded bores (A) on each of three surfaces (A₁).

- Use all threaded bores of one surface to attach the gearbox to a machine.

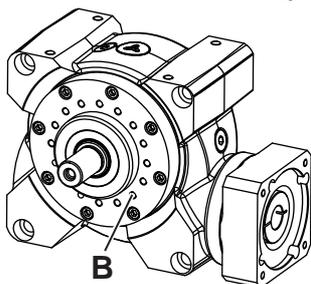
① For appropriate screw sizes and tightening torques, see Chapter 9.2.1 "Threaded bores in housing", Table "Tbl-22".

- by threaded bores (B) on the output side (only VT⁺, VS⁺)

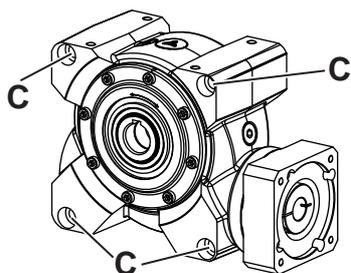


Threaded bores (B) are available on the drive side to attach the gearbox to your machine.

① For appropriate screw sizes and tightening torques, see Chapter 9.2.2 "Threaded bores in the output side (only VT⁺, VS⁺)", Tables "Tbl-23" and "Tbl-24".



- by the through-holes (C)



Through-holes (C) are available in the housing to attach the gearbox to your machine.

① For appropriate screw sizes and tightening torques, see Chapter 9.2.3 "Through-holes in the housing", Table "Tbl-25".

- Center the gearbox in the machine base.
- Apply threadlocker (e.g., Loctite[®] 243) to the fastening screws.

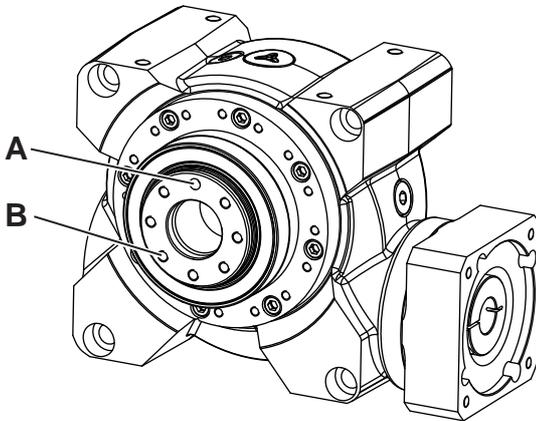
- Fasten the gearbox on the machine with the fastening screws through the threaded bores (A/B) / through-holes (C).
- ① Mount the gearbox in such a way that the identification plate can still be read.
- ① Do not use washers (e.g. plain washers, tooth lock washers).

5.4 Components mounted on the output side

	NOTICE
	<p>Distortions during assembly can damage the gearbox.</p> <ul style="list-style-type: none"> • Mount the mounting parts onto the output side without using force. • Never attempt to assemble by force or hammering! • Only use suitable tools and devices for assembly.

5.4.1 Mounting on the flange hollow shaft (only VT⁺)

This section is valid **only** for gearboxes VT⁺.



The large output flange has two centering mechanisms and a bore hole for an indexing pin (A) so that the gearbox (or the application) can be zeroed mechanically.

- ① For bore diameters for an indexing pin can be found in Chapter 9.3 "Specifications for mounting on the output side (only VT⁺)", Table "Tbl-26".
- Maintain the maximum screw depth of mountings in the threaded bores (B).
- ① The prescribed screw sizes, screw depths, and tightening torques for mountings on the output flange can be found in Chapter 9.3 "Specifications for mounting on the output side (only VT⁺)", Table "Tbl-26".

The hollow shaft is **not** intended for transmission of force.

- ① Cables and rigid components may be conducted through the hollow shaft, but are not permitted to touch the inner diameter.

5.4.2 Mountings on the output shaft (VS⁺, NVS, CVS)

This section is valid **only** for gearboxes VS⁺, NVS, CVS.

The standard manufactured versions of the output shaft are as follows:

- Smooth shaft
- Shaft with shaft key
- Splined shaft (only VS⁺)

	NOTICE
	<p>Distortions during assembly can damage the gearbox.</p> <ul style="list-style-type: none"> • Make sure not to exceed the maximum permissible static axial forces on the output bearing (see Table "Tbl-9") in particular when pulling or shrink-fitting a mounting part onto the output shaft.

gearbox size VS ⁺	040	050	063	80	100
Fa max [N]	–	10750	18500	31250	49750
gearbox size NVS	040	050	063	80	100
Fa max [N]	6500	10750	18500	–	–
gearbox size CVS	040	050	063	80	100
Fa max [N]	2400	3000	4000	–	–
Ordering code: CVSxxxx-xFx-xxx-xxx-xx-xxx					
Fa max [N]	6500	10750	18500	–	–
Ordering code: CVSxxxx-xTx-xxx-xxx-xx-xxx					

Tbl-9: Maximum permissible static axial forces at static load rating (s0) = 1.8 and radial force (Fr) = 0

5.4.3 Mounting on the hollow shaft with shaft key (VH⁺, NVH, CVH)

This section is valid **only** for gearboxes VH⁺, NVH, CVH.

The shaft end of the machine must be equipped with a DIN 6885 Part 1, Form A shaft key and must have a DIN 332 Form DS centering (with thread).

NOTICE

Incorrectly aligned shafts can lead to damage.

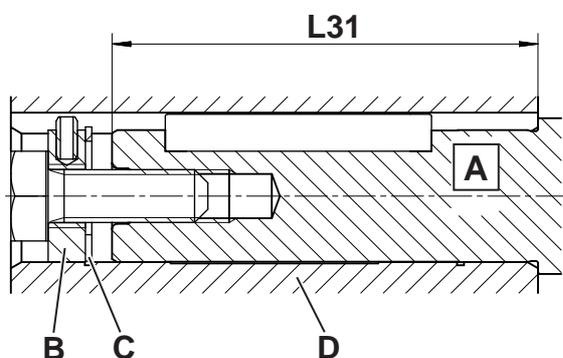
- Check the hollow and load shafts for damaged edges or poor fit. Re-machine the parts if necessary.
- Ensure that the hollow shaft is aligned with the load shaft.
- Mount the hollow shaft onto the load shaft without using force.
- Never attempt to assemble by hammering or applying pressure.

NOTICE

Dirt can inhibit transmission of the torque.

- Degrease the load shaft and the hollow shaft leaving no residual traces.

① Protect the cleaned contact surfaces against rust with a suitable lubricant (e.g. Klüger Altemp Q paste).



① The axial securing of the hollow shaft gearbox to the load shaft (A) can be made with an end washer (B) and a retaining ring (C).

① If the end washer is to be used for dismantling as a forcing washer, the load shaft (A) may not exceed a certain insertion length (L 31) in the hollow shaft (D). The maximum insertion lengths can be found in Table "Tbl-10".

gearbox size VH ⁺ , NVH, CVH	Maximum insertion length L 31 [mm]
040	64
050	77
063	89
080	119
100	159

Tbl-10: Maximum insertion length load shaft

5.4.4 Mounting on the hollow output shaft with shrink disk (VH⁺, NVH, CVH)

This section is valid **only** for gearboxes VH⁺, NVH, CVH.

The hollow output shaft is axially secured to the load shaft by means of a shrink disk connection. If a shrink disk was ordered, it is already installed on the hollow output shaft.

- If a different shrink disk is used, observe the instructions of the manufacturer.

① The material of the shrink disk is specified in the article code (AC) (see Table "Tbl-12").

Depending on the material of the shrink disk, the load shaft has to meet the following conditions:

	Material of the shrink disk		
	standard	nickel-plated	stainless steel
Minimum yield stress [N/mm ²]	≥ 385	≥ 260	≥ 260
Surface roughness Rz [μm]	≤ 16		
Tolerance	h6		

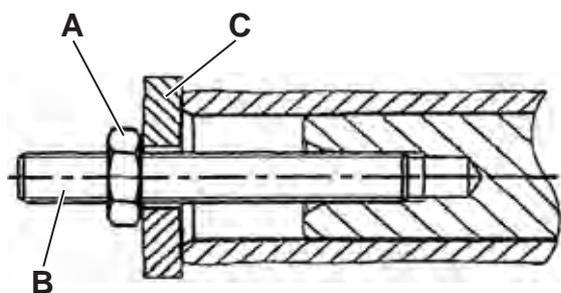
Tbl-11: Features of the load shaft

	NOTICE
	<p>Dirt can inhibit transmission of the torque.</p> <ul style="list-style-type: none"> • Do not disassemble the shrink disk prior to installation. • De-grease the load shaft and the hollow output shaft leaving no residual traces in the area of the shrink disk seat.

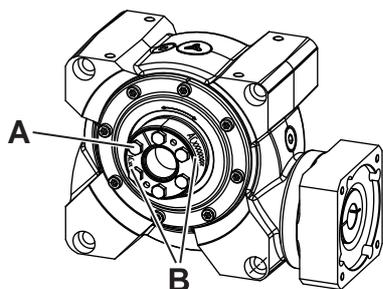
① Only the exterior surface of the hollow output shaft may be greased in the area of the shrink disk seat.

	NOTICE
	<p>The forces of the shrink disk can deform the hollow output shaft.</p> <ul style="list-style-type: none"> • Always install the load shaft first before tightening the clamping screws of the shrink disk.

	NOTICE
	<p>Incorrectly aligned shafts can lead to damage.</p> <ul style="list-style-type: none"> • Ensure that the hollow output shaft is aligned with the load shaft. • Mount the hollow output shaft onto the load shaft without using force. • Never attempt to assemble by hammering or applying pressure.



- Draw the hollow output shaft onto the load shaft using a nut (A) and a threaded spindle (B). The support (C) must be provided by the hollow output shaft.



Depending on the design, the article code (B) is located either on the front side or on the circumference of the shrink disk.

- Refer to the article code to determine the material of the shrink disk.
- Tighten the clamping screws (A) of the shrink disk evenly in several sequences.
- Tighten the individual clamping screws only up to the maximum permitted tightening torque.
 - ① For screw sizes and prescribed tightening torques, see Table "Tbl-12".
- Check that the clamping screws (A) have the maximum tightening torque, going through in sequence twice.
 - ① If a separately supplied shrink disk is to be mounted, read the information in Chapter 5.4.5 "Installing the shrink disk".

Material of the shrink disk: standard			
gearbox size VH ⁺ , NVH, CVH	Article code (AC)	Tightening torque	Clamping screw thread
040	20001389	12 Nm	M6
050	20020687	13 Nm	M6
063	20020688	30 Nm	M8
080	20020689	34 Nm	M8
100	20020690	34 Nm	M10
Material of the shrink disk: nickel-plated			
gearbox size VH ⁺ , NVH, CVH	Article code (AC)	Tightening torque	Clamping screw thread
040	20047957	7.5 Nm	M6
050	20047934	14 Nm	M6
063	20047530	34 Nm	M8
080	20047935	34 Nm	M8
100	20047927	34 Nm	M10

Material of the shrink disk: stainless steel			
gearbox size VH ⁺ , NVH, CVH	Article code (AC)	Tightening torque	Clamping screw thread
040	20043198	7.5 Nm	M6
050	20047885	6.8 Nm	M6
063	20035055	16 Nm	M8
080	20047937	16 Nm	M8
100	20047860	16 Nm	M10

Tbl-12: Tightening torques for clamping screws of the supplied shrink disk

5.4.5 Installing the shrink disk

- ① The removed shrink disk does not need to be disassembled and regreased prior to bracing it again. It is only necessary to disassemble and clean the shrink disk when it is dirty.

	NOTICE
	<p>Cleaned shrink disks can have another coefficient of friction. This can lead to damage during assembly.</p> <ul style="list-style-type: none"> Lubricate the inner smooth surfaces of the shrink disk using a solid lubricant with a coefficient of friction of $\mu = 0.04$.

- ① The following lubricants are permitted for relubricating the shrink disk:

Lubricant	Commercial form	Manufacturer
Molykote 321 R (lubricating varnish)	Spray	DOW Corning
Molykote Spray (powder spray)	Spray	DOW Corning
Molykote G Rapid	Spray or paste	DOW Corning
Aemasol MO 19 P	Spray or paste	A. C. Matthes
Unimoly P 5	Powder	Klüber Lubrication

Tbl-13: Lubricants for relubricating the shrink disk

- Push the shrink disk onto the hollow output shaft.
- ① Only the exterior surface of the hollow output shaft may be greased in the area of the shrink disk seat.
- Observe the further instructions given in Chapter 5.4.4 "Mounting on the hollow output shaft with shrink disk (VH⁺, NVH, CVH)".

6 Startup and operation

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

	<p>Improper use can cause damage to the gearbox.</p> <ul style="list-style-type: none"> • Make sure that <ul style="list-style-type: none"> - the ambient temperature does not drop below -15 °C or exceed $+40\text{ °C}$ and - the operating temperature does not exceed $+90\text{ °C}$. • Avoid icing, which can damage the seals. • For other conditions of use, consult our Customer Service department. • Only use the gearbox only up to its maximum limit values, see Chapter 3.5 "Performance data". • Only use the gearbox only in a clean, dust-free and dry environment.
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	<p>When using the gearbox in continuous duty operation (S1 operation), we recommend the use of a ventilation screw.</p> <p>① The ventilation screw is not included in the scope of delivery. WITTENSTEIN alpha GmbH offers suitable ventilation screws to this end (see Table "Tbl-14"). If you would like to order a ventilation screw, contact our sales department.</p>
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V-Drive gearbox size	040		050	063	080	100
Material number for ventilation screw	20070677	20071468 (only with ordering code xxx040x-xxx-xxx-xx-XDx)	20070677			
Thread size	G1/4"	G3/8"	G1/4"			

Tbl-14: Ventilation screw

7 Maintenance and disposal

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

7.1 Maintenance work

7.1.1 Visual inspection

- Check the entire gearbox for exterior damage.
- The radial shaft seals are subject to wear. Therefore also check the gearbox for leakage during each visual inspection.
 - ① You can find more general information on radial shaft seals on our partner's Internet site at <http://www.simrit.de>.
 - ① Check the mounting position, so that no foreign medium (e.g. oil) has collected on the output shaft.

7.1.2 Checking the tightening torques

- Check the tightening torque of the clamping bolt on the motor mounting. If you discover while checking the tightening torque that the clamping bolt can be turned further, tighten it with the prescribed tightening torque.
 - ① The prescribed tightening torques can be found in Chapter 9.1 "Specifications for mounting on a motor", Tables "Tbl-19", "Tbl-20" and "Tbl-21".
- Check the tightening torque of the fastening screws on the gearbox. If, while checking the tightening torque, you discover that a fastening screw can be further tightened, follow the instructions in "Remounting the screw".
 - ① The prescribed tightening torques can be found in Chapter 9.2 "Specifications for mounting on a machine", Tables "Tbl-22", "Tbl-23", "Tbl-24" and "Tbl-25".

Remounting the screw

	<ul style="list-style-type: none"> ● Make sure that it is possible to remount the screw on the gearbox without damaging the entire machine.
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- 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).
- Screw in the screw and tighten it with the prescribed tightening torque.

7.2 Startup after maintenance work

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

7.3 Maintenance schedule

Maintenance work	At startup	For the first time after 500 operating hours or 3 months	Every 3 months	Yearly
Visual inspection	X	X	X	
Checking the tightening torques	X	X		X

Tbl-15: Maintenance schedule

7.4 Notes on the lubricant used

i	All gearboxes 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 permanently lubricated by the company.
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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-16: Lubricant manufacturers

7.5 Disposal

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

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

8 Malfunctions

	NOTICE
	<p>Changed operational behavior can be an indication of existing damage to the gearbox or cause damage to the gearbox.</p> <ul style="list-style-type: none"> Do not put the gearbox back into operation until the cause of the malfunction has been rectified.

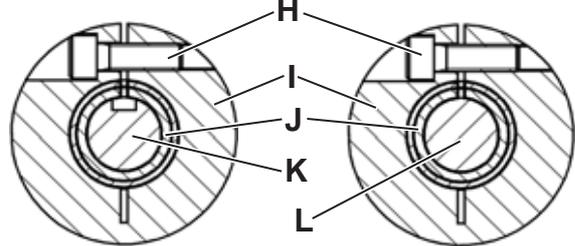
	<p>Rectifying of malfunctions may only be done by specially trained technicians.</p>
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Fault	Possible cause	Solution
Increased operating temperature	The gearbox is not suited for the task.	Check the technical specifications.
	Motor is heating the gearbox.	Check the wiring of the motor.
		Ensure adequate cooling.
	Change the motor.	
	Ambient temperature too high.	Ensure adequate cooling.
Increased noises during operation	Distortion in motor mounting	Please consult our Customer Service Department.
	Damaged bearings	
	Damaged gear teeth	
Loss of lubricant	Lubricant quantity too high	Wipe off discharged lubricant and continue to watch the gearbox. Lubricant discharge must stop after a short time.
	Seals not tight	Please consult our Customer Service Department.

Tbl-17: Malfunctions

9 Appendix

9.1 Specifications for mounting on a motor

		Designation	
		Label	Description
H			Clamping bolt
I			Clamping ring (part of the clamping hub)
J			Bushing
K			Keyed motor shaft
L			Smooth motor shaft

Tbl-18: Arrangement of motor shaft, clamping hub, and bushing

9.1.1 Specifications for the V-Drive Advanced (VT⁺, VH⁺, VS⁺) version

gearbox size VT ⁺ , VH ⁺ , VS ⁺	Clamping hub interior Ø "x" [mm]	Clamping screw (H)/ property class 12.9 DIN ISO 4762	Width across flats [mm]	Tightening torque [Nm]	Max. axial force clamping hub [N]	
					Plug receptacle	Coupling
040	1-stage	x ≤ 14 14 < x ≤ 19	M5 M6	4 5	8.5 14	– 10
	2-stage	x ≤ 14 14 < x ≤ 19	M5 M6	4 5	9.5 14	100 –
050	1-stage	14 < x ≤ 19	M6	5	14	– 20
	2-stage	x ≤ 14 14 < x ≤ 19	M5 M6	4 5	9.5 14	100 –
063	1-stage	x ≤ 28	M8	6	35	– 30
	2-stage	x ≤ 19 x ≤ 24	M6 M8	5 6	14 35	120 –
080	1-stage	x ≤ 38	M10	8	69	– 50
	2-stage	x ≤ 24 24 < x ≤ 38	M8 M10	6 8	35 79	150 –
100	1-stage	x ≤ 48	M12	10	86	– 200
	2-stage	x ≤ 38 38 < x ≤ 48	M10 M12	8 10	79 135	200 –

Tbl-19: Specifications for mounting on a motor

9.1.2 Specifications for V-Drive Value (NVH, NVS) version

gearbox size NVH, NVS		Clamping hub interior Ø "x" [mm]	Clamping screw (H)/ property class 12.9 DIN ISO 4762	Width across flats [mm]	Tightening torque [Nm]	Max. axial force clamping hub [N]	
						Plug receptacle	Coupling
040	1-stage	$x \leq 14$	M5	4	8.5	–	10
		$14 < x \leq 19$	M6	5	14		
	2-stage	$x \leq 14$	M5	4	9.5	100	–
		$14 < x \leq 19$	M6	5	14		
050	1-stage	$x \leq 19$	M6	5	14	–	20
	2-stage	$x \leq 14$ $14 < x \leq 19$	M5 M6	4 5	9.5 14	100	–
063	1-stage	$x \leq 28$	M8	6	35	–	30
	2-stage	$x \leq 19$ $19 < x \leq 28$	M6 M8	5 6	14 35	120	–

Tbl-20: Specifications for mounting on a motor V-Drive Value

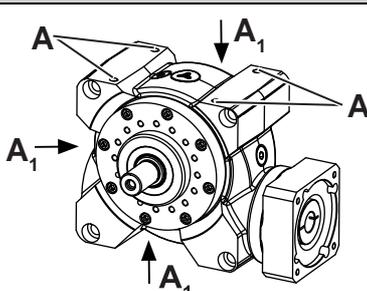
9.1.3 Specifications for V-Drive Basic (CVH, CVS) version

gearbox size CVH, CVS		Clamping hub interior Ø "x" [mm]	Clamping screw (H)/ property class 12.9 DIN ISO 4762	Width across flats [mm]	Tightening torque [Nm]	Max. axial force clamping hub [N] (coupling)
040	1-stage	$x \leq 14$	M5	4	8.5	10
		$14 < x \leq 19$	M6	5	14	
050	1-stage	$x \leq 19$	M6	5	14	20
063	1-stage	$x \leq 28$	M8	6	35	30

Tbl-21: Specifications for mounting on a motor V-Drive Basic

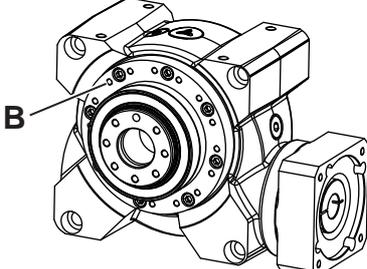
9.2 Specifications for mounting on a machine

9.2.1 Threaded bores in housing

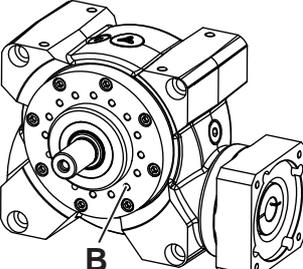
gearbox size V-Drive	Quantity x Thread (A) x Depth [] x [mm] x [mm]	Tightening torque [Nm] Property class 8.8	
	040	4 x M6 x 11.0	9.0
	050	4 x M8 x 13.5	21.5
	063	4 x M10 x 17.0	42.5
	080	4 x M12 x 19.5	73.5
	100	4 x M12 x 19.5	73.5

Tbl-22: Threaded bores in housing V-Drive

9.2.2 Threaded bores in the output side (only VT⁺, VS⁺)

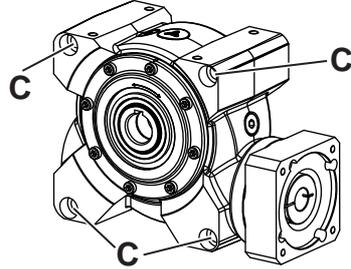
gearbox size V-Drive VT ⁺	Quantity x Thread (B) x Depth [] x [mm] x [mm]	Tightening torque [Nm] Property class 10.9	
	050	16 x M5 x 8.5	7.6
	063	16 x M5 x 8.5	7.6
	080	24 x M6 x 12.0	13.2
	100	24 x M8 x 15.5	32.0

Tbl-23: Threaded bores in the output side V-Drive VT⁺

gearbox size V-Drive VS ⁺	Quantity x Thread (B) x Depth [] x [mm] x [mm]	Tightening torque [Nm] Property class 10.9	
	050	16 x M6 x 10.0	13.2
	063	16 x M8 x 13.0	32.0
	080	24 x M10 x 15.0	62.5
	100	24 x M12 x 23.0	108

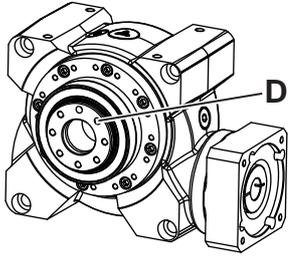
Tbl-24: Threaded bores in the output side V-Drive VS⁺

9.2.3 Through-holes in the housing

gearbox size V-Drive	Screw size (C)	Tightening torque [Nm] Property class 8.8	
	040	4 x M8	21.5
	050	4 x M10	42.5
	063	4 x M10	42.5
	080	4 x M10	42.5
	100	4 x M12	73.5

Tbl-25: Through-holes in housing V-Drive

9.3 Specifications for mounting on the output side (only VT⁺)

gearbox size V-Drive VT ⁺	Quantity x Thread (D) x Depth [] x [mm] x [mm]	Hole circle Ø [mm]	Tightening torque [Nm] Property class 10.9	Indexing bore Ø	
	050	7 x M6 x 10	50	14	6 H 7
	063	11 x M6 x 12	63	14	6 H 7
	080	11 x M8 x 15	80	34	8 H 7
	100	11 x M10 x 20	125	67	10 H 7

Tbl-26: Thread in output flange V-Drive VT⁺

9.4 Tightening torques for common thread sizes in general mechanical engineering

The specified tightening torques for headless 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 $\mu=0.10$
- Exploitation 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.

- Set these values **precisely** on the scale.

Property class Screw / nut	Tightening torque [Nm] with thread												
	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-27: Tightening torques for headless screws and nuts



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