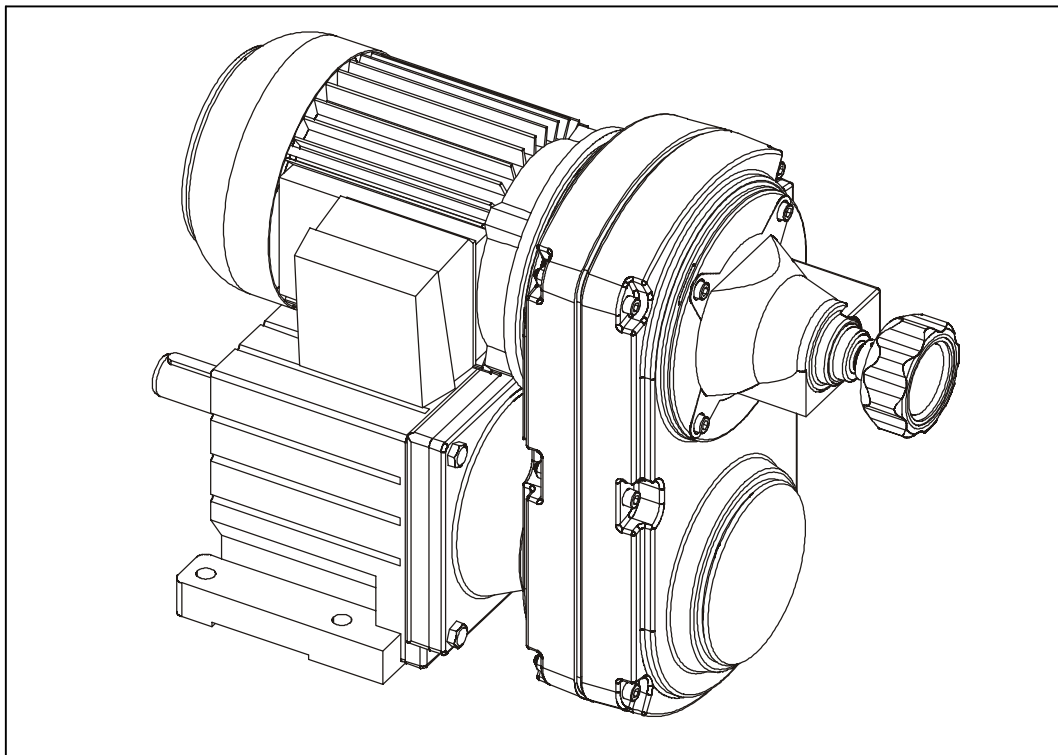


BA 11.1031
453 985 EN

Lenze

Operating Instructions



Simplabelt
Compact Units

What is new / what has changed ?

Material No.	Edition	Important	Contents
00 178 416	1.0 06/94 TD09	1st edition	First edition for pilot series
00 390 299	1.0 01/96 TD09	1st edition Replaces 178 415	Completely revised
00 390 299	2.0 07/97 TD09	2nd edition Replaces 1st edition	Product key completed Chapter 3.3.2 Ambient media: new Chapter 6.4 Spare parts new
00 453 985	1.0 05/02 TD09	1st edition Replaces 390 299	Chapter 3.1.2: Item numbers of spare parts list adapted Chapter 6.1: Maintenance intervals completed Chapter 6.4: Order form completed

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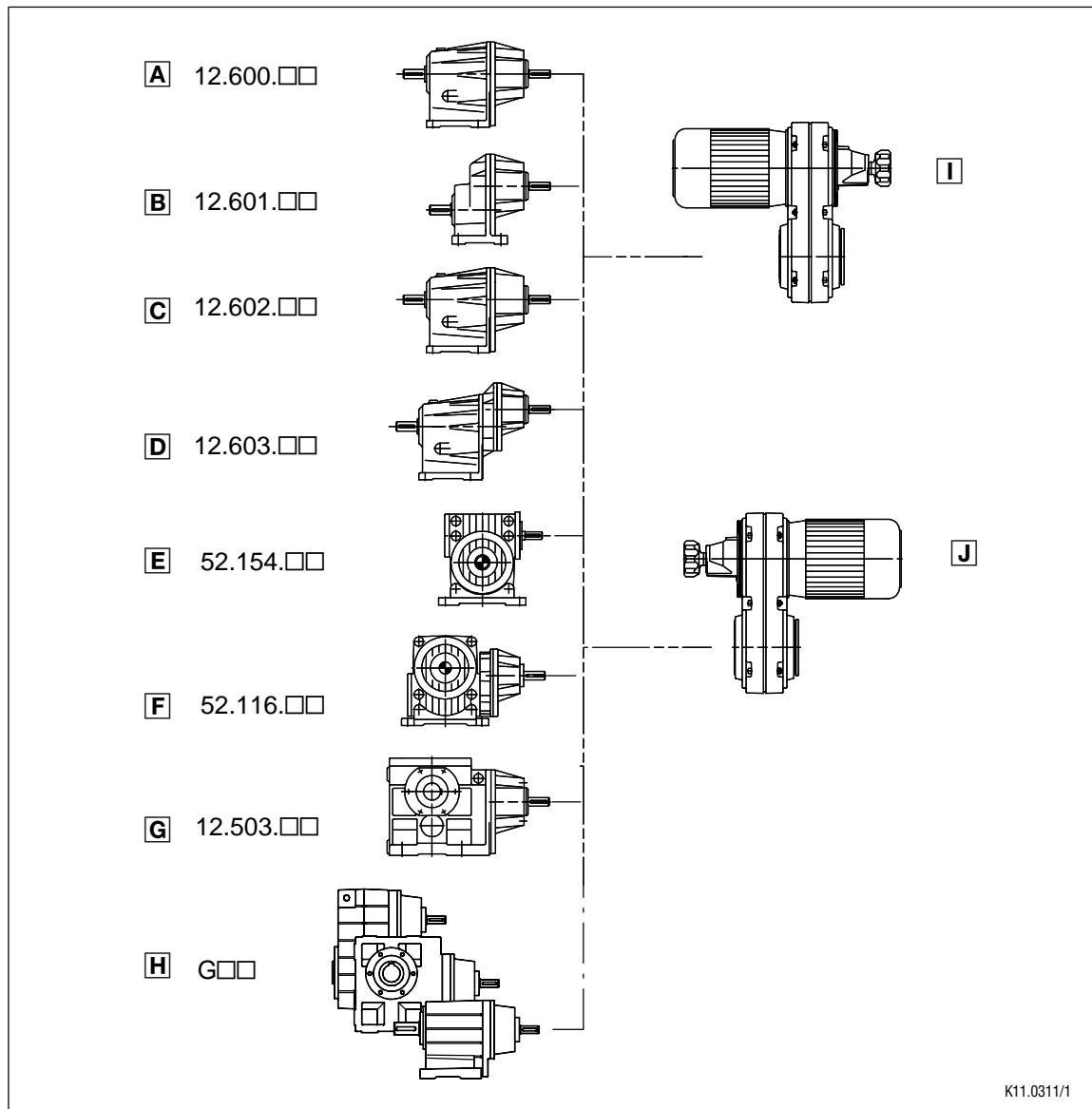
All indications given in these Operating instructions have been selected carefully. We will include necessary corrections in subsequent editions.

BA 11.1031

Author: Lenze Drive Systems GmbH

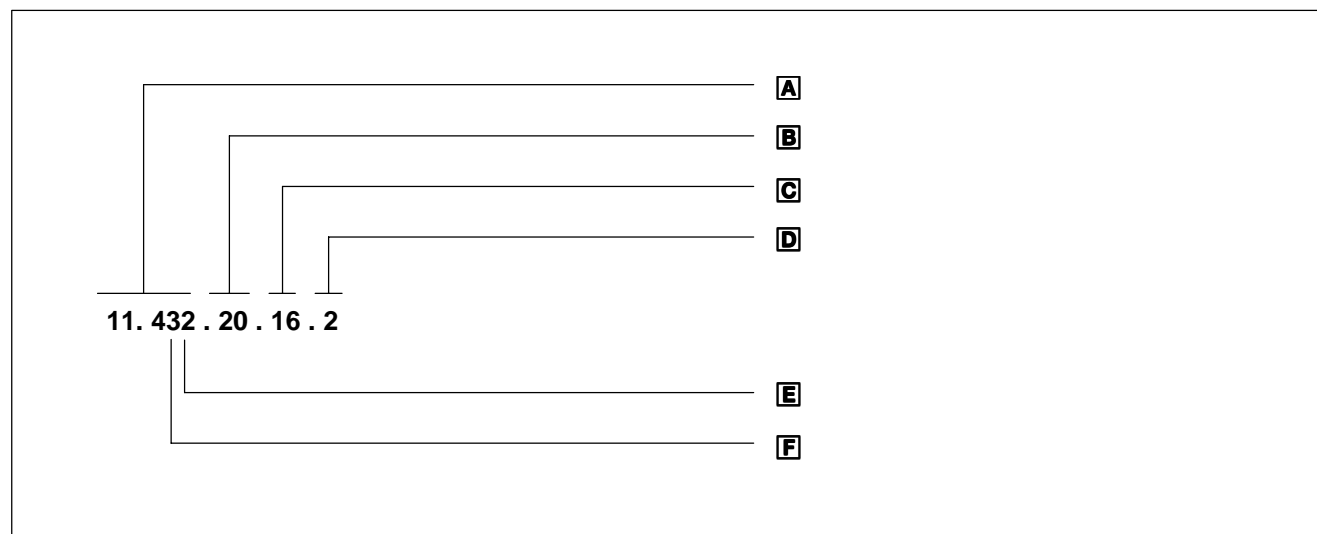
Edition: 1.0 05/02

System overview



- | | |
|---------------------------------------|--|
| A Helical gearbox $i=1$ | F Helical worm gearbox |
| B Single-stage helical gearbox | G Helical bevel gearbox |
| C Two-stage helical gearbox | H Series G□□ gearboxes |
| D Three-stage helical gearbox | I Simplabelt variable speed drive for compact units in U-design |
| E Worm gearbox | J Simplabelt variable speed drive for compact units in Z-design |

Type code

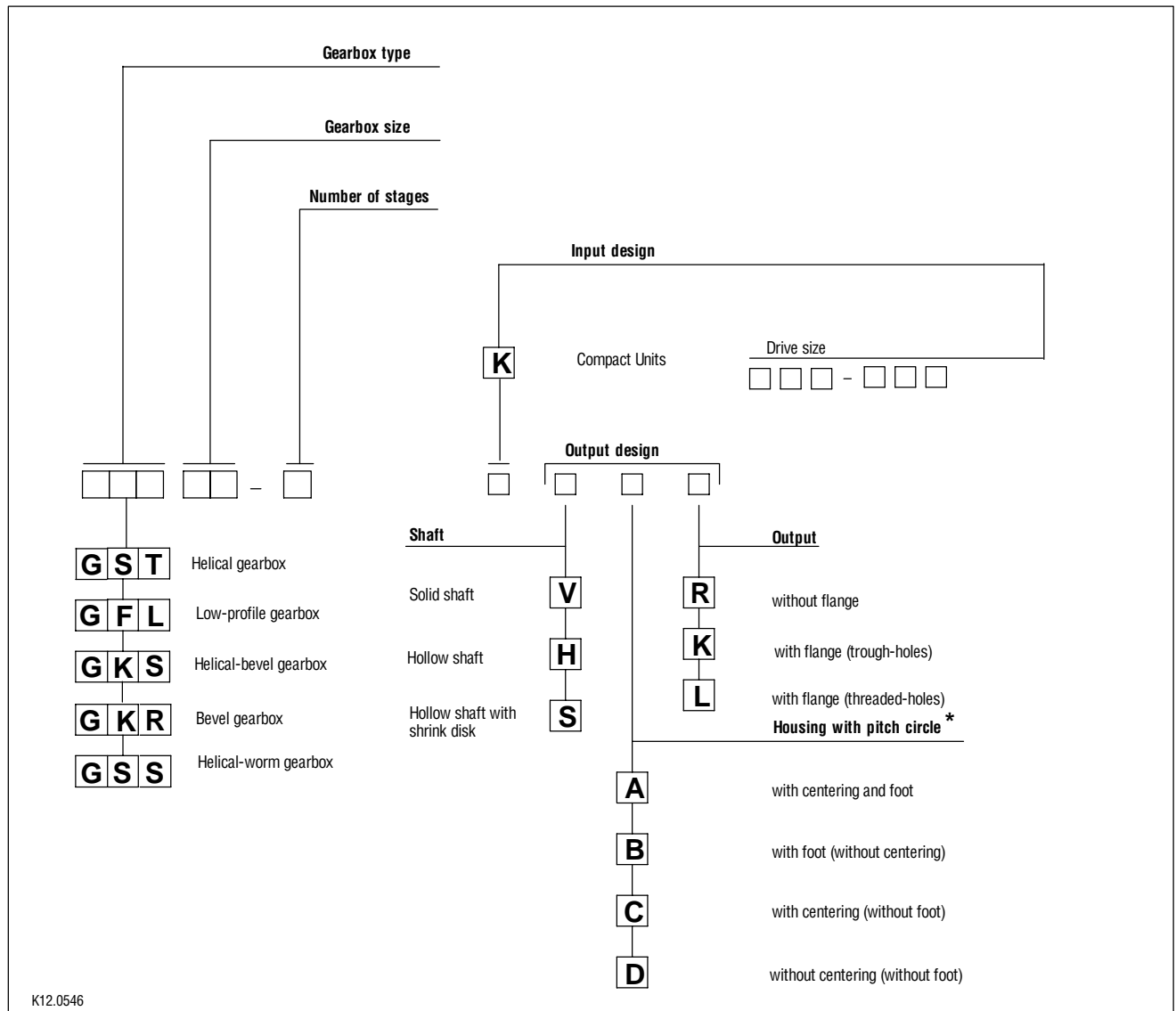


- A** Type 11.432 (example)
Compact unit in U-design with two-stage helical gearbox
- B** Sizes of the compact unit 10, 13, 16, 20, 25, 31, 40
- C** Reduction gearbox sizes
Helical gearboxes 08, 10, 12, 16, 20, 25, 32
Worm gearboxes 04, 05, 06, 08, 10, 12
Helical worm gearboxes 15, 19, 24, 30
- D** Motor code
- E** Reduction gearbox design
0 = Helical gearbox $i=1$
1 = Single-stage helical gearbox
2 = Two-stage helical gearbox
3 = Three-stage helical gearbox
5 = Worm gearbox
6 = Helical worm gearbox
7 = Helical bevel gearbox
- F** Design of the compact unit
3 = U-design
4 = Z-design

Nameplate

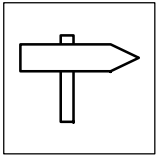
The nameplate for the whole drive is attached to the housing of the modular unit.

Product key



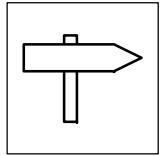
Product key with gearboxes of product family G□□

* according to product family

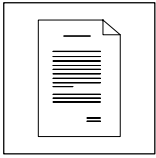


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1 Preface and general information

1.1 How to use these Operating Instructions

- These operating instructions are intended for safety-relevant operations on and with the Simlabeled compact units. They contain safety information which must be observed.
- All personnel working on and with the compact units must have the Operating Instructions available and observe the information and notes which are relevant for them.
- The Operating Instructions must always be complete and perfectly readable.

1.1.1 Terminology used

Compact unit

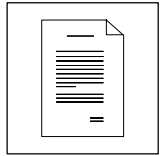
For "Simlabeled compact unit" the term "compact unit" will be used in the following text.

Drive system

For drive systems with Simlabeled compact units and other Lenze drive components the term "drive system" will be used in the following text.

1.2 Contents of delivery

- The drive systems are combined individually according to a modular design. The contents of delivery can be obtained from the pertinent papers.
- After receipt of the supply, check immediately whether the contents of delivery correspond to the accompanying papers. Lenze does not grant any warranty for subsequent claims.
Immediately claim:
 - visible transport damages to the forwarder
 - visible deficiencies/incompleteness to the responsible Lenze branch office or agency.



1.3 Lenze-drive systems

1.3.1 Labelling

- Lenze drive systems are uniquely designated by the content of their nameplates.
- Manufacturer:
Lenze GmbH & Co KG
Postfach 10 13 52
D-31763 Hameln

1.3.2 Application as directed

- Lenze drive systems
 - are intended for use in machinery and systems
 - must only be used for the purposes ordered and confirmed
 - must only be operated under the ambient conditions prescribed in these operating instructions
 - must not be operated beyond their corresponding power limits

Any other use shall be deemed inappropriate!

1.3.3 Legal regulations

Liability

- The information, data, and notes in the Operating Instructions were on the state of the art at the time of printing. Claims about drive systems already supplied cannot be made from the information, illustrations, and descriptions.
- We do not accept any liability for damages and operating interference caused by:
 - inappropriate use
 - unauthorized modifications to the drive system
 - improper working on and with the drive system
 - operating mistakes
 - disregarding the Operating Instructions

Warranty

- Conditions of warranty: see terms of sale and delivery of Lenze Drive Systems GmbH.
- Warranty claims must be made to Lenze immediately after detecting the deficiency or fault.
- The warranty is void where liability claims cannot be also made either.



2 Safety information

2.1 Personnel responsible for safety

Operator

- An operator is any natural or legal person who uses the drive system or on behalf of whom the drive system is used.
- The operator or his safety officer must ensure
 - that all relevant regulations, instructions and legislation are observed.
 - that only qualified personnel works with and on the drive system.
 - that the personnel have the operating instructions available for all corresponding operations.
 - that non-qualified personnel are prohibited from working with and on the drive system.

Skilled personnel

Skilled personnel are persons who are - because of their education, experience, instructions, and knowledge about corresponding standards and regulations, rules for the prevention of accidents, and operating conditions - authorized by the person responsible for the safety of the plant to perform the required actions and who are able to recognize potential hazards (see IEC 364, definition for skilled personnel).

2.2 General safety information

- This safety information is not claimed to be complete. In case of questions and problems please contact your Lenze representative.
- At the time of supply the drive system meets the state of the art and ensures basically safe operation.
- The drive system is a source of danger for persons, for the drive system itself, and for other material assets of the operator, if
 - non-qualified personnel work with and on the drive system.
 - the drive system is used inappropriately.
- The drive systems must be designed such that they perform their functions after proper installation and with application as directed in non-interfered operation and that they do not cause hazards for persons. This also applies for their interaction with the complete plant.
- Make sure by appropriate measures that in case of failure of the drive system no material damage is caused.
- Operate the drive system only when in proper state.
- Retrofittings, modifications, or redesigns of the drive system are basically prohibited. In any case, Lenze must be contacted.
- The compact units must not be adjusted in standstill.



2.3 Layout of the safety information

- All safety information in these operating instructions has a uniform design:



Signalwort!

Hinweistext

- The icon designates the kind of danger.
- The signal word designates the severeness of the danger.
- The notes describe the danger and suggest how to avoid the danger.

Warning of personal injury

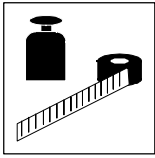
Icons used	Signal words	
 Warning of hazardous electrical voltage Warning of a general danger	Danger	Warns of imminent danger . Consequences if disregarded: Death or most severe injuries
	Warning!	Warns of a potential, very hazardous situation . Consequences if disregarded: Death or most severe injuries
 Warning of a general danger	Caution!	Warns of a potential, hazardous situation . Consequences if disregarded: Light or minor injuries.

Warning of material damage

Icons used	Signal words	
 STOP	Stop!	Warns of potential material damage . Consequences if disregarded: Damage to the drive system/device or its environment.

Other information

Icons used	Signal words	
 i	Note!	Designates a general, useful note. If you observe it, handling of the drive system/device is made easier.



3 Technical data

- The most important data are indicated on the nameplate.
- Further technical data are listed in the product catalogues.

3.1 Product features

3.1.1 Design

Drive systems have a modular design. They consist of:

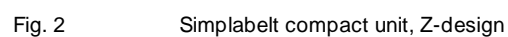
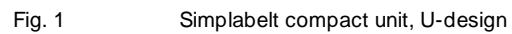
- Simplabelt attachment units
- Reduction gearboxes (helical gearboxes, worm gearboxes, helical worm gearboxes, or helical bevel gearboxes)
- Three - phase AC motors to IEC standard
- Adjustment facilities
- Speed displays

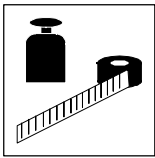
3.1.2 Method of operation

(see Fig. 1 and Fig. 2)

The three-phase AC motor (11BA) drives the mechanically adjustable variable speed pulley (1BA) which drives the spring-loaded variable speed pulley (2BA) via the V-belt (3BA). This pulley is fitted onto the driving shaft of the reduction gearbox (12BA). The variable speed pulleys and the V-belt are covered by the housings (4BA and 5BA).

The speed is adjusted via the adjustment facilities (6BA, 7BA, 8BA), i.e. by turning the handwheel or operating the adjusting motor to move the pulley flange of the mechanically adjustable variable speed pulley (1BA) in the axial direction. The speed is indicated by means of the speed indicator in the handwheel or a DC tachometer or an impulse recorder and a display.





Technical data

3.2 Weights

Compact Units	Weight [kg]		Compact Units	Weight [kg]
11.4□1.10	< 25		11.431.25	< 200
11.4□2.10	< 25		11.432.25	< 500
11.4□3.10	< 40		11.433.25	< 400
11.4□5.10	< 25		11.435.25	< 250
			11.436.25	< 300
			11.437.25	< 400
11.4□1.13	< 60		11.431.31	< 400
11.4□2.13	< 60		11.432.31	< 400
11.4□3.13	< 80		11.433.31	< 500
11.4□5.13	< 60		11.437.31	< 500
11.4□6.13	< 60			
11.4□7.13	< 60			
11.4□1.16	< 100		11.431.40	< 1000
11.4□2.16	< 100		11.432.40	< 1000
11.4□3.16	< 125		11.437.40	< 1000
11.4□5.16	< 100			
11.4□6.16	< 100			
11.4□7.16	< 125			
11.4□1.20	< 100			
11.4□2.20	< 125			
11.4□3.20	< 250			
11.4□5.20	< 150			
11.4□6.20	< 150			
11.4□7.20	< 200			

3.3 Operating conditions

3.3.1 Temperatures

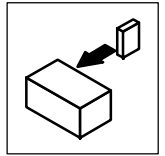
The permissible temperature range is determined by the following:

- The torque to be transmitted (→ dimensioning).
- The lubricant specification of the gearbox considering the oil temperature expected during operation (see nameplate and/or Operating Instructions of the gearbox).
- The thermal class of the motor considering the motor temperature expected during operation (see nameplate and Operating Instructions of the motor).

The operating temperature is determined by the power loss, the ambient temperature and the cooling system!

3.3.2 Ambient conditions

- Gearboxes are protected against dust and spray water.
- Motors according to their enclosure (see nameplate and/or Operating Instructions of the motor).
- Ambient media - especially chemically aggressive - can destroy shaft seals and coatings (plastics). Abrasive media may endanger shaft seals.



4 Installation



Caution!

Transport the drive only with transport equipment or hoists which are suitable for this load. Ensure a safe fixing. Avoid shocks!
The units in Z-design are not stable! Ensure proper support!

4.1 Storage

If you do not install the gearbox immediately, ensure the appropriate storage conditions.

- Up to one year:

Without special measures in dry, dust-free rooms which are protected against sunlight.

- Store gearbox with ventilation so that the breather screw is located at the top.
- Shafts and bright surfaces are delivered with protection against corrosion.

- Remove V-belts when storing the units for more than three months.
- More than a year:
Please contact the factory.

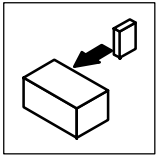
4.2 Installation

4.2.1 Preparation after long storage

Carefully remove the anti-corrosion agents from output shafts and flange surfaces.

4.2.2 General information on the assembly of drive systems

- Take the necessary safety measures prior to any operations:
 - Disconnect the machine from the mains, ensure standstill of the machine and avoid any machine movement.
 - Check the proper state of the drive system. Never install and set-up damaged drive systems.
 - Check the combination of drive function and machine function. Check the direction of rotation.
- The mounting surfaces must be even, without torsion, and free of vibrations.
- Align the drive system on the mounting surfaces exactly with the machine shaft to be driven.
- Ensure that the assembly is without torsion, to avoid additional load.
- Compensate minor misalignment by using suitable flexible couplings.
- Upport the reaction torque appropriately.
- Fixings of accessories and attachments must be secured against loosening.
- We recommend bonding screw connections.



Installation



Stop!

The lubricant filling is adapted to the mounting position. To avoid damages to the gearbox, do not change the mounting position indicated on the nameplate.



Caution!

Compact units in Z-design are not stable. Ensure proper support.

4.3

Electrical connection



Danger!

Electrical connections must only be carried out by skilled personnel!

4.3.1

Connection of the main motor

Connect the motor of your drive system according to the notes in the terminal box and the motor operating instructions. Please observe the technical data on the motor nameplate pos. 2 (Fig. 1 and Fig. 2).

4.3.2

Connection of the remote-control motor



Stop!

The remote-control motor must only be operated when the main motor is running. For testing the functions at standstill, the momentary-contact switches must only be touched briefly.

1. Connect the remote-control motor according to the circuit diagram (Fig. 3).
2. Check the direction of rotation in inching mode:
 - Touch switch S1: the contact pin must move towards the flange.
 - Touch switch S2: the contact pin must move in the opposite direction.
 - If the pin does not move as indicated, reverse the motor polarity.
3. Check the limit switch:
 - Actuate limit switch S3 (n_{2max}) and touch S1.
 - Actuate limit switch S4 (n_{2min}) and touch S2.
 - The contact pin must not move in either cases.

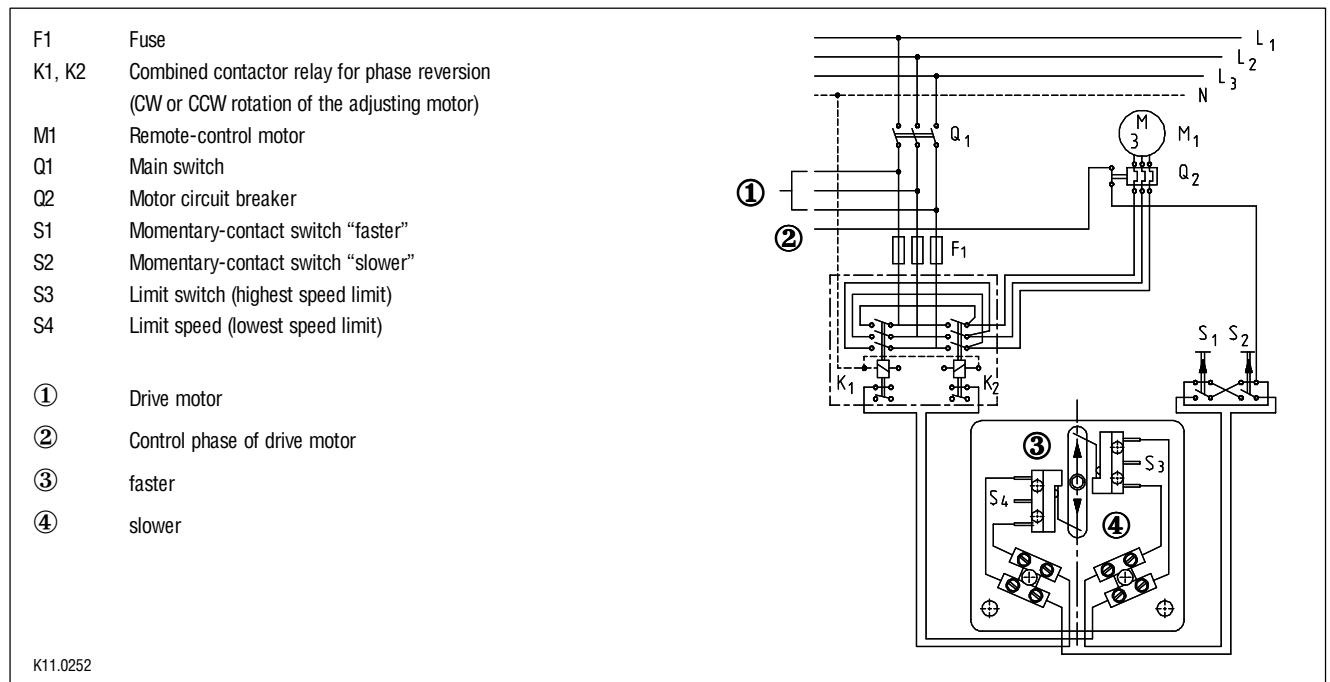
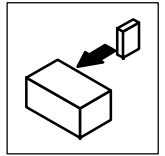


Fig. 3 Connection diagram for the electrical remote control

4.3.3 Connection of the speed measuring unit

You can select the speed measuring units. They all can be retrofitted. The speed measuring units are delivered with connection cables. They are connected according to the user's application or to the requirements of the Lenze display units.

Three-phase AC tacho with rectification

The three-phase AC tacho with rectification generates a voltage which depends on the speed and the input resistance of the evaluating unit. The generated voltage can be evaluated via a superimposed control or Lenze display units.

Suitable Lenze display units:

Analog voltmeter VSC 96 (approx. 5000Ω)

Digital voltmeter Fdi 635-F (> 100 kΩ)

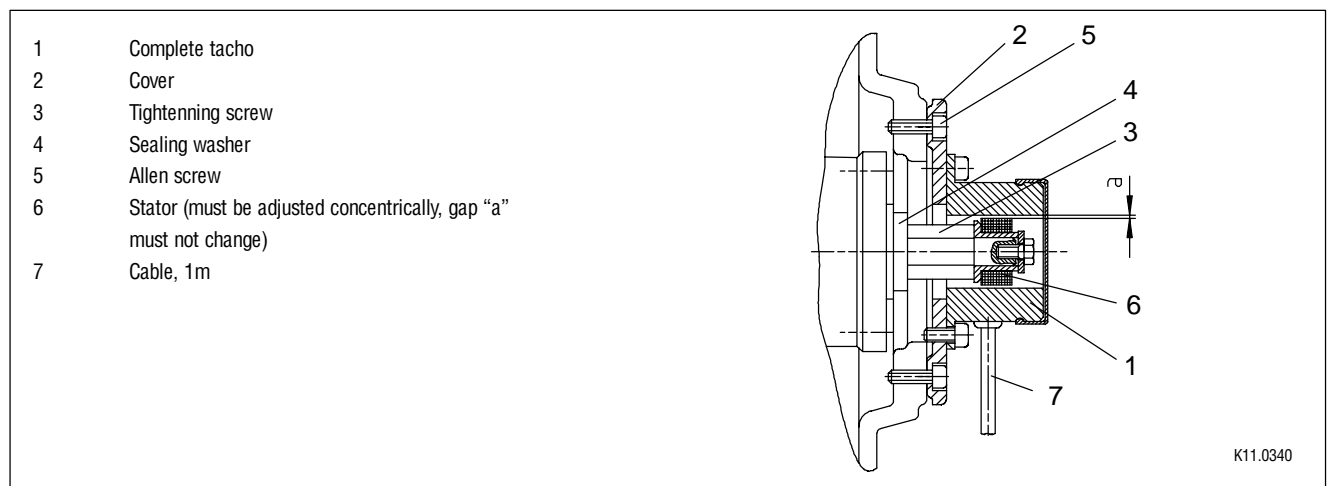
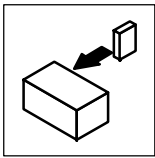


Fig. 4 Three-phase AC tacho with rectification



Installation

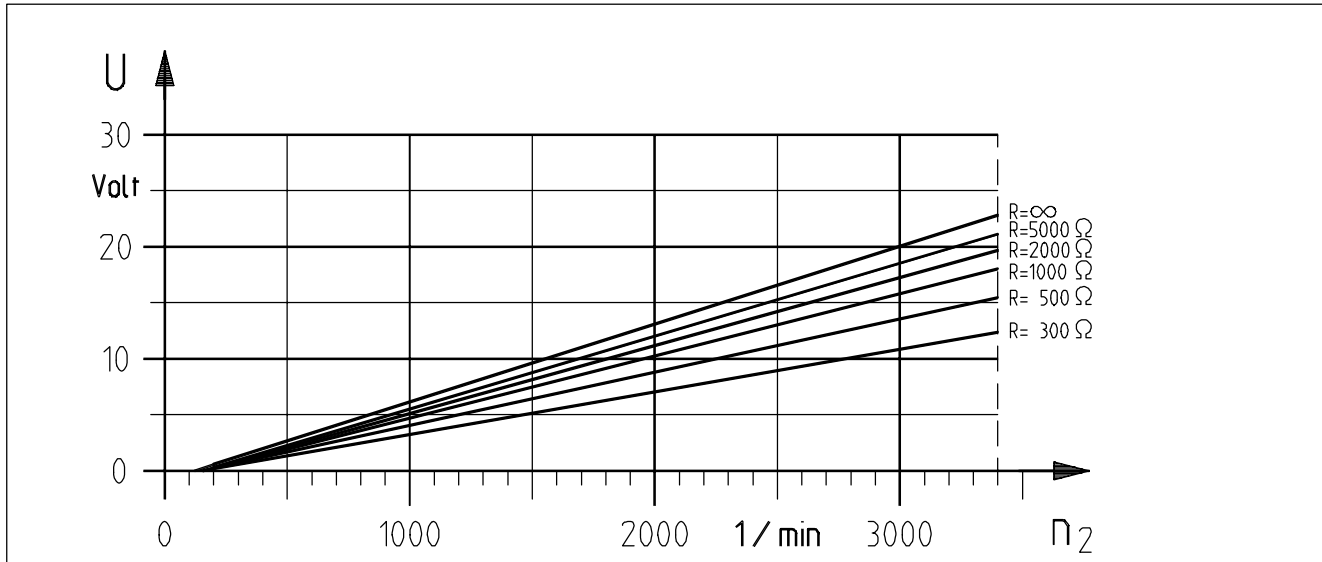


Fig. 5 Output voltage of the three-phase AC tachometer with rectification as a function of the speed and the input resistance of the display unit

Pulse recorder

The contactless speed measuring works with a rotating punched disk and a fixed pulse recorder. In connection with a NAMUR input the pulse recorder generates a digital signal.

Suitable Lenze display units:

Analog voltmeter VSC 96 (approx. 5000 Ω) with digital-to-analog converter

Digital display unit ELTA 2000 A

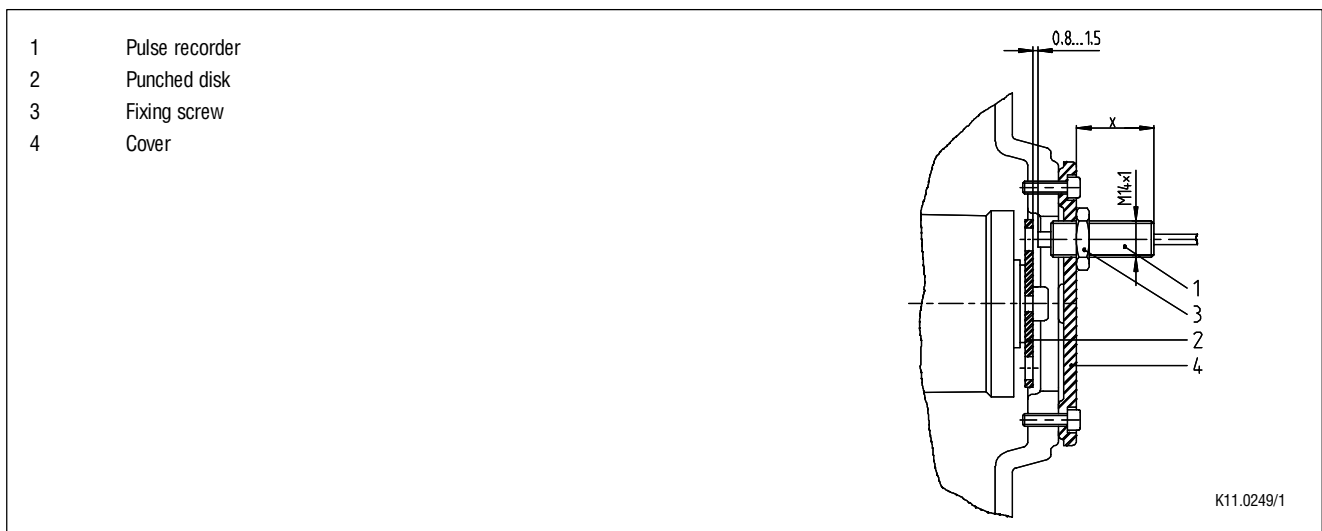
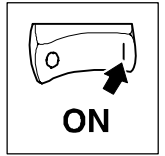


Fig. 6 Pulse recorder

Technical data:

Housing	Stainless steel
Connection cable	2.5 m PVC cable 2 x 0.14mm max. 300 m should be connected
Control circuit	DIN 19234 or NAMUR
Auxiliary power/rated value	8.2 V " 0.5 V / $R_i = 1 \text{ k}\Omega$ " 50 Ω
Signal voltage	> 1,2 V _{ss}



5 Commissioning and operation



Stop!

The drive must only be commissioned by skilled personnel!

5.1 Before you start

Ensure that the drive is not connected to mains and does not rotate unintentionally. Please check:

- Is the mechanical fixing o.k.?
- Are the electrical connections o.k.?
- For gearboxes with ventilation:
Is the plug removed from the breather screw?

5.2 During operation

Check the drive periodically during operation and take special note of unusual noises or temperatures, leakages, loose fastening elements, and the state of the electrical cables. If any interference occurs, proceed according to the troubleshooting list in chapter 7. If it is not possible to eliminate the interference, please contact the Lenze Service.



Stop!

Never adjust the speed at standstill!
Otherwise, the compact unit will be damaged!



Maintenance

6 Maintenance

6.1 Maintenance intervals



Stop!

With drive systems: Please observe the maintenance intervals of the other drive components, too!

- Wide V-belts have a natural wear which depends on several factors:
 - On-time
 - Load type
 - Speeds
 - Ambient temperature

As a guide value Lenze recommends to check the wide V-belt for wear and fissures every 4 to 6 months and replace it, if necessary.

- Variable speed pulleys are maintenance-free.



Note!

While checking the wide V-belt Lenze recommends to inspect visually the variable speed pulleys. Check if the movable disc can be moved and the state of the disc face. Run-in grooves on the disc face caused by wear reduces the belt life.

6.2 Maintenance operations

6.2.1 Replacing the V-belt

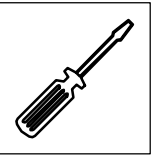


Stop!

Only use original Simplabelt V-belts!

Disassembly with U-design (see Fig. 1):

1. Activate the drive and accelerate it to max. speed, then switch off the drive and disconnect it from mains.
2. Loosen 6 screws (1.16; 1.15) and remove the cover (5BA).
3. Completely open the variable speed pulleys (1BA), pull the V-belt (3BA) over the front edge of the variable speed pulley (1BA) and remove it when turning the variable speed pulley.



Disassembly with Z-design (see Fig. 2):

1. Activate the drive and accelerate it to max. speed, then switch off the drive and disconnect it from the mains.
2. Loosen 6 screws (1.16; 1.15). Then push aside the covers (5BA and 4BA) to remove the V-belt (3BA) from the variable speed pulley (1BA). The three-phase AC motor (5.0) must be supported.

Assembly (U-design and Z-design)



Note!

With sizes 31 and 40, the spring-loaded variable speed pulley can be opened by screwing a screw into the flange (Fig. 7).

Remove the screw after assembly!

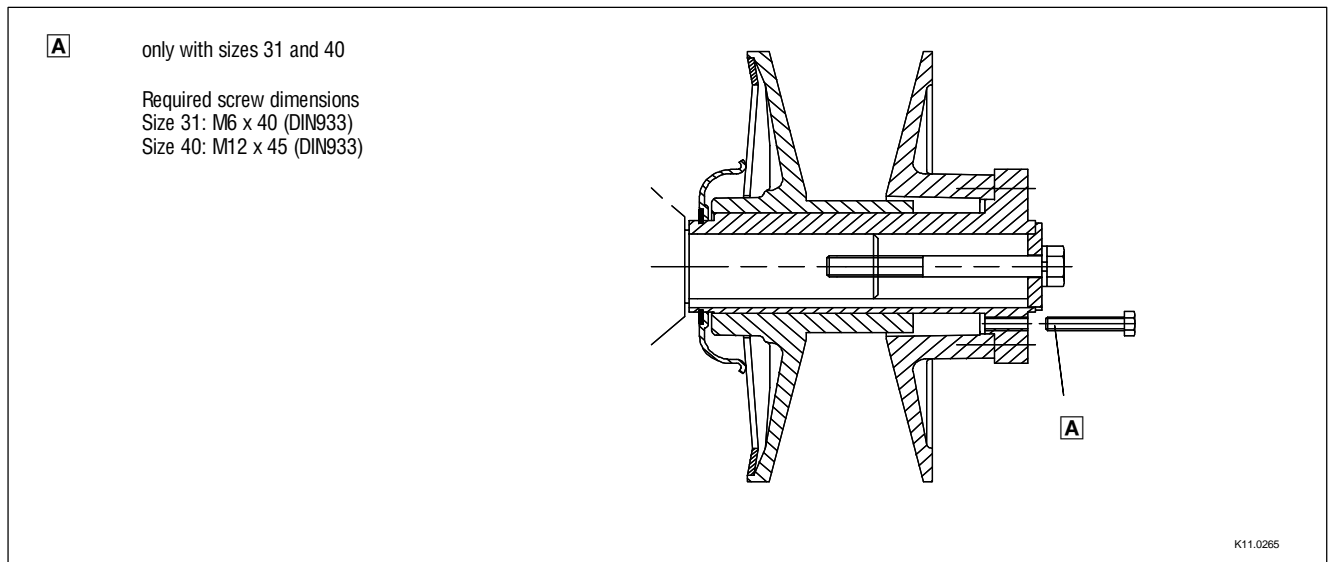


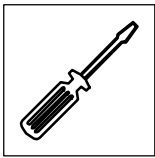
Fig. 7

Variable speed pulley

1. First place the new V-belt onto the mechanically adjustable variable speed pulley (1BA) and then draw it over the spring-loaded variable speed pulley (2BA) (see Fig. 1 and Fig. 2).
2. Refix housing (6 screws).
3. Start test running and check the speed limiting and the adjustment of the speed indicators by means of a hand tachometer. A readjustment may be necessary (see chap. 6.2.2).

6.2.2 Adjustment of output speed

The limit for the output speeds n_{2min} and n_{2max} are factory-set. A readjustment according to the indication on the nameplate (pos. 1) may be necessary in the event of increased wear or after the change of the V-belt (Fig. 1 and Fig. 2).



Maintenance

6.2.3 Replacing the lubricant at gearboxes

See Gearbox Operating Instructions.



Stop!

Never adjust the speed at standstill!
Otherwise, the compact unit will be damaged!

It must be observed that the V-belt

- does not run on the hub base (clearly audible running noises).
- does not run over the edge of the variable speed pulley.

Non-observance may lead to damage of the drive (bearing damage, belt damage).

Procedure of electric remote adjustment (Fig. 3)

1. Switch on the drive motor.
2. First adjust the upper speed limit (n_{2max}).
 - Check speed with hand tacho, increase speed to max with switch S1.
 - Move limit switch S3 towards the contact pin until it switches audibly.
 - Tighten the fixing screws of the limit switch.
3. Afterwards adjust the lower speed limit in the same way (momentary-contact switch S2 and limit switch S4).

Procedure of front and angle adjustment (Fig. 8 and Fig. 9)

1. Switch on the drive motor.
2. Remove the bottom cover (4) of the adjustment unit.
3. Increase speed to its maximum indicated on the nameplate (pos. 1) (Fig. 1 and Fig. 2) by means of the handwheel and the hand tacho.
4. Bolt (6) must be screwed in as an end limit.
5. Adjust the minimum speed in the same way and use bolt (5) as a limitation.
6. Remount the cover (4).

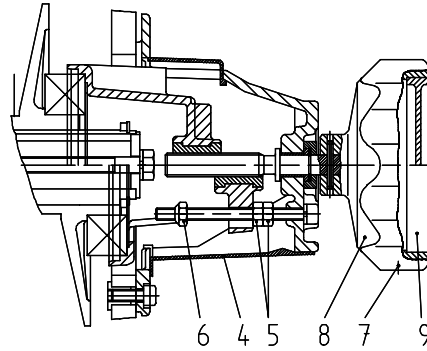
Afterwards check with the hand tacho whether the display values of the position indicator at the handwheel correspond to the actual speed value. If not:

Adjust position indicator

7. Loosen setscrew (7) and remove the position indicator (9).
8. Turn the position indicator (9) until the display value corresponds to the actual value, ensure that the scale is in position.
9. Refit the position indicator (9) in the handwheel (8) and secure it with the setscrew (7).



- 4 Cover
- 5 Fixing screw
- 6 Bolt
- 7 Setscrew
- 8 Handwheel
- 9 Position indicator

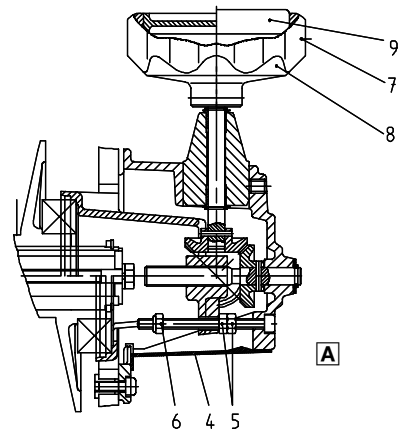


K 11.0263

Fig. 8 Front adjustment

- 4 Cover
- 5 Fixing screw
- 6 Bolt
- 7 Setscrew
- 8 Handwheel
- 9 Position indicator

A drawing turned by 90°



K 11.0263/2

Fig. 9 Angle adjustment

6.3 Repair

Lenze recommends that repairs are carried out by Lenze Service.



6.4 Spare-parts list

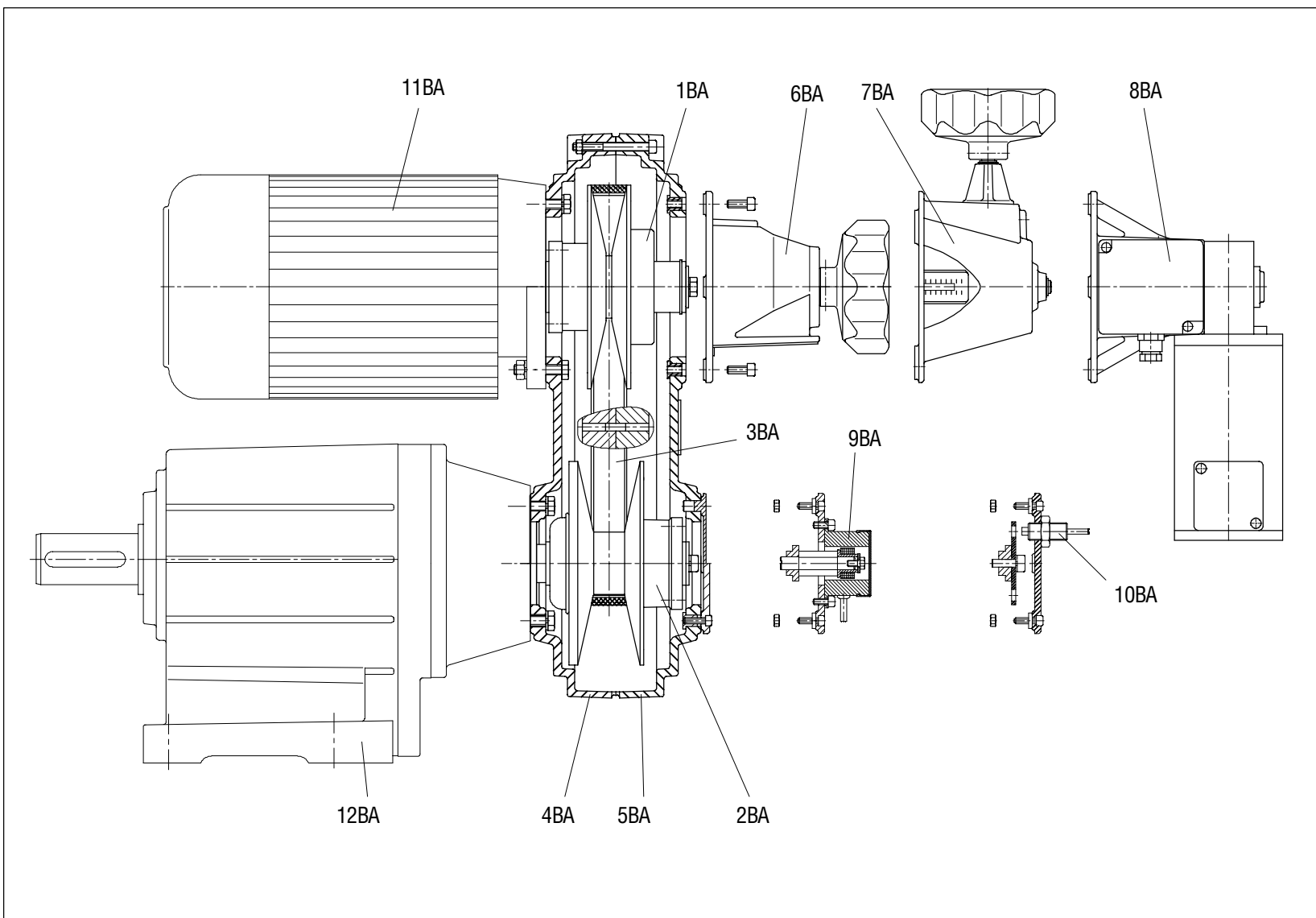


Fig. 10 Compact unit module

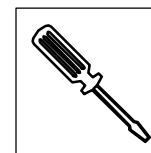
6.5 Order form

all G <input type="checkbox"/> <input type="checkbox"/>		Recipient: Lenze
		Postal code/City: _____
		Fax-no.: _____
Sender		
Company _____	Customer no. _____	
Street / P.O. Box _____	Order no. _____	
Postal code/City _____	Issued by _____	
Delivery address _____	Phone _____	
	Fax _____	
Invoice recipient* _____	Date of delivery _____	
Date _____	Signature _____	
* Please indicate if other than sender		

LENZE type number: _____

Order number: _____

Item	Name	Pieces
1BA	Variable speed pulley (mech. adjustable)	
2BA	Variable speed pulley (spring-loaded)	
3BA	V-belt	
4BA	Housing (gearbox side)	
5BA	Housing	
6BA	Front control	
7BA	Angular control	
8BA	Electric front control	
9BA	Three-phase tacho	
10BA	Impulse generator	
11BA	Three-phase motor (see Operating Instructions Motor)	
12BA	Gearbox (see Operating Instructions Gearbox)	





Troubleshooting and fault elimination

7 Troubleshooting and fault elimination

If any disturbance should occur during operation of the drive system, please check the possible causes using the following table. If the fault cannot be eliminated by means of one of the listed measures, please contact Lenze Service.

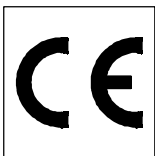
Fault	Possible cause	Remedy
Drive does not start	No or faulty connection of main motor	Check motor connection
Clearly audible running noise	V-belt runs on hub base, wrong adjustment of speed limit	Correct adjustment of speed limit
Speeds indicated on the nameplate cannot be reached	Wrong adjustment of speed limit	Correct adjustment of speed limit
	Wrong V-belt	Use V-belt which corresponds to compact unit
Position indicated on handwheel does not correspond to output speed	Wrong assembly of position indicator	Assemble position indicator at adjustment of max. output speed
Motor of electric remotecontrol does not rotate	Adjustment spindle is stalling	To do this, remove the plastic plug at the rear side of the adjustment motor. Loosen via the central thread of the motor shaft.



8 Waste disposal

Help to protect the environment! Packing material can be recycled.

Material?		Where to dispose?
Transport material	Pallets	Return to the manufacturer or forwarder
	Packing material	Cardboard boxes to waste paper Plastic to plastic recycling or waste material Reuse or dispose of wood shaving
Lubricants	Oil, grease	Dispose according to the valid regulations
Components	Housing: grey cast iron Bearings, shafts, gear wheels: steel Seals/V-belts: special waste disposal	Separate valuable substances and dispose



Manufacturer's Certification

Lenze

Manufacturer's Certification

We herewith certify that the below listed products are intended for assembly into a machine or for assembly with other elements to form a machine. Commissioning of the machine is prohibited before it is proven that it corresponds to the EC regulation 98/37/EC.

Gearboxes

Lenze GmbH & Co KG
Postfach 10 13 52
D-31763 Hameln

Site: Bösingfeld
Breslauer Straße 3
D-32699 Extertal
Telephone (05154) 82-0
Telefax (05154) 82-15 75

Product:

Low-profile gearboxes and geared motors
Helical gearboxes and geared motors
Helical bevel gearboxes and geared motors
Bevel gearboxes and geared motors
Helical worm gearboxes and geared motors
Variable speed belt drives and geared motors
Variable speed drives with/without gearbox
Shaft-mounted gearboxes
Worm gearboxes and geared motors

Type :

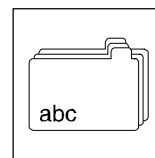
GFL
GST, 12.6□□
GKS, 12.5□□
GKR
GSS, 52.1□□
G□□-K
11.1□□, 11.2□□, 11.4□□
G□□-D
11.7□□
12.4□□
52.3□□, 52.4□□, 52.5□□

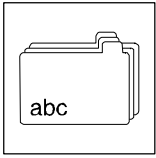
Applied standards and regulations:

EN 292 part 1
EN 292 part 2

Hameln, October 18, 2001

(i.V. Dr. Kiel)
Head of R&D dept. gearboxes





Notes