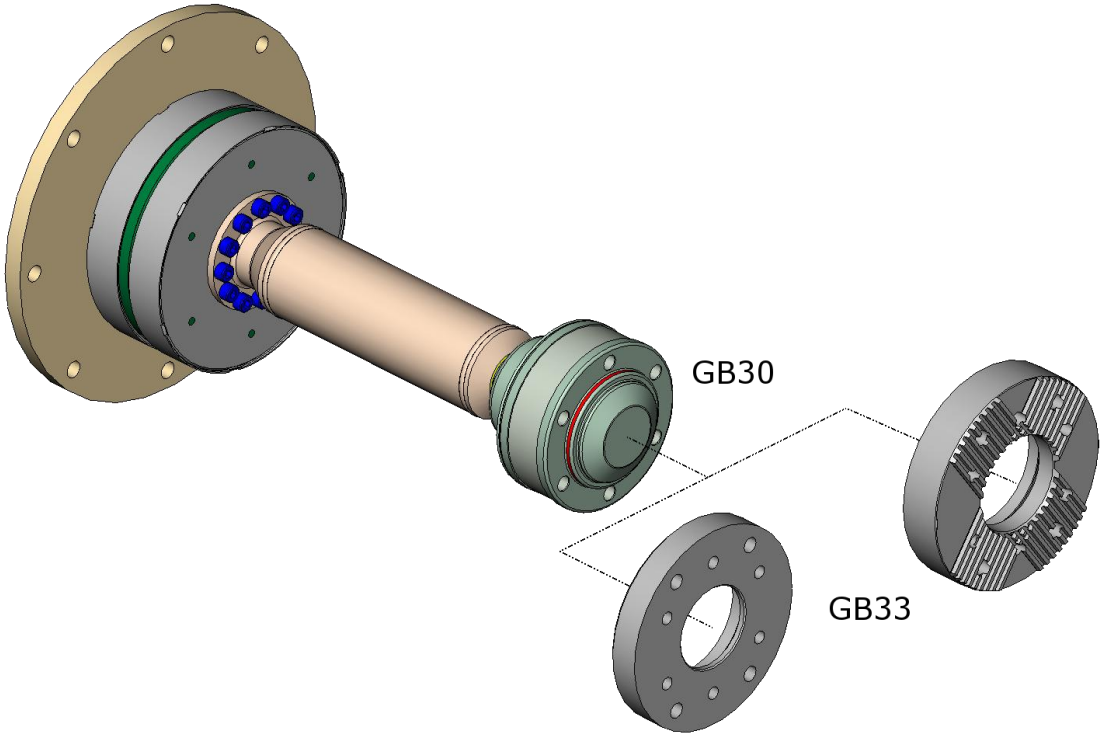
CENTA POWER TRANSMISSION
LEADING BY INNOVATION



CENTAX-TEST

Assembly and operating instructions
053C-00011…00017-GB3.
M053-00001-EN
Rev. 1

Contents

1 General remarks 5

2 Safety 6

2.1 Safety remarks 6
2.1.1 Signal words 6
2.1.2 Pictograms 7
2.2 Qualification of deployed personnel 7
2.3 Intended application 7
2.4 Application not in compliance with the intended use 9

3 Delivery, transport, storage and disposal 10

3.1 Delivery 10
3.2 Transport 10
3.3 Storage 10
3.3.1 Storage location 11
3.3.2 Storage of couplings / flexible elements 11
3.4 Disposal 11

4 Technical description 12

4.1 Characteristics 12
4.2 Specifications 12

5 Alignment of the units being connected 13

5.1 Axial alignment 14
5.2 Radial alignment 15
5.3 Angular alignment 16

6 Mounting 17

6.1 General assembly instructions 17
6.2 Mounting overview 19
6.3 Mounting the adapter (if existing) 20
6.3.1 Mounting the adapter with cross-serration 20
6.3.2 Mounting the adapter 21
6.4 Aligning the units 21
6.5 Mounting the pre-mounted coupling 22
6.6 After completed mounting 23

7 Operation 24

7.1 Operating faults, root causes and remedy 24
7.2 Admissible overall misalignment of the coupling 24

8 Care and maintenance 25

8.1 Work to be performed 25
8.1.1 Cleaning the coupling 25

8.1.2 Visual inspection of the coupling 25
8.1.3 Inspection of the screw connections 25
8.2 Replacing defective parts 25

9 Dismantling 26

9.1 General dismantling instructions 26
9.2 Dismantling the pre-mounted coupling 27
9.3 Dismantling the adapter (if necessary) 27
9.4 Reassembling the coupling 27

10 Wearing and spare parts 28

11 Annex 29

11.1 CENTA data sheet D013-013 (lubricated screw connections) 29
11.2 CENTA data sheet D053-900 Declaration of incorporation according to the EC Machinery Directive 2006/42/EC, Appendix II B 30

Index of illustrations

Fig. 5-1 Axial misalignment 14
Fig. 5-2 Radial misalignment 15
Formula 5-3 Radial alignment tolerance $\Delta K_{R\,max}$ 15
Fig. 5-4 Angular misalignment 16
Fig. 6-1 Example: 053C-00011...00017-GB3. 19
Fig. 6-2 Mounting the adapter with cross-serration 20
Fig. 6-3 Mounting the adapter 21
Fig. 6-4 Mounting the pre-mounted coupling 22

Index of tables

Table 2-1 Shape and size of ventilation holes 8
Table 7-1 Troubleshooting table 24

Index of formulas

1 General remarks

These assembly and operating instructions form a constituent part of the coupling delivery and must be kept in an easily accessible place at all times.

CENTA products are developed and produced to quality standard DIN EN ISO 9001:2000.

In the interests of further development, CENTA reserves the right to make technical changes.

IMPORTANT

CENTA is unable to accept liability for damage and operating faults caused by failure to observe the operating instructions.

In case of technical questions, please enquire with our head office:

CENTA Antriebe
Kirschey GmbH
Bergische Strasse 7
42781 Haan
GERMANY
Phone +49-2129-912-0
Fax +49-2129-2790
centa@centa.de
www.centa.info

2 Safety

The purpose of these operating instructions is to enable users to:

- use the coupling safely and correctly
- maximize efficiency
- ensure that care and maintenance are carried out correctly

For this reason, these operating instructions must be thoroughly read and understood prior to work on and with the coupling.

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Failure to adhere to the safety and accident prevention regulations valid at the relevant installation site The safety and accident prevention regulations valid at the installation site in question must be adhered to when performing any of the tasks described in these operating instructions.

2.1 Safety remarks

In these operating instructions, safety remarks are indicated by a pictogram and a signal word.

2.1.1 Signal words

The following signal words are used in the safety remarks:

DANGER	Denotes the immediate threat of danger. If not prevented, fatal or extremely serious injuries can result.
WARNING	Denotes a potentially dangerous situation. If not prevented, fatal or extremely serious injuries can result.
CAUTION	Denotes a potentially dangerous situation. If not prevented, minor injuries and/damage to property may result.
IMPORTANT	Denotes application tips and particularly useful information. This is not a signal word denoting a dangerous or damaging situation.

2.1.2 Pictograms

Possible pictograms in the safety precautions:

Warning of a hazardous area

Do not switch

Use protective gloves

Use protective goggles

2.2 Qualification of deployed personnel

All the work described in these operating instructions may only be performed by authorized persons with adequate training and instruction.

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Work at the coupling which is not described in these instructions Only carry out work which is described in these operating instructions.

2.3 Intended application

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Application not in compliance with the intended use The couplings are intended exclusively for use in accordance with the relevant design. They may only be used under the specified conditions.

WARNING	
	**Injuries can occur as a result of:** ▪ Contact with rotating parts Shield the coupling in accordance with the applicable accident prevention regulations with an enclosure. **Exception:** The coupling is encased by the driving and driven units.

The scope of delivery provided by CENTA does not include a protective enclosure.

This enclosure must fulfil the following criteria:

- Provide protection against persons gaining access to rotating parts
- Restrain any rotating parts which may be work loose
- Guarantee sufficient ventilation for the coupling

This enclosure must be made of stable steel components. In order to ensure adequate ventilation for the coupling, the enclosure must be fitted with regular openings. For safety reasons, these openings must not exceed the dimensions outlined in table 2-1.

Component	Circular openings [mm]	Rectangular openings [mm]
Top of the enclosure	Ø 8	□ 8
Side elements of the enclosure	Ø 8	□ 8

Table 2-1 Shape and size of ventilation holes

The enclosures must be positioned a minimum of 15 mm distant from rotating parts. The enclosure must be electrically conductive and be included in the equipotential bonding.

Before commencing long-term operation, the plant must successfully complete a test run.

2.4 Application not in compliance with the intended use

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Inadmissibly high torque ▪ Inadmissibly high or low speeds ▪ Exceeding the specified ambient temperature ▪ Inadmissible ambient medium ▪ Inadmissible coupling enclosure ▪ Exceeding the admissible overall misalignment values Only use the coupling for the specified application.

CENTA bears no liability for damage resulting from application not in compliance with the intended use of the equipment.
Should there be a change of plant parameters, the coupling design must be reviewed by CENTA (address see chapter 1).

3 Delivery, transport, storage and disposal

3.1 Delivery

After delivery, the coupling:

- must be checked for completeness and correctness of the delivery.
- must be examined for possible transport damage (which must be reported immediately to the carrier).

3.2 Transport

CAUTION	
	**Injury and material damage can occur as a result of:** ▪ Incorrect transportation of couplings Ensure that the coupling is correctly transported.

CAUTION	
	**Material damage to coupling components can occur as a result of:** ▪ Contact with sharp-edged objects Protect coupling components for transportation. Only hoist coupling components with nylon belts or ropes. Always cushion parts when supporting them from below.

Following transportation damage:

- Check the coupling carefully for damage.
- Consult the manufacturer (Address see chapter 1).

3.3 Storage

CAUTION	
	**Material damage to elastic elements and rubber parts can occur as a result of:** ▪ Incorrect storage These parts must be stored laid flat and so they cannot distort, and protected from ozone, heat, light, moisture and solvents.

IMPORTANT
Rubber parts are marked where possible with their production date. From this date, they may only be stored for a maximum of 5 years.

3.3.1 Storage location

Requirements imposed on the storage location:

- Moderately ventilated and low in dust
- Dry (max. 65% humidity)
- Temperature stabilized (-10°C to +25°C)
- Free of ozone-producing devices such as light sources and electric motors
- Free of UV light sources and direct sunlight
- Do not store solvents and disinfectants, fuels or lubricants, acids, chemicals etc. in the same location

For more details, refer to DIN 7716.

3.3.2 Storage of couplings / flexible elements

- ➢ Unpack the parts.
- ➢ Check the packaging for damage. Replace if necessary.
- ➢ Check that the wax protection on steel components is intact. If necessary, patch or renew.
- ➢ Package the parts (for prolonged periods of storage, enclose desiccant and weld into film).
- ➢ Place the parts into storage.

3.4 Disposal

RECYCLING	
	Ensure safe, environmentally responsible disposal of operating supplies and exchange parts. For this, locally provided recycling facilities and regulations must be utilized.

For disposal, the coupling parts must be separated where possible and sorted according to material type.

4 Technical description

4.1 Characteristics

CENTAX-TEST couplings:

- are highly flexible test bed couplings for high speeds, for optimum test conditions
- based on a highly flexible rubber element, combinable with homokinetic joints, carden shafts, slip joints, etc., as demanded by test requirements
- are extremely adaptable designed with torsionally flexibility
- dampen torsional vibrations and shocks
- compensate axial, tagential and angular misalignments
- are suitable for high speed ranges and long-term tests
- are available in any length and mounting dimensions to be adaptable to the respective test situation
- are easy to mount because slip joints and elements can be shifted in axial direction
- are optionally available as customised solutions for automatic docking onto combustion engines

4.2 Specifications

The specifications can be found in the catalogue and the dimensions in the installation drawing.

5 Alignment of the units being connected

IMPORTANT

- Align the units during the assembly.
- Align the units that are to be connected as accurately as possible. In this way, a long service life for the coupling and maximum operating misalignment values can be achieved.
  The overall misalignment is composed of the misalignment and the operating misalignment. The permissible overall misalignment values can be found in chapter 7.2 and must not be exceeded.
- All permissible alignment tolerances apply to arrangements at operating temperatures.
  If the arrangement would be aligned at a different temperature, there would be additional deviations in the arrangement, which were produced by the difference between the aligning and operating temperature.
  For alignment, this has to be taken into account.
- After completion of assembly, check the alignment of the coupling again and correct, if necessary.

5.1 Axial alignment

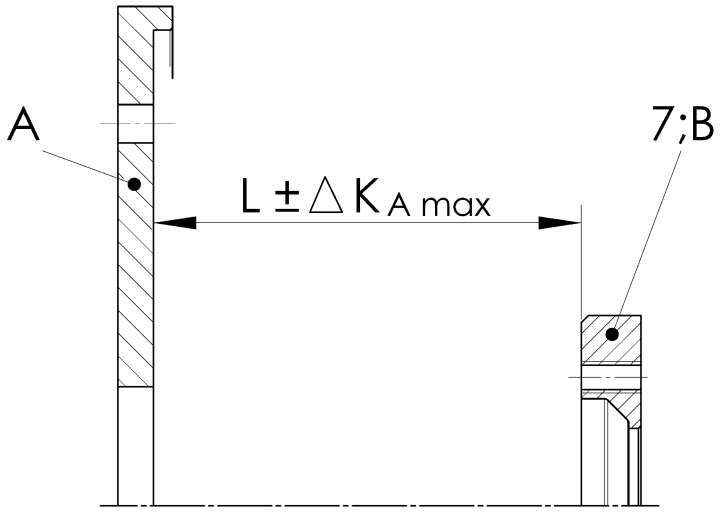


Fig. 5-1 Axial misalignment

Item	Info	Designation	Remark
7		Adapter	See installation drawing
A		Flywheel	Costumer part
B		Flange	Costumer part

Determine the axial misalignment (see Fig. 5-1).

- Take installation length **L** from the installation drawing.
- Align the units (installation dimension = **$L \pm \Delta K_{A\ max}$**).

Permissible axial alignment tolerance:
$\Delta K_{A\ max}$=1.0 **mm**

5.2 Radial alignment

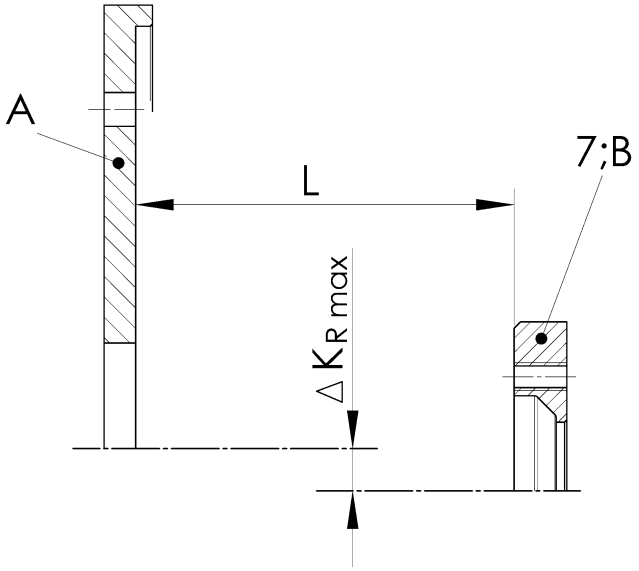


Fig. 5-2 Radial misalignment

Item	Info	Designation	Remark
7		Adapter	See installation drawing
A		Flywheel	Costumer part
B		Flange	Costumer part

CAUTION

Material damage to elastically installed engines can occur as a result of:

- Disregard to which extent the engine mounts may settle during alignment

During vertical alignment, take into account the extent by which the engine mounts settle. Please enquire about specifications for the degree of settling from the engine manufacturer or engine mounts manufacturer.

Determine the radial misalignment (see Fig. 5-2).

- Take installation length **L** from the installation drawing.
- The permissible radial alignment tolerance **$\Delta K_{R\ max}$** should be calculated according to formula below:

$$\Delta K_{R\,max} = (L \cdot 0{,}00087) - 0{,}1$$

Formula 5-1 Radial alignment tolerance $\Delta K_{R\ max}$

- Align the units (calculated deviation **$\leq \Delta K_{R\ max}$**).

5.3 Angular alignment

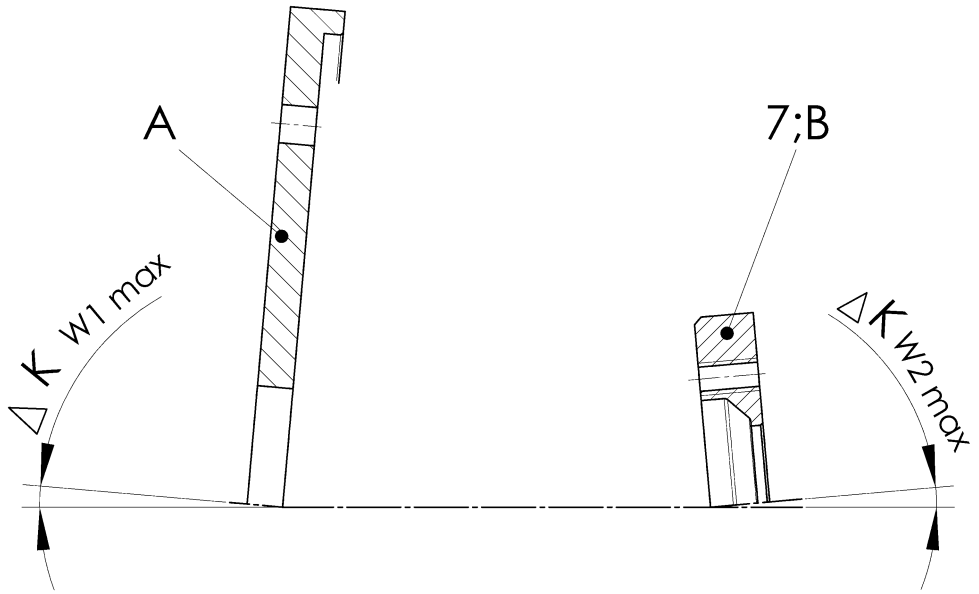


Fig. 5-3 Angular misalignment

Item	Info	Designation	Remark
7		Adapter	See installation drawing
A		Flywheel	Costumer part
B		Flange	Costumer part

Determine the angular misalignment (see Fig. 5-3).

- Align the units (calculated deviations **≤ΔK$_{W1\ max}$** and **≤ΔK$_{W2\ max}$**) . The angular deflection has to be checked at each flange separately.

Permissible angular alignment tolerance:
(A) **ΔK$_{W1\ max}$=**0.05°
(7/B)**ΔK$_{W2\ max}$=**0.2°

6 Mounting

6.1 General assembly instructions

Any work method which impairs the safety of the coupling is prohibited.
The user undertakes to notify the manufacturer immediately of any changes occurring at the coupling which could impair safety (address see chapter 1).

WARNING	
	**Injuries can occur as a result of:** ▪ Contact with rotating parts Before starting work at the coupling, switch off the plant and secure against unintentional start-up.

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Assembly of the coupling in the wrong sequence Only ever assemble the coupling in the described sequence.

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Falling coupling components Secure coupling components against falling to the floor.

CAUTION	
	**Material damage to coupling components can occur as a result of:** ▪ Contact with sharp-edged objects Protect coupling components for transportation. Only hoist coupling components with nylon belts or ropes. Always cushion parts when supporting them from below.

CAUTION	
	**Material damage can occur as a result of:** ▪ Soiled joint surfaces The surfaces that are to be joined must be free of dirt, preservatives and lubricants.

CAUTION

Material damage to coupling components can occur as a result of:

- Anaerobic adhesives (e.g. Loctite) used for screw locking

This type of screw locking medium may not be in contact with rubber parts.

IMPORTANT

- Screw preparation and tightening torque levels in accordance with CENTA data sheet D013-013 (see chapter 11.1).
- Use suitable lifting devices for assembly.
- The following assembly stages are described for coupling 053C-00015-GB3..
- Part illustration and marking may different slightly from installation drawing and delivery state.

6.2 Mounting overview

The following figures show examples of possible design.

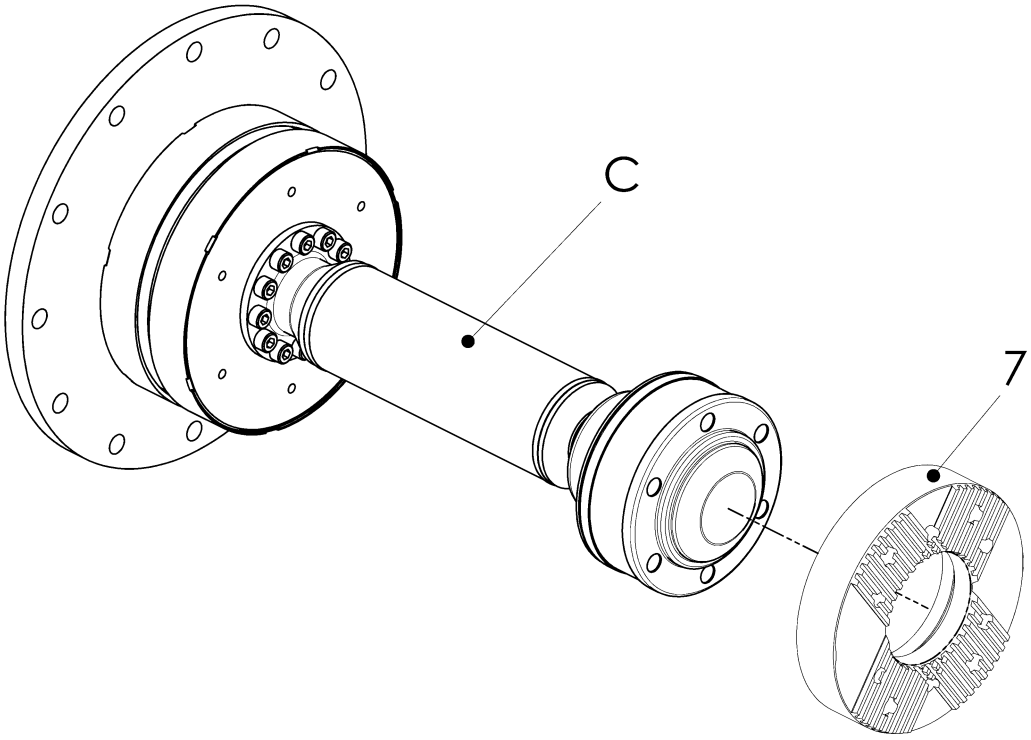


Fig. 6-1 Example: 053C-00011...00017-GB3.

Item	Info	Designation	Remark
7		Adapter	If scope of supply
C		Pre-mounted coupling	

IMPORTANT

This assembly instruction describes the mounting of several design.
Mount the coupling as appropriate for the supplied design (see installation drawing).

- Mount the coupling as appropriate for the supplied design, according to the sequence described below. For supplied design and the parts built-in, see installation drawing.
  - Mounting the adapter (7), see chapter 6.3 .
  - Aligning the units, see chapter 5 .
  - Mounting the pre-mounted coupling (C), see chapter 6.4 .
  - After completed mounting, see chapter 6.5 .

6.3 Mounting the adapter (if existing)

- Mount the adapter (7) as appropriate for the supplied design (see installation drawing):
  - Mounting the adapter with cross-serration, see chapter 6.3.1 .
  - Mounting the adapter, see chapter 6.3.2 .

6.3.1 Mounting the adapter with cross-serration

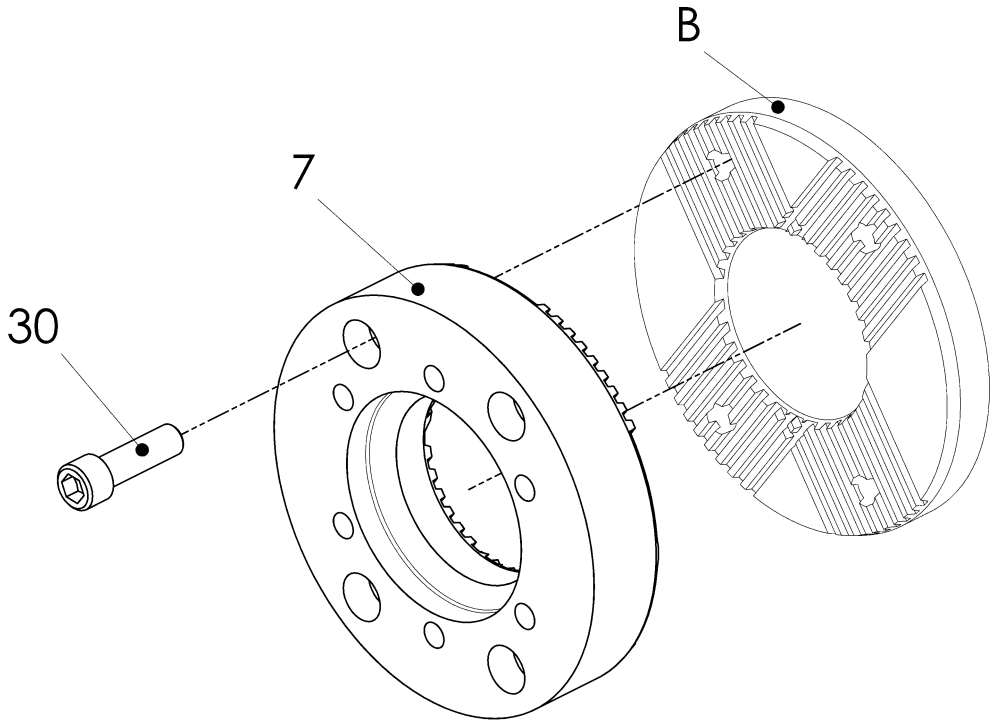


Fig. 6-2 Mounting the adapter with cross-serration

Item	Info	Designation	Remark
7		Adapter	
30		Screw	If ordered
B		Flange	Customer part

- Push the adapter (7) into the toothing of the flange (B).
- Screw the adapter (7) to the flange (B) using the screws (30).

6.3.2 Mounting the adapter

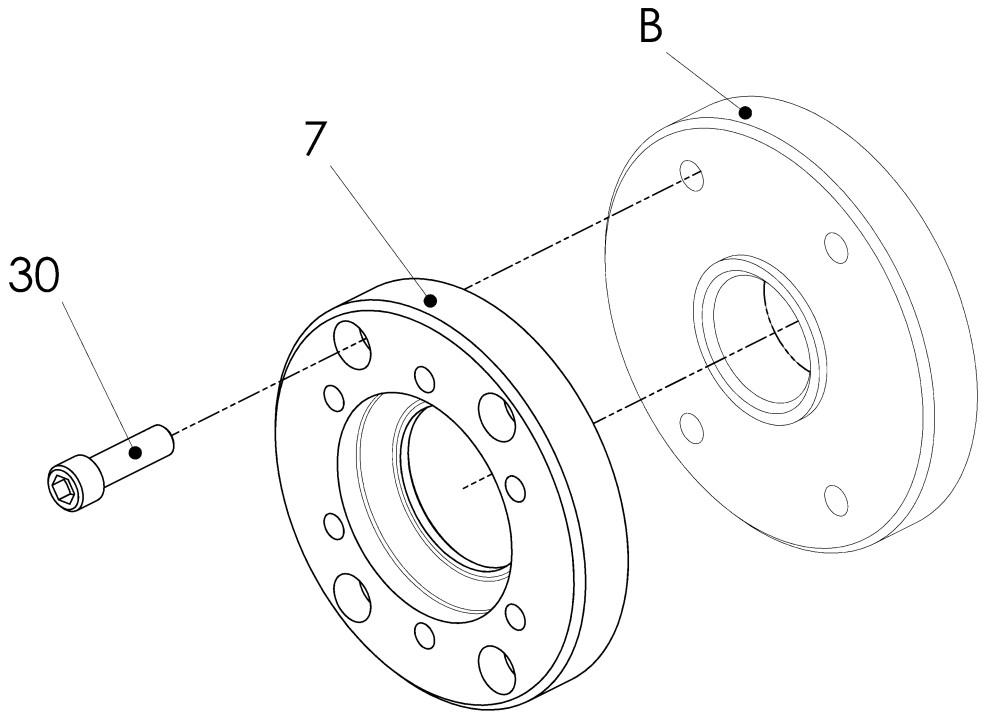


Fig. 6-3 Mounting the adapter

Item	Info	Designation	Remark
7		Adapter	
30		Screw	If ordered
B		Flange	Customer part

- Push the adapter (7) onto/into the centring of flange (B).
- Screw the adapter (7) to the flange (B) using the screws (30).

6.4 Aligning the units

- Align the units to be connected (see chapter 5).

6.5 Mounting the pre-mounted coupling

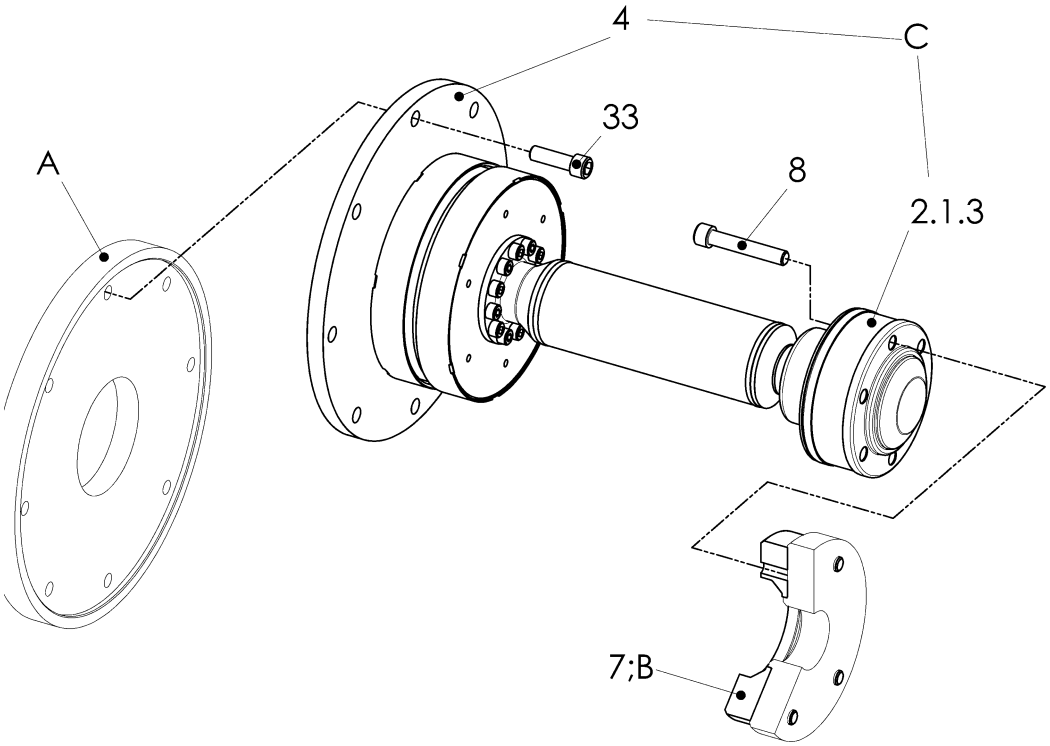


Fig. 6-4 Mounting the pre-mounted coupling

Item	Info	Designation	Remark
2.1.3		Joint	CV-joint
4		Adapter	
7		Adapter	If scope of supply
8		Screw ISO4762-10.9 M..	
33		Screw	If ordered
A		Flywheel flange	Customer part
B		Flange	Customer part
C		Pre-mounted coupling	

- Push the joint (2.1.3) towards the adapter (4).
- Position the pre-mounted coupling (C) in the installation space and support.
- Push the flange (4) of the pre-mounted coupling (C) into the centring of the flywheel flange (A).
- Screw the flange (4) to the flywheel flange (A) using the screws (33).
- Push the joint (2.1.3) close to the adapter/flange (7/B).
- Screw the joint (2.1.3) to the adapter/flange (7/B) using the screws (8).

6.6 After completed mounting

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Loose screw connections Before commissioning, the tightening torque levels of all screws must be checked and corrected if necessary.

Before commencing long-term operation, the plant must successfully complete a test run.

7 Operation

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Worn coupling components If the running noises change and/or vibrations occur turn the plant off immediately.

Determine the fault and its root cause, and remedy.
The troubleshooting process is simplified by the table in the next chapter.
On principle in case of a fault, an analysis of the entire plant should be performed.

7.1 Operating faults, root causes and remedy

Faults	Possible root causes	Remedy
Running noises or vibrations in the plant	Alignment error	1. Switch off the plant 2. Check alignment, correct if applicable 3. Trial run
	Loose screws	1. Switch off the plant 2. Check alignment, correct if applicable 3. Check screw torque levels and correct if necessary 4. Trial run
Breakage of the rubber element	Alignment error	1. Switch off the plant 2. Exchange defective parts 3. Check alignment, correct if applicable 4. Trial run
	Inadmissibly high torque	1. Switch off the plant 2. Exchange defective parts 3. Check alignment, correct if applicable 4. Trial run

Table 7-1 Troubleshooting table

In case of uncertainty or if you have questions, please contact our head office (address see chapter 1).

7.2 Admissible overall misalignment of the coupling

The overall misalignment values can be found in the catalogue.

8 Care and maintenance

WARNING	
	**Injuries can occur as a result of:** ▪ Contact with rotating parts Before starting work at the coupling, switch off the plant and secure against unintentional start-up.

The coupling requires low maintenance. It is possible to perform a visual inspection during the regular scheduled maintenance intervals for the complete unit. Every 12 month a visual inspection is strictly required.

8.1 Work to be performed

8.1.1 Cleaning the coupling

- ➢ Remove any loose dirt from the coupling.

8.1.2 Visual inspection of the coupling

- ➢ Inspect the coupling for cracks, chips or missing parts.
- ➢ Replace faulty and missing parts.

8.1.3 Inspection of the screw connections

- ➢ Check the tightening torque levels of all screws and if necessary, correct.

8.2 Replacing defective parts

- ➢ Remove the coupling as described in chapter 9.
- ➢ Replace wearing parts.
- ➢ Mount the coupling as described in chapter 6.

9 Dismantling

9.1 General dismantling instructions

Any work method which impairs the safety of the coupling is prohibited.
The user undertakes to notify the manufacturer immediately of any changes occurring at the coupling which could impair safety (address see chapter 1).

IMPORTANT

The coupling is dismantled in reverse order to the assembly process.
Please refer to the illustrations in chapter 6.

WARNING

Injuries can occur as a result of:

- Contact with rotating parts

Before starting work at the coupling, switch off the plant and secure against unintentional start-up.

WARNING

Injury and material damage can occur as a result of:

- Dismantling of the coupling in the wrong sequence

Only ever dismantle the coupling in the described sequence.

WARNING

Injury and material damage can occur as a result of:

- Falling coupling components

Secure coupling components against falling to the floor.

CAUTION

Material damage to coupling components can occur as a result of:

- Contact with sharp-edged objects

Protect coupling components for transportation.
Only hoist coupling components with nylon belts or ropes.
Always cushion parts when supporting them from below.

IMPORTANT

Use suitable lifting devices for dismantling.

9.2 Dismantling the pre-mounted coupling

See Fig. 6-4:

- Support the pre-mounted coupling (C).
- Loosen the screws (8) of the connection joint (2.1.3) and adapter/flange (7/B) and remove.
- Pull the joint (2.1.3) out of the adapter/flange (7/B) and push it towards the adapter.
- Loosen the screws (33) of the connection adapter (4) and flywheel flange (B) and remove.
- Pull the adapter (4) out off the centring of the flywheeel flange (B).
- Remove the pre-mounted coupling (C) out of the installation space.
- Remove all dismantling supports.

9.3 Dismantling the adapter (if necessary)

See Fig. 6-3 and 6-2:

- Loosen the screws (30) of the connection adapter (7) and flange (B) and remove.
- Pull the adapter (7) out of/off the centring/toothing of the flange (B) and remove.

9.4 Reassembling the coupling

- Reassemble the coupling as described in chapter 6.

10 Wearing and spare parts

WARNING	
	**Injury and material damage can occur as a result of:** ▪ Mounting and/or utilization of non-original CENTA parts Never use parts from other manufacturers.

A stock of the most important wearing and spare parts is the most important condition to ensure that the coupling is functional and ready for operation at all times.

We only provide a warranty for CENTA original parts.

Wearing parts of this coupling:

- Rubber elements
  When exchanging the rubber elements also the spherical bearing, the shaft-bearing and all screw connections must be renewed. These must be ordered separately.
- CV-joint

IMPORTANT
Exchange of wearing and spare parts only by CENTA or by CENTA service partner.

When ordering a spare, specify:

- Order no.
- Coupling order no.
- Drawing no.

11 Annex

11.1 CENTA data sheet D013-013 (lubricated screw connections)

Validity:
For all non-dynamically stressed screw connections with **lubricated** shank bolts in accordance with ISO 4014, ISO 4017 and ISO 4762 (DIN 912) with metric standard thread in accordance with DIN ISO 262, unless other specifications are given on CENTA documents.

Preparation of parts that are to be screwed together:
The joining areas must be free of dirt, preservatives and lubricants.

Preparation of screws that ARE NOT secured with liquid screw locking medium:
Give the screws extra lubrication with motor oil under the screw head and in the thread.

Preparation of screws that ARE secured with liquid screw locking medium:
Give the screws extra lubrication with motor oil under the screw head. Remove all grease from the thread.

Screw tightening method:
Screw in (by hand with torque wrench).

Thread size				Thread size			
d	Strength class	Tightening torques [Nm] ±5%	Tightening torques [in lbs] ±5%	d	Strength class	Tightening torques [Nm] ±5%	Tightening torques [in lbs] ±5%
M6	8.8	9	80	M22	8.8	470	4160
	10.9	13	115		10.9	670	5930
	12.9	15	135		12.9	780	6900
M8	8.8	21	185	M24	8.8	600	5310
	10.9	30	265		10.9	850	7520
	12.9	35	310		12.9	1000	8850
M10	8.8	41	360	M27	8.8	750	6640
	10.9	60	530		10.9	1070	9470
	12.9	71	630		12.9	1250	11060
M12	8.8	71	630	M30	8.8	1000	8850
	10.9	104	920		10.9	1450	12830
	12.9	121	1070		12.9	1700	15050
M14	8.8	113	1000	M33	8.8	1400	12400
	10.9	165	1460		10.9	1950	17250
	12.9	195	1725		12.9	2300	20350
M16	8.8	170	1500	M36	8.8	1750	15500
	10.9	250	2210		10.9	2500	22150
	12.9	300	2660		12.9	3000	26550
M18	8.8	245	2170	M39	8.8	2300	20350
	10.9	350	3100		10.9	3300	29200
	12.9	410	3630		12.9	3800	33650
M20	8.8	350	3100				
	10.9	490	4340				
	12.9	580	5130				

11.2 CENTA data sheet D053-900 Declaration of incorporation according to the EC Machinery Directive 2006/42/EC, Appendix II B

Manufacturer:

CENTA Antriebe
Kirschey GmbH
Bergische Strasse 7
42781 Haan / GERMANY

Contact:

Phone +49-2129-912-0
Fax +49-2129-2790
centa@centa.de
www.centa.info

We herewith declare that the **incomplete** machine

Product:	Highly elastic drive shaft CENTAX-VC
Model / series code:	CX-CV / 053C
Installation size:	13…15
Design:	all
Serial number:	according to shipping documents, if applicable

- provided this is possible as far as the scope of supply is concerned - complies with the following basic requirements of the **Machinery Directive 2006/42/EC** Appendix I, subchapters 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.3, 1.3.4 and 1.5.4.

In addition, we declare that the special technical documents for this incomplete machine were compiled according to Appendix VII Part B and undertake to forward these to the market monitoring authorities by request via our "Documentation Department".

Commissioning of the incomplete machine is interdicted until the incomplete machine has been incorporated in a machine and the latter complies with the provisions of the EC Machinery Directive and the EC Declaration of Conformity according to Appendix II A is on hand.

The declaration is invalidated by every modification to the delivered parts.

Authorised representative for the compilation of the relevant technical documents:

i.A. S. Anderseck

by order of Gunnar Anderseck
(Authorised Person Documentation)

Declaration of incorporation was issued:

i.V. J. Exner

Haan, 17.12.2009

by proxy Dipl.-Ing. Jochen Exner
(Design Management)