Contents

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2010-03 / Rev. 8.2. Printed in Germany.
Subject to modification due to technical development.

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1 Technical Data

Necessary information for use in potentially explosive atmospheres:

CE Ex - Marking:		
Ambient temperature, if deviating from -25 °C T_a +40 °C		°C
max. surface temperature (T3= 200 °C, T4= 135 °C, or deviating)		°C
Temperature monitoring	☐ MTS [1] for pre-warning	
	☐ BTS [2] for pre-warning	
	☐ BTS-Ex [2] for limitation of max. surface temperature for Voith Turbo couplings acc. to EC Directive 94/9/EG Maximum permissible temperature of turbo coupling on motor start:	°C
Nominal response temperature of temperature monitoring		°C
Max. permissible fill rate [3]		dm^3 (litre)
Fusible plug (SSS)	☐ SSS ☐ SSS-X	
Overload (see **chap. 4.6**), causing response of thermal fuse (fusible plug(s) and/or BTS-Ex) requires switch-off of power supply after		s (sec)
Additional monitoring of output speed is required to switch off power supply prior to response of fusible plugs.	☐ yes ☐ no	
After motor switch-on, monitoring of output speed has to become effective after		s (sec)
Diameter input [4]		mm
Diameter output [4]		mm
Replacement of roller bearings		h

Table 1

1) MTS: Mechanical thermal switch unit (see **chapter 18.1**).
2) BTS: Non-contacting thermal switch unit (see **chapter 18.2**).
3) Applies for missing fill rate on cover sheet.
4) Diameter and fit of hub or shaft to be joined by means of shaft-hub connection.

Additional data required for use on potentially explosive areas:

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2 Declarations of Manufacturer

2.1 Declaration regarding assemblies and components

Since 29 December 2009 a new Machinery Directive 2006/42/EC has to be applied bindingly in the member state of the European Community.

Voith turbo couplings of Product Group 'Start-up Components' as defined by the new Machinery Directive 2006/42/EC and the explanations of the guidelines published in December 2009 to implement the machinery directive, are neither *"Machinery"* nor *"incomplete machinery"* but assemblies or components.

As our products are no incomplete machinery, we do not issue a declaration of incorporation as per Machinery Directive 2006/42/EC.

Also, an EC Declaration of Conformity must not be issued, neither the CE marking be made, unless specified by other EC directives or regulations.

Voith as certified company ensures that the basic safety and health requirements for their products are always be met by internal quality management systems and by applying harmonized standards.

The technical documentation for Voith products is so comprehensive that they may be installed reliably into machinery or incomplete machinery and a safe operation of the complete machinery with regard to the Voith products is also possible later on when observing this documentation.

Issued in	Crailsheim, Germany
On	March 18th 2010
Name of the undersigned	Mr. B. Morlock, General Manager - Start-up Components
Signature	

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2.2 EC Declaration of Conformity (RL 94/9/EC, Annex X.B)

in confirmation of compliance of the machinery with Directive 94/9/EC

The manufacturer **Voith Turbo GmbH & Co. KG, Voithstraße 1, D-74564 Crailsheim**

hereby declares that the machinery described below:

Description	T... Turbo Couplings with constant fill
Serial No.	see shipping documents

complies with the provisions of the following harmonized standards in the version valid at signature date:

EN ISO 12100-1 / -2	Safety of machinery - basic concepts and general principles for design Part 1: Terminology, methodology Part 2: Technical principles
EN 1127-1 / -2	Explosive atmospheres, explosion prevention and protection, basic concepts and methodology
EN 13463-1	Non-electrical equipment for use in potentially explosive atmospheres, Part 1: Basic method and requirements
EN 13463-5	Non-electrical equipment for use in potentially explosive atmospheres, Part 5: Protection by constructional safety "c"
EN 13463-8	Non electrical equipment for use in potentially explosive atmospheres, Part 8: Protection by liquid immersion "k"
EN 1710	Equipment and components intended for use in potentially explosive atmospheres in underground mines

as well as with the following European and national standards and technical specifications in the version valid at signature date:

TRBS 2153	Avoidance of ignition hazards resulting from electrostatic charging

Each modification by the customer on the parts supplied, invalidates the declaration.

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3 Preface

3.1 General information

This manual will support you in using the turbo coupling in a safe, proper and economical way.

If you observe the information contained in this manual, you will
- increase the reliability and lifetime of coupling and installation,
- avoid risks,
- reduce repairs and downtimes.

This manual must
- **always be available at the machine site,**
- **be read and used by every person who works on the coupling.**

The coupling is manufactured to the state of art and approved safety regulations. Nevertheless, the user's or third parties' life may be endangered or the machine or other material assets impaired in case of improper handling or use.

Spare parts:
Spare parts must comply with the requirements determined by Voith.
This is guaranteed when original spare parts are being used.
Installation and/or use of non-original spare parts may negatively change the mechanical properties of the **Voith Turbo coupling** and thus have an adverse impact on the safety.
Voith is not liable for damages resulting from use of non-original spare parts.

Use only appropriate workshop equipment for repair. Professional maintenance or repair can only be guaranteed by the manufacturer or an authorized specialist workshop.

This manual has been issued with utmost care. However, in case you should need any further information, please contact:

Voith Turbo GmbH & Co. KG
Start-up Components
Voithstr. 1
74564 Crailsheim
GERMANY
Tel. +49 7951 32-0
Fax. +49 7951 32-480
startup.components@voith.com
www.voithturbo.com/startup-components

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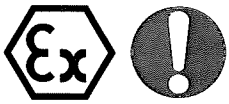
3.2 Proper use

The turbo coupling with constant fill is provided to transmit the torque from the drive motor to the driven machine.

The **power** permitted during stationary operation at a specific **input speed** and a specific **coupling fill** (operating fluid and filling) is entered on the cover sheet of this manual. Use for another purpose, e.g. higher power ratings, higher speeds or for other operating conditions not agreed, is considered not being in accordance with the regulations.

Use in accordance with the regulations also includes observing this installation and operating manual and complying with the inspection and maintenance conditions.

The manufacturer is **not** liable for damages resulting from use not in accordance with the regulations. The risk is to be borne solely by the user.



– **EX-PROTECTION! / ATTENTION!**

If no according information is given in Chapter 1, it is not possible to use this coupling in potentially explosive atmosphere!
Please check whether the coupling, according to the marking, is approved for hazardous areas.

DANGER!

– **Remaining risks on the turbo coupling:**

Improper use or mishandling may cause death, severe injuries or minor injuries as well as property damage and harm to the environment.

Only persons who are sufficiently qualified, trained and authorized are allowed to work on or with the turbo coupling!

Please pay attention to the warnings and safety information!

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4 Safety

4.1 Notes and symbols

The safety notes included in this instruction manual are particularly marked with safety marks according to DIN 4844:

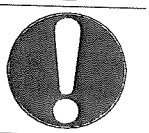
Damage/ harm to...	Signal word	Definition	Consequences	Symbol
Persons Property	EX-PRO-TECTION!	Notes to Ex-protection	Explosion hazard	
Persons	DANGER!	imminent danger	fatal or most serious injuries (crippling)	
Persons	WARNING!	dangerous situation possible	fatal or most serious injuries possible	
Persons	CAUTION!	less dangerous situation	slight or minor injuries possible	
Persons Property		warning of combustible materials	fire hazard	
Persons		use goggles	risk of losing sight, risk of going blind	
Persons		Use ear protection	hearing damage	
Property	ATTENTION!	harmful situation possible	damage possible to – the product – its environment	
–	Note! Information!	application hints and other useful information	efficient in operation	

Table 2

Marking with the Ex-symbol (Ex) indicates possible hazards which have to be observed only if applied in explosion hazardous areas.

If apart from the symbol for Ex-protection (Ex) there is another symbol (⚠ or ❗), adhere to the instructions for operation also out of explosion hazardous areas.

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4.2 As delivered condition

- Basic type T...:
  The turbo coupling is delivered complete with mounted connecting coupling (if included in the scope of supply).

  Basic type T...N...:
  The turbo coupling is delivered complete with mounted primary coupling flange.

→ **Coupling fill: Chapter 11, page 50**

- The turbo coupling is without fill.
  Any operating fluid included in the scope of supply is delivered in a separate container.
  The operator himself fills in the operating fluid.
- Other accessories are supplied as loose parts.
  Basic type T...: Fixing bolt and holding disk are supplied additionally.
- One set of fusible plugs is supplied as spares.

ATTENTION!
Dispose of the packing and used parts in accordance with the stipulations of the country of installation!

4.3 Storage / Packing / Preservation

4.3.1 Storage of turbo coupling

As delivered condition:
The as delivered condition of the Voith Turbo Couplings depends on transportation and storage period:
Condition no. 1 represents the condition as delivered. For deviations, please refer to order documents.

No.	- Transport - adm. storage period	Packing / Measures taken
1	- Transport by land / by air - Storage up to **6 months** in closed hall	- Device to suit transportation - Weather protection through means of transportation - Packed in PE foil
2	- Transport by sea - Storage up **6 months** in closed hall	- Device to suit transportation - Sharp edges protected - Welded in PE-foil - Drying agent acc. to DIN 55473/55474 - Water-proof cardboard or wooden box - Internal case cover lined with closed webplate (Akylux). Shimmed with PVC-foil in case of joint plates
3	- Transport by sea - Storage up to **12 months** in closed hall	- like 2
4	- Transport by sea - Storage up to **24 months** in closed hall	- like 2, - instead of PE-foil welded in alu-sandwich foil.

Table 3

Opening of the packing:
Foils, which have been opened for control upon receipt, are to be re-closed airtight for further storage. Use drying agent, if necessary.

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Extension of storage period:
The admissible storage period may be extended 3 x maximum. Check and, if need be, replace the packing. Replace external preservation according to the permissible storage period. Realize internal preservation and repeat same annually (In case of packing 4: every 2 years). After replacing the drying agent, close the foil packings airtight.
Repeated preservation is also required, if the turbo coupling is installed in a machine which is not set into operation.

External preservation:
Spray bright metal parts (hub bores, brake discs etc.) with Shell Ensis Fluid S.

Internal preservation:
Moisten the turbo coupling inside with an oil according to selection list.
Turbo coupling mounted: Fill turbo coupling with oil above axis of rotation center and rotate turbo coupling input and output at least once.
Turbo coupling mounted or in mounting position (turbo coupling not turnable): Fill turbo coupling up to upper fusible plug.
Then drain the oil and close the turbo coupling properly.
The oil may remain in the turbo coupling for other planned represervations if it is ensured that prior to commissioning, the turbo coupling is filled with new oil (oil filling according to design data).

Selection list for internal preservation agents:

Producer	Designation
ARAL	Aral Oel KONIT SAE 20W-20
Mobil	Mobilarma 524 (SAE 30)
Shell	Shell Ensis Motoröl 20 (Standard)
Wintershall	Wintershall Antikorrol 20W-20
The recommended operating fluids are also admitted for preservation	

Table 4

ATTENTION!
When storing couplings type "TW" below 0°C , drain the water! Risk of frost!
Remove flexible parts (item 1820) prior to cleaning the coupling components and applying long-term preservation!

4.3.2 Storage of flexible elements

EX-PROTECTION!
Storage of flexible elements (item 1820) until use in connecting coupling must not exceed 4 years.
The storage area has to be dry and free of dust.
Never store flexible elements (item 1820) together with chemicals, solvents, fuels, acids, etc. Protect them against light with high ultraviolet content.

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4.4 Lifting

DANGER!
Slinging and lifting of coupling
Improper slinging and lifting of the turbo coupling may cause damage of property and personal injuries!
It is only allowed to lift the coupling at the slinging points provided at the housing top (see the following pictures)!

Lifting appliances, load suspension devices, slinging/lifting points
Pay attention to the turbo coupling weight (see cover sheet)!

Lifting appliances (e.g. crane, high-lift truck), slings (ropes, chains, etc.) and slinging points (swivels, thread size as for item 1830 or 0780, see chapter 6.3) need to be
- checked and approved,
- sufficiently dimensioned and in sound condition and
- only authorized and trained persons are allowed to operate same!

Pay attention to operating manuals of lifting appliances, slings (ropes, chains, etc.) and slinging points!

Damaged load suspension devices or those with insufficient carrying capacity may break under load, with the consequence of most serious or even fatal injuries!

Check the lifting appliances and load suspension devices for

- **sufficient carrying capacity (weight see cover sheet),**
- **sound condition.**

Eye bolts are prohibited!
Please use swivels as illustrated on the following pictures!

If a connecting coupling is screwed on, remove same to screw in the swivels.

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Proper suspending of a Voith turbo coupling (exemplary):

Remove flexible connecting coupling (if any).

Screw suitable swivel (thread size as for item 1830 or 0780, see **chapter 6.3**) into the coupling, as shown in the pictures, and attach slings (ropes, chains etc.).

Do not screw out existing screws for this purpose, use provided threads:

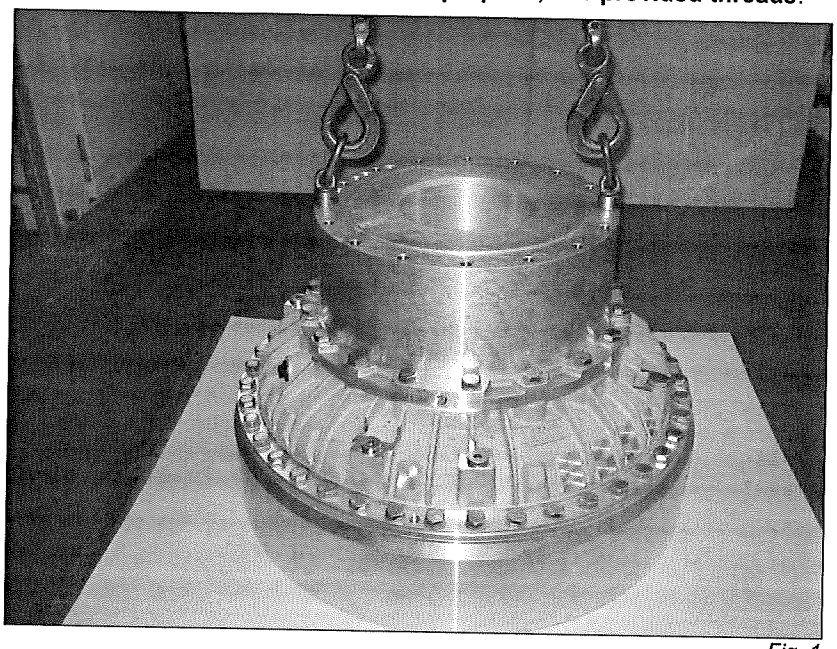

Fig. 1

DANGER!

Do not loop the coupling with slings (ropes, chains, etc.) for lifting and turning around!

Do not step under suspended material and pay attention to the general instructions for the prevention of accidents.

Unless the turbo coupling is mounted between driving and driven machine, secure same against tipping over and sliding.

Danger of life and risk of injury caused by falling load, tipping and sliding of the coupling!

For turning the coupling around, suspend it to the slings (ropes, chains etc.) as shown below:

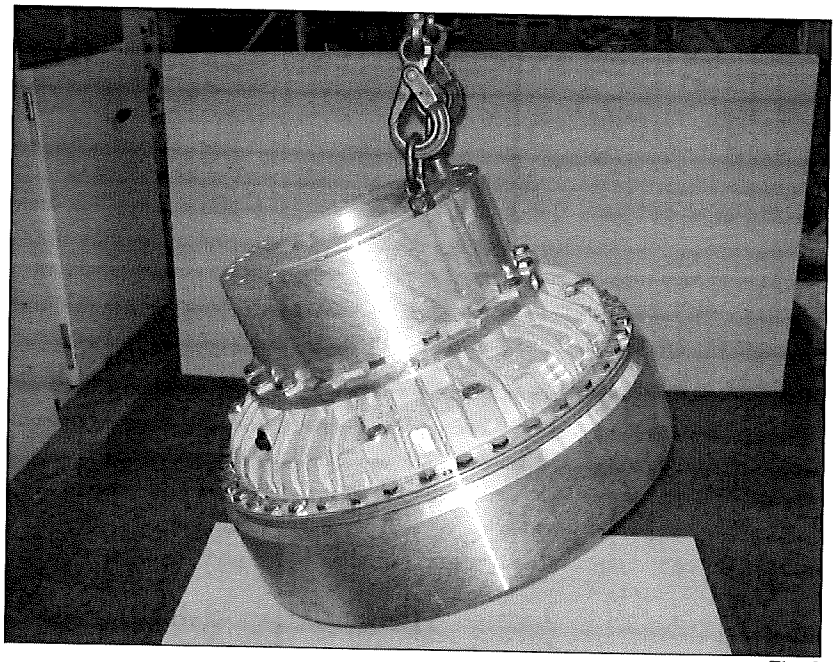

Fig. 2

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DANGER!
Always use at least 2 slings (ropes, chains etc.) for lifting.
For turning round use 2 slings (ropes, chains etc.) on each side!

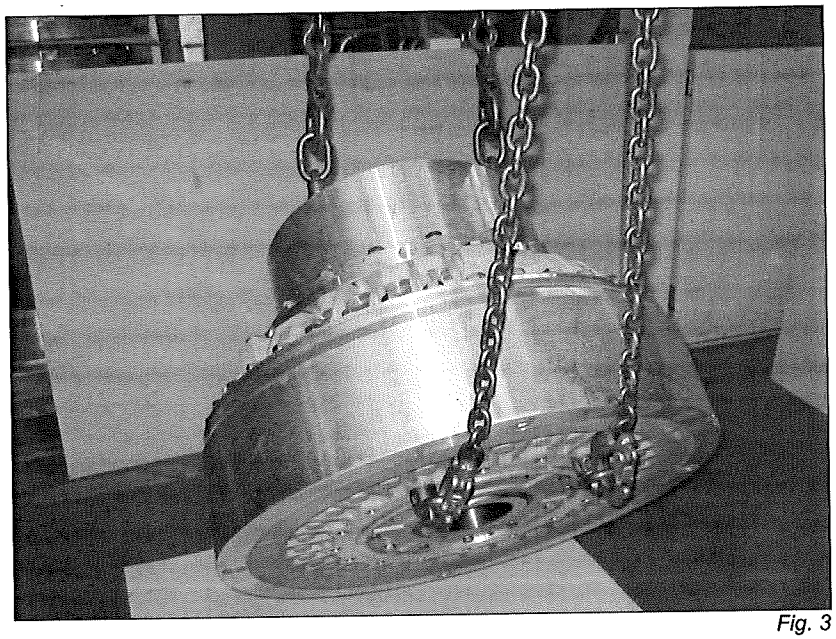

Fig. 3

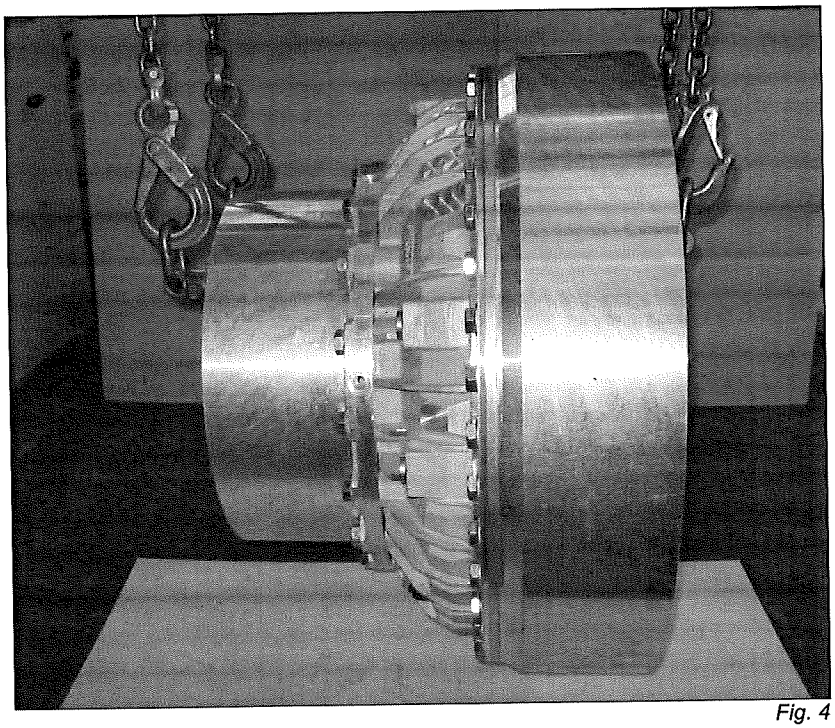

Fig. 4

Place coupling cautiously onto a wooden board or pallet and secure it against tipping over.

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4.5 General information with regard to dangerous situations

For all works performed on the turbo coupling, please observe the local regulations for prevention of accidents!

DANGERS!

- **Danger occurring during works performed on the turbo coupling:**

  There is the risk of injury by cutting, squeezing and cold burns in case of minus degrees.
  Never touch the turbo coupling without wearing protective gloves!

  Start to work on the coupling only after it has cooled down below 40 °C otherwise there is the risk of burns!

  Ensure that there is sufficient light, a sufficiently big working space and good ventilation when working on the turbo coupling.

  Switch off the unit the coupling is installed into and secure the switch against switching on.

  For all work performed on the turbo coupling ensure that both, drive motor and driven machine have stopped running and startup is absolutely impossible!

- **Hot surfaces:**

  The coupling temperature rises during operation.

  Please provide a guard for protection against contact with the coupling! However, ventilation of coupling must not be impaired.

  Never use fluids to cool down the coupling!

  → **Protective cover see chapter 12**

- **Rotating parts:**

  Rotating parts, for example, the turbo coupling itself and exposed shaft parts need to be protected against contact by a guard! However, ventilation of coupling must not be impaired.

  Never operate the coupling without these guards!

  → **Protective cover see chapter 12**

- **Noise:**

  The turbo coupling generates noise during operation.
  If the A-classified equivalent sound pressure level exceeds 80 dB(A) this may cause hearing damage!

  Wear ear protection!

  → **Sound pressure level see cover sheet**

- **Electric shock:**

  Contact with open or free terminals, lines and components may cause serious or even fatal injuries!

  In the event of a fault even operationally potential-free assemblies may have a respective potential.

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- **Overspeed:**

  This refers only to installations where overspeed (exceeding the rated speed) is possible:
  Check whether the entire system is equipped with a device which safely prevents overspeed (for example brake or back-run safety mechanism).
  For rated speed, please refer to cover sheet.

- **Extreme ambient temperatures:**

  Extreme ambient temperatures may cause thermal overload of the turbo coupling, which may result in spraying of fusible plugs, seriously injuring persons in its surroundings and damaging the turbo coupling!

  For operating medium water:
  Ambient temperature must be above freezing point of operating fluid! The frozen operating fluid may damage the coupling.

  Adhere to the temperature limits indicated (see Chapter 4.6)!

- **Sprayed-off and discharged operating fluid:**

  In the event of thermal overload of the turbo coupling the fusible plugs respond. Operating fluid is discharged through these fusible plugs.

  If the fusible plugs spray off, immediately switch off drive!

  Electrical devices located near the coupling need to be protected against spraying!

  Please ensure that the sprayed-off operating fluid cannot get in contact with persons! Danger of burning!

  Persons being in the surrounding of turbo coupling have to wear goggles. Spraying off hot operating fluid means a risk of losing sight!

  Make sure that spraying operating fluid cannot get into contact with hot machine parts, heaters, sparks or open flames! There is a risk of fire!

  In order to prevent danger (e.g. risk of skidding, risk of fire) caused by escaping oil, remove same immediately!

  Catch spraying solder of fusible plugs.

  Collect operating fluid leaking out to prevent contact with parts (motor, belt) which might ignite or catch fire.

  Please provide a catch pan of sufficient size, if required!

- **Fire hazard:**

  After response of fusible plugs the spraying oil may ignite on hot surfaces causing fire, as well as releasing toxic gases and vapor. There is a risk of burning and intoxication, as well as a risk of harm to machines, environment and property.

  After response of the fusible plugs, immediately switch off driven machine!

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4.5.1 Fire extinguishing means, Fire fighting

In case of fire act as follows:

- Extinguish the fire using **ABC-powder** or **carbon dioxide**.
- **Never use water to extinguish a fire!**
- The minimum distance depends, besides others, on the nozzle diameter, spraying jet or full jet. If a 2"-pipe with nozzle (12 mm) and spraying jet is used the minimum distance is one meter, in case of full jet the minimum distance is five meters.

– **Control of methane content prior to Works on the turbo coupling:**

In order to guarantee safety of works on turbo couplings with housing of aluminium alloy and the guard of which has been removed during underground installation, maintenance and dismounting, the methane content has to be controlled locally using appropriate devices. Prior to starting and during performance of these woks the methane content in the area of turbo coupling must not exceed the permissible limit (e.g. 1 Vol.-% in Russia). Should this limit value be exceeded, all works have to be stopped until the local value falls under the limit value again.

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4.6 Important information with regard to operation

ATTENTION!
If irregularities are found during operation, immediately switch off the drive unit!

- **Power transmission:**
  The cover sheet of this manual shows the possible power transmission at a specific input speed and a specific coupling fill (operating fluid and filling). These values describe a permissible working point for stationary operation of coupling. Voith Turbo's approval is required for stationary operation of coupling at a different working point!

- **Operating fluid:**
  Use only the operating fluid shown on the cover sheet of this operating manual.
  Operate the turbo coupling only with the filling amount shown on the cover sheet of this operating manual.
  A too low filling results in thermal overload of the coupling and, in case of overfill, the coupling may be damaged by internal pressure.

- **Temperature rise at start-up:**
  At start-up the temperature rise in the turbo coupling is higher than at stationary operation due to an increased slip. Please provide sufficient intervals between starts to avoid thermal overload!

- **Starting characteristic of turbo couplings with delay chamber:**
  At start-up, the operating fluid is delivered from the delay chamber into the turbo coupling working chamber. On standstill, the operating fluid flows back into the delay chamber. Please provide sufficient intervals (a few minutes!) between starts to obtain a correct starting characteristic!

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EX-PROTECTION! / ATTENTION!

- **Coupling temperature:**

  Please consult Voith Turbo, if the turbo coupling should be used for ambient temperatures
  - below -25 °C for operating fluid oil
  - below 0 °C for operating fluid water (freezing point) !

  Please also refer to order documents.

  Overheating may damage the coupling!

  The nominal coupling temperature will not be exceeded for the planned application as long as sufficient ventilation is provided.

  The following applies only to couplings in hazardous areas:
  Make sure that the air surrounding the turbo coupling does not exceed the permissible value.

→ Technical Data: Chapter 1, page 5

- **Fusible plugs:**

  The fusible plugs protect the turbo coupling against damage due to thermal overload.

  Switch off the drive motor immediately on response of one of the fusible plugs!

  Use original fusible plugs only with the response temperature shown on the cover sheet of this operating manual!

→ Technical Data: Chapter 1, page 5

- **Monitoring devices:**

  Check whether the existing monitoring devices are in a state ready for operation.
  Repair any defective monitoring device immediately!
  Never bridge safety devices!

→ For monitoring devices, see Chapter 18, page 81

- **Blocking:**

  Blocking of the driven machine may cause overheating of the turbo coupling and response of the fusible plugs thus endangering persons as well as the turbo coupling and environment.

  Immediately switch off driven machine!

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EX-PROTECTION!

– **Overload of the coupling:**
On response of the thermal fuse switch off power supply after the time required in Chapter 1 at the latest.
In case of multi-motor-drive switch off the entire system!

→ **Technical Data: Chapter 1, page 5**

If additional monitoring of overload is required, monitor output speed.
If the output speed falls below the input speed by more than 10%, immediately switch off power supply.
It is necessary to switch off the power supply, otherwise the max. surface temperature indicated there cannot be kept

Note!
The coupling will be overloaded in case that
– the driven machine blocks
– the driven machine is loaded excessively during nominal operation or during running-up
(contact Voith Turbo).

→ **Connecting couplings: Chapter 20, page 100**

– **Connecting couplings:**

Connecting couplings of type EPK:
After breakage (shearing) of a flexible element of the EPK connecting coupling, switch off the drive immediately!
In case of multi-motor drives, switch off the entire system!
We recommend regular control of the wear condition of the pads.

Connecting couplings of types ENK, EEK, Nor-Mex G:
In case of too heavily worn flexible elements, there is the risk of a hitting together of parts of the connecting coupling.
- **Fire and explosion hazard by spark formation!**
- **Danger to life by flying debris!**
- **Risk of damage on drive and driven machine!**

4.7 Transportation

→ **Chapter 12, page 56**

EX-PROTECTION!
In potentially explosive atmospheres the coupling is only to be transported in suitable packing. This has to meet the same minimum mandatory requirements as the guard.

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WARNING!

Falling parts may seriously injure or kill you!

Secure the coupling sufficiently, pay attention to the center of gravity position and use the provided slinging and lifting points!

Use appropriate transportation means and slings (ropes, chains, etc.)

→ **Masses: Cover sheet**

Incorrect handling of the turbo coupling may cause bruising of upper and lower limbs and seriously injure persons.

Expert staff only is allowed to carry out transportation!

4.8 Staff qualification

WARNING!

Personnel not sufficiently qualified is exposed to danger or is dangerous for third parties. Possible consequences can be death, serious or minor injuries, damage of property or harm to the environment.

Only sufficiently trained, instructed and authorized persons are allowed to work on or with the turbo coupling! Keep unauthorized people away!

Qualified experts only are allowed to carry out maintenance and inspection works, trouble shooting and remedial action!

The staff in charge of any work to be done on the coupling must

- be reliable,
- have the legal minimum age,
- be trained, instructed and authorized with regard to the intended work.
- at use in potentially explosive atmosphere observe **EN 1127-1 Annex A** and **EN 1127-1 Section 7**. Only use tools admissible in potentially explosive areas. Avoid sparking.

4.9 Product observation

We are under legal obligation to observe our products, even after shipment.
Please therefore inform us about anything that might be of interest to us. For example:

- change in operating data.
- experience gained with the unit.
- recurring problems.
- problems experienced with this installation and operating manual.

→ **You will find our address on page 9**

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5 Voith Turbo Couplings with Constant Fill

5.1 Function

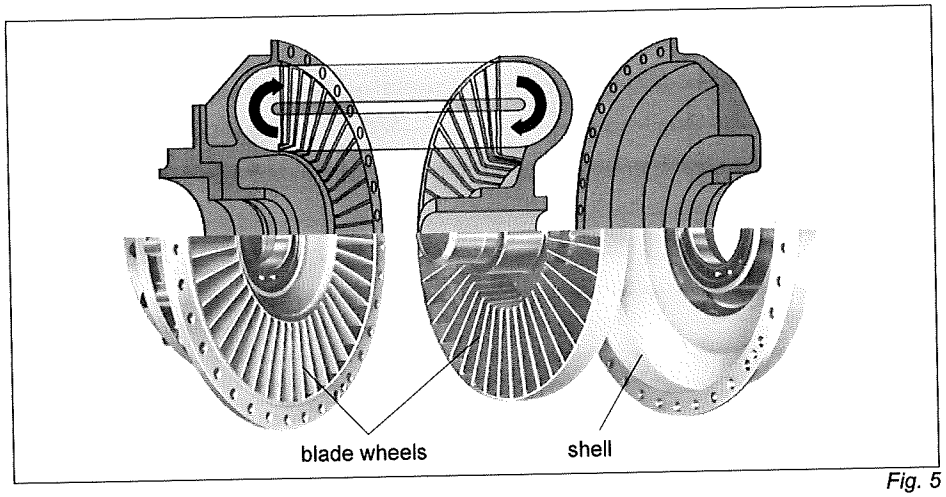

Fig. 5

The Voith turbo coupling is a hydrodynamic coupling working to the Föttinger principle. Its main components consist of two blade wheels – the pump impeller and turbine wheel – enclosed by a shell. Both wheels are provided with bearings relative to each other. The power is transmitted nearly without wear, there is no mechanical contact between the power-transmitting parts. A constant amount of operating fluid is in the coupling.
The mechanical energy provided by the drive motors is converted to kinetic energy of the operating fluid in the connected pump impeller. In the turbine wheel this kinetic energy is converted back to mechanical energy.

Three conditions are to be considered with regard to the coupling function:

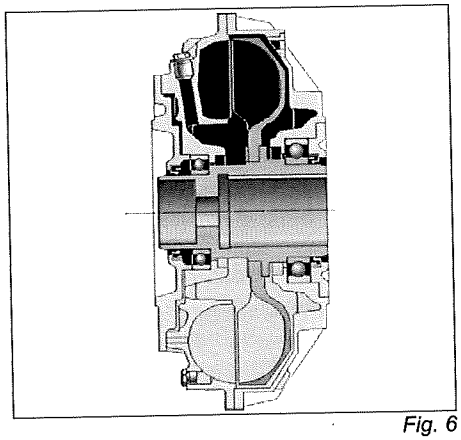

Fig. 6

– **Standstill:**
The total operating fluid is resting statically in the coupling.

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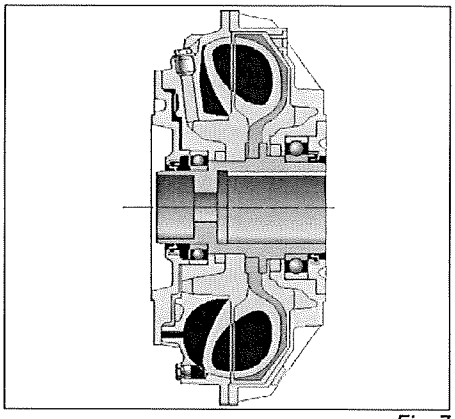

Fig. 7

– **Starting condition:**
The pump impeller accelerates the operating fluid with increasing motor speed causing a circulating flow in the working chamber. The complete blade chamber of turbine wheel is flooded, starting to move as a result of the kinetic energy of fluid flow. The coupling characteristic determines the torque curve during start-up.

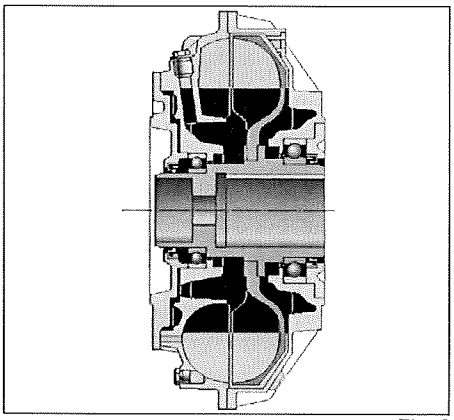

Fig. 8

– **Normal operation:**
During normal operation only the torque required by the driven machine is transmitted. The low speed difference between pump impeller and turbine wheel (the so-called rated slip) results in a stationary flow condition in the coupling.

5.2 Type designation

For hydrodynamic couplings with constant fill the type designation is determined as follows:

→ **Type designation:** See **cover sheet** of this operating manual

1	2	3	4	5	6	7	8	9	10	11	12

Example: 562 TVVS03

562	T			VV		S		03			

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1 **Coupling size (profile diameter in mm)**

possible sizes: 154, 206, 274, 366, 422, 487, 562, 650, 750, 866, 1000, 1150

2 **Number of hydrodynamic circuits**

T:	single-circuit coupling
DT:	double-circuit coupling

3 **Material**

"no code letter":	Silumin
U:	ferrous product

4 **Operating fluid**

"no code letter":	mineral oil
W:	water (for antifreezing compound consult Voith)

5 **Delay chamber**

"no code letter":	without delay chamber
V:	with delay chamber
VV:	with enlarged delay chamber

6 **Draining of delay chamber**

"no code letter":	time-dependent draining without dynamic refill
F:	with centrifugal valves (standard type open on standstill)
Y:	with dynamic refill

7 **Shell**

"no code letter":	standard design
S:	designed as annular chamber

8 **Turbo coupling connection**

"no code letter":	designed for flexible connecting coupling mounted on the outer wheel side.
N:	designed for primary coupling flange and flexible connecting coupling mounted on the coupling shaft.

9 **Design status**

"old":	A, B, C, E, G, H, J
"new":	01, 02, 03, 04, 05, 06, 07, 08, 09, 10, ...

10 **Throttle plate**

"no code letter":	without throttle plate
D:	with throttle plate

11 **Design**

"no code letter":	standard design
-X:	special constructional design
-Z:	special hydrodynamic design

12 **Possible supplementary information in plain text**

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5.3 Design examples

5.3.1 Connecting coupling on the input side

Type **T** (basic type):

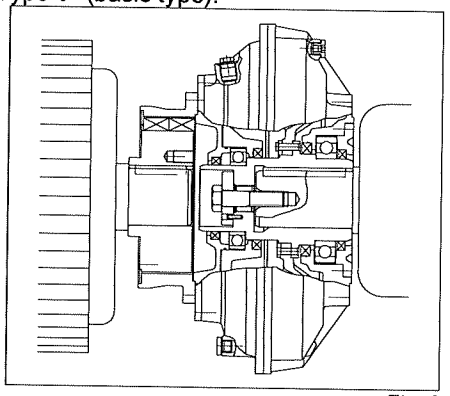

Fig. 9

Type **TV**:

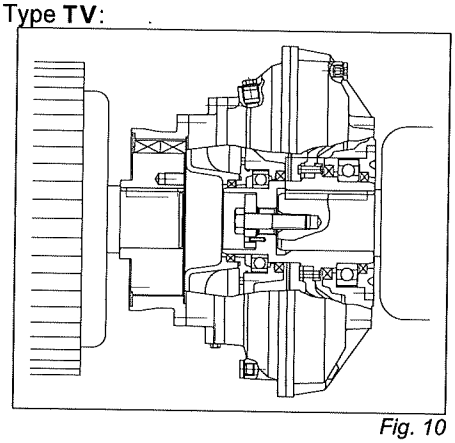

Fig. 10

Type **TVV**:

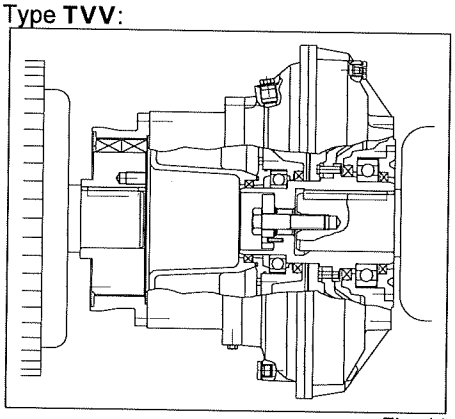

Fig. 11

Type **TVVS**:

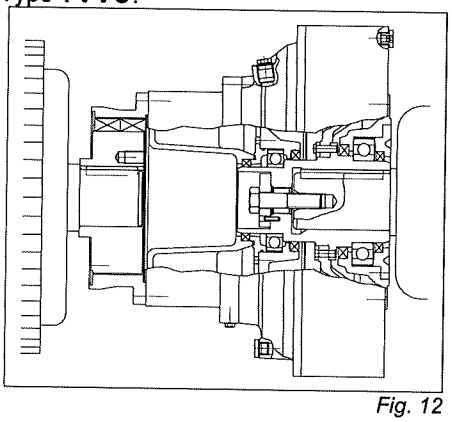

Fig. 12

Type **DT**:

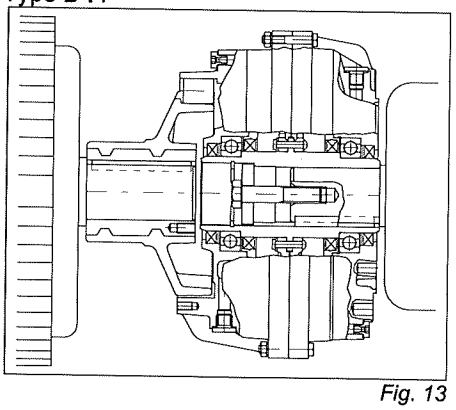

Fig. 13

Type **DTV**:

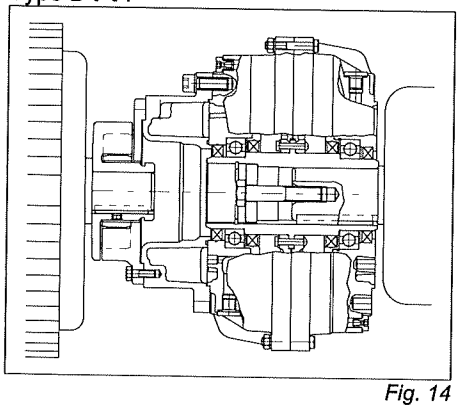

Fig. 14

5.3.2 Connecting coupling on the output side

Type **TN** (basic type):

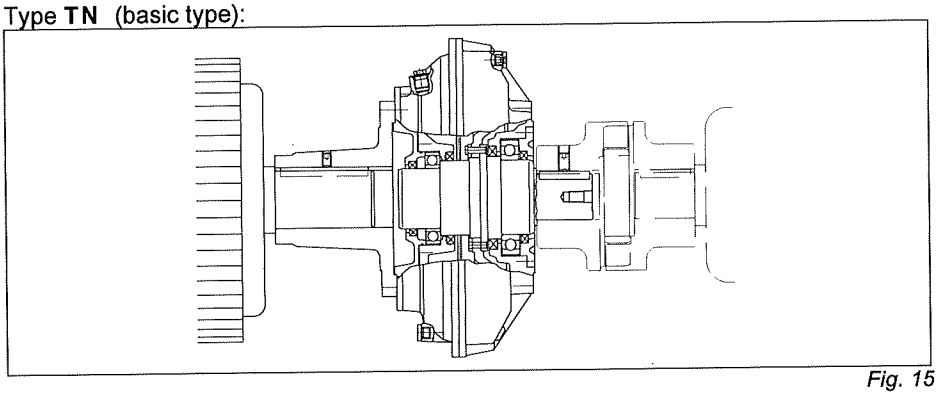

Fig. 15

Type **TVN**:

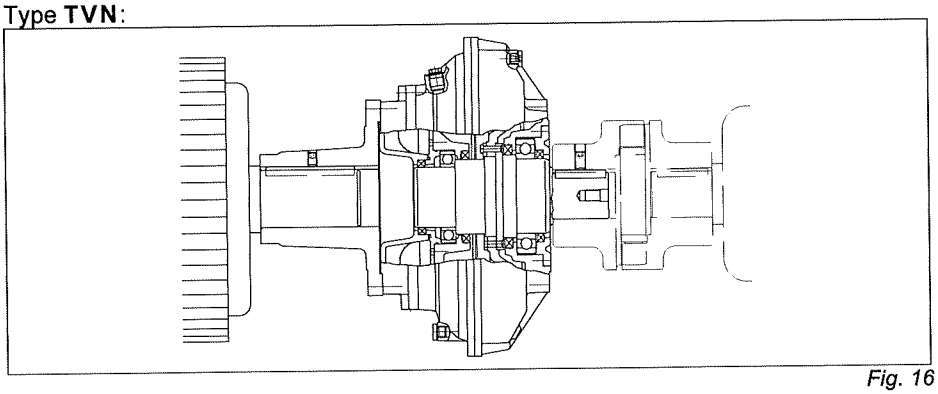

Fig. 16

Type **TVVN**:

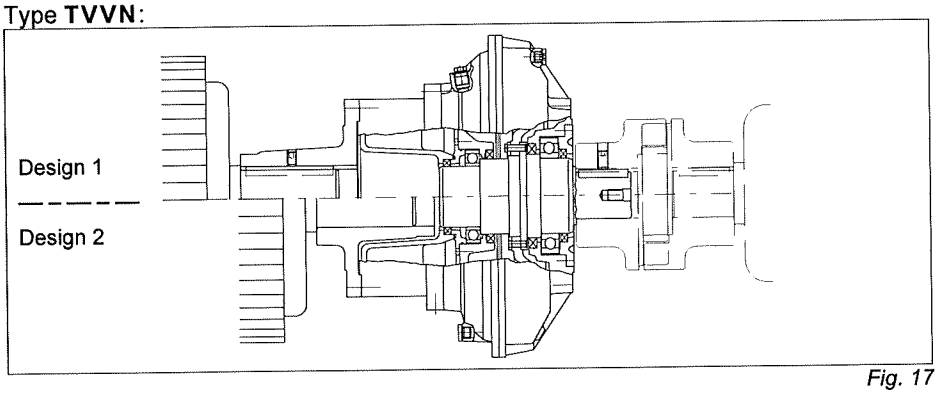

Fig. 17

Type **TVVSN**:

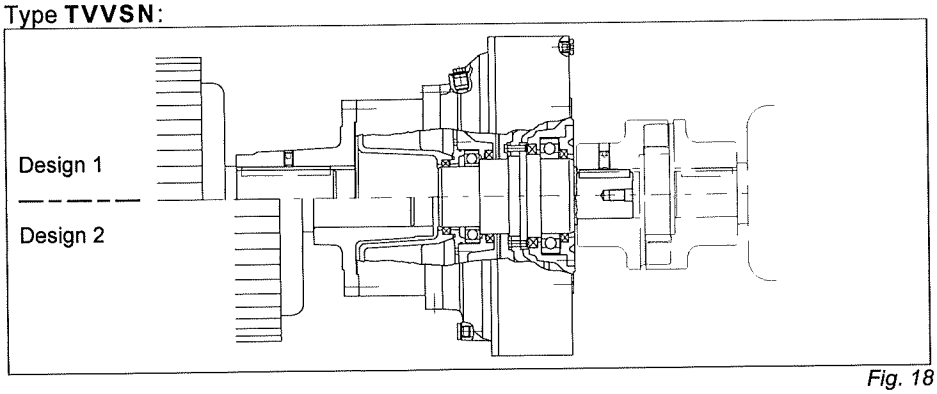

Fig. 18

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6 Tightening Torques

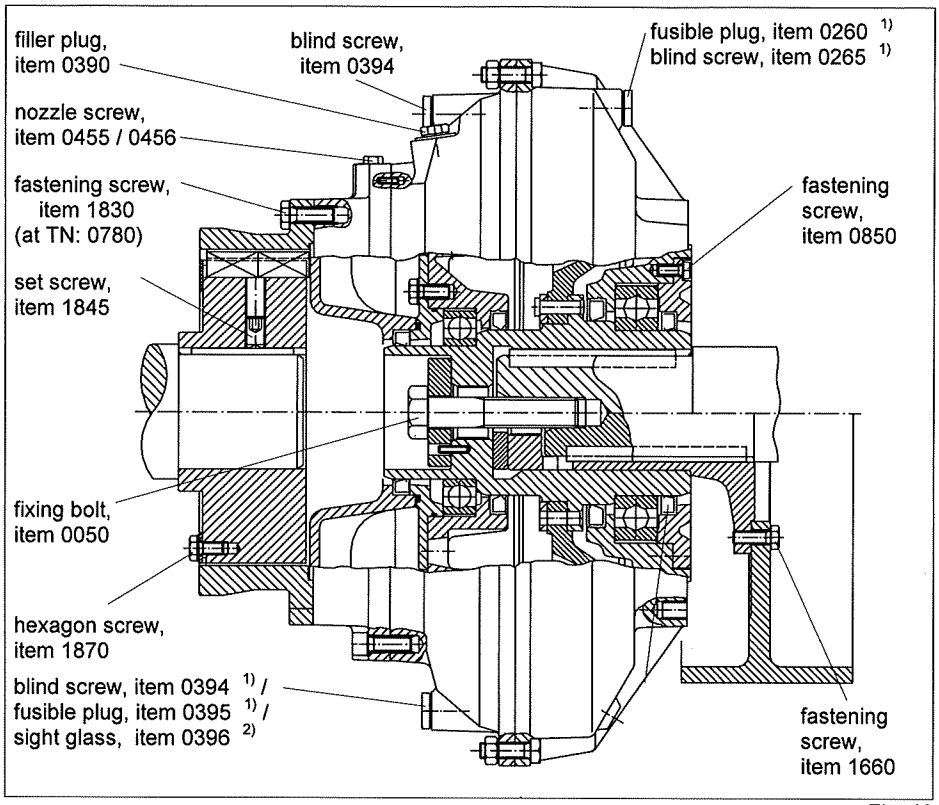

Fig. 19

1) For arrangement and quantity, please refer to tables in Chap. **13.4**.
2) From size 366.

6.1 Set screws and fixing bolts

The tightening torque applicable for set screw (item 1845) and fixing bolt (item 0050) depends on its dimension of thread:

	Tightening torque in Nm									
Thread	M6	M8	M10	M12	M16	M20	M24	M30	M36	M42
Set screw	4	8	15	25	70	130				
Fixing bolts		23	46	80	195	380	660	1350	2350	3750

Table 5

The tightening torques for set screws apply for property classes to DIN EN 898-5 / ISO 898-5.

Tightening torques of fixing bolts apply to bolts with property class 8.8 or higher (to DIN EN ISO 898-1), oil-moistened and of relevant shaft journal material.

6.2 Fusible plugs, filler plugs, sight glasses, blind- and nozzle screws

Tightening torque in Nm (dimension of thread)									
Coupling size	**Fusible plug, item 0395 / 0260**		**Filler plug, item 0390**		**Blindscrew, item 0394 / 0265**		**Sight glass, item 0396**		**Nozzle screw, item 0455, item 0456**	
154	8	(M8)	13	(M10)	8	(M8)	–	–	–	–
206	13	(M10)	20	(M12x1.5)	13	(M10)	–	–	–	–
274	13	(M10)	30	(M14x1.5)	13	(M10)	–	–	–	–
366 to 650	50	(M18x1.5)	80	(M24x1.5)	50	(M18x1.5)	50	(M18x1.5)	48	(M16x1.5)
750 to 1150	144	(M24x1.5)	235	(M36x1.5)	144	(M24x1.5)	144	(M24x1.5)	48	(M16x1.5)

Table 6

6.3 Fastening screws

Tightening torque in Nm (dimension of thread)										
Coupling size	**Fastening screw [1], item 1830 / 0780**		**Fastening screw [1], item 0850**		**Fastening screw [1], item 1660**		**Socket head screw Nor-Mex G, item 1816 [3]**		**Hexagonal screw [1] EPK, item 1870**	
154	9	(M6)	–	–	–	–	–	–	–	–
206	23	(M8)	–	–	–	–	–	–	–	–
274	68	(M12)	–	–	–	–	–	–	–	–
366	68	(M12)	23	(M8)	80	(M12)	49 [1]	(M10)	23	(M8)
422	68	(M12)	23	(M8)	80	(M12)	49 [1]	(M10)	46	(M10)
487	68	(M12)	23	(M8)	80	(M12)	49 [1]	(M10)	46	(M10)
562	68	(M12)	46	(M10)	195	(M16)	125 [2]	(M12)	46	(M10)
650	135	(M16)	46	(M10)	380	(M20)	200 [2]	(M14)	46	(M10)
750	135	(M16)	68	(M12)	380	(M20)	–	–	46	(M10)
866	250	(M20)	68	(M12)	380	(M20)	–	–	80	(M12)
1000	250	(M20)	68	(M12)	--	--	–	–	80	(M12)
1150	580	(M27)	68	(M12)	--	--	–	–	80	(M12)

Table 7

[1] Screws with property class 8.8 or higher (to DIN EN 20898-1 / DIN EN ISO 898-1) are used.

[2] Screws with property class 10.9 or higher (to DIN EN 20898-1 / DIN EN ISO 898-1) are used.

[3] See **Fig. 68, Chapter 20.2.1, page 101.**

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7 Installation of Basic Coupling Type T

DANGER!
Please observe, in particular, Chapter 4 (Safety) when working on the turbo coupling!

- **Outer wheel drive:**
  The coupling is mounted on the driven machine shaft and then, via a flexible connecting coupling, coupled with the drive motor.

- **Inner wheel drive** (special case)**:**
  The coupling is mounted on the drive motor shaft and then, via a flexible connecting coupling, coupled with the driven machine shaft.

7.1 Tools

EX-PROTECTION!
When using or assembling an Ex-coupling use only tools approved for application in explosion hazardous areas. Avoid sparking!

The list does not claim to be complete, check in detail with assembly plan.

Tools:
Open-end wrench spanner set
Ring spanner set
Hexagon socket spanner box (contains hexagon spanners, ratchet etc.)
Hexagonal recess/allen wrenches (Allan key set)
Screwdriver
Torque wrenches
Hammer, rubber hammer
File set
File brush (Wire brush)

→ **Dimension of thread see Chapter 6, page 29**

Measuring instruments:
Dial gauge with holder
Caliper gauge
External micrometer gauge according to shaft-diameter
Inside micrometer (Bore gauge) according to hub-diameter

→ **Dial gauges: Chapter 9.4, page 43**

Mounting auxiliaries:
Auxiliaries for alignment of motor and gearbox (fastening screws),
e.g. shims for motor and gearbox pedestals (0.1 – 0.3 – 0.5 – 1.0 – 3.0mm).
Grinding cloth, graining 100, 240

Lifting appliances and load suspension devices:
- Crane.
- Two shackles with appropriate slings (ropes, chains etc.) for coupling suspension. **Observe Fig. 20 and 21 on page 34 !**
- Adjustable chains or ropes with sufficient tensile strength (see individual weights).

→ **Swivel size see Chapter 6.3, page 30 item 1830 for T, item 0780 for TN**

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7.2 Preparation

→ Fig. 22, page 35

- Check the length of fixing bolt, if the length of shaft journal, on which the coupling is mounted, changed or was not indicated to Voith Turbo.
- Check radial runout of shaft journals of drive motor and driven machine.
- Clean fitting surfaces on shaft journals and hubs using emery cloth and check fitting dimensions.
- In case of installation, degrease flanges to be screwed.
- Slightly oil screw threads of screws.

EX-PROTECTION!

- **Shafts connected to the turbo coupling by means of a flexible connecting coupling must not exceed 80 °C during operation.**

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- Apply a thin slip additive film to the shaft journals.

Note!

Please use a slip additive with the following characteristics:

- operating temperature range: -20 °C...+180 °C,
- water and wash-out resistant,
- protection against fretting corrosion and corrosion.

- **Proposed slip additive:**

Manufacturer	Designation
Dow Corning	Molykote D Molykote G-Rapid plus Molykote TP 42
Fuchs	gleitmo 815 gleitmo 100 S
Liqui Moly	LM 48
Optimol	PASTE WHITE T PASTE MP 3

Table 8

ATTENTION!

- **Keys should be provided with sufficient back clearance, be axially fixed and run smoothly in the keyways.**
- **Observe that the balancing method is the same for shaft and hub. Our parts are marked to DIN ISO 8821 / ISO 8821:**
  H: Half key agreement
  F: Full key agreement
- **When using a shaft-hub connection with one (1) key and balancing to half key agreement, with the key being longer than the hub, reduce or shorten the key accordingly to avoid unbalance.**

- Insert the keys.
- Prepare suitable tools and lifting appliances; observe the turbo coupling weight!

→ **Lifting appliances: Chapter 4.4**

Note!

The cover sheet indicates the turbo coupling weight. The weight is also stamped on the outer diameter of coupling flange, if it exceeds 100 kg.

WARNING!

Damaged load suspension devices or those with insufficient carrying capacity may break under load, with the consequence of most serious or even fatal injuries!

Check the lifting appliances and load suspension devices for

- **sufficient carrying capacity (weight see cover sheet),**
- **sound condition.**

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7.3 Mounting

Note!
We recommend to use the **mounting and removal devices**, available at Voith Turbo as accessories from **size 274**.

ATTENTION!
The use of unsuitable working means and methods may cause damage to property.
When mounting the coupling prevent the use of
- **pressure plates,**
- **hammers,**
- **welding torches.**

In case of couplings with operating fluid water the hub bore is provided with solid film lubricant. Do not remove the solid film lubricant!

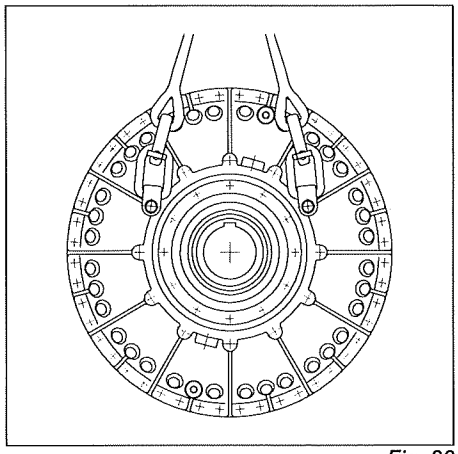

Fig. 20

- Fix the coupling to a suitable lifting appliance.
- Careful warming-up of the coupling hub (to approx. 80 °C) facilitates coupling mounting.

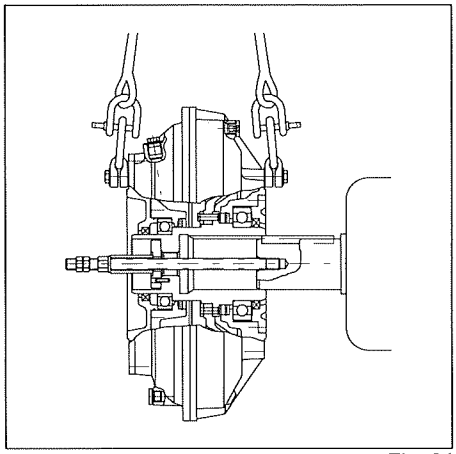

Fig. 21

- Position the coupling at the relevant shaft journal.
- Insert the holding disk supplied.

Note!
- For couplings up to **size 274** remove the circlip prior to inserting the holding disk and then reinsert it.
- For couplings from **size 366** secure the holding disk by means of a roll pin against rotation.

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ATTENTION!

Depending on the design of shaft, the coupling hub must be in contact with the shaft collar or the end face of shaft journal.

Coupling sizes 154 and 206:

- Insert a suitable and slightly oiled threaded rod in the shaft of the relevant machine.
- Mount the coupling on the shaft journal using a nut and a spacer tube.

Coupling sizes 274 up to 1150:

- Oil the mounting spindle slightly.
- Mount the coupling on the shaft journal using the mounting spindle, the spacer tube and the holding disk.

→ **Mounting devices: Chapter 7.4, page 36**

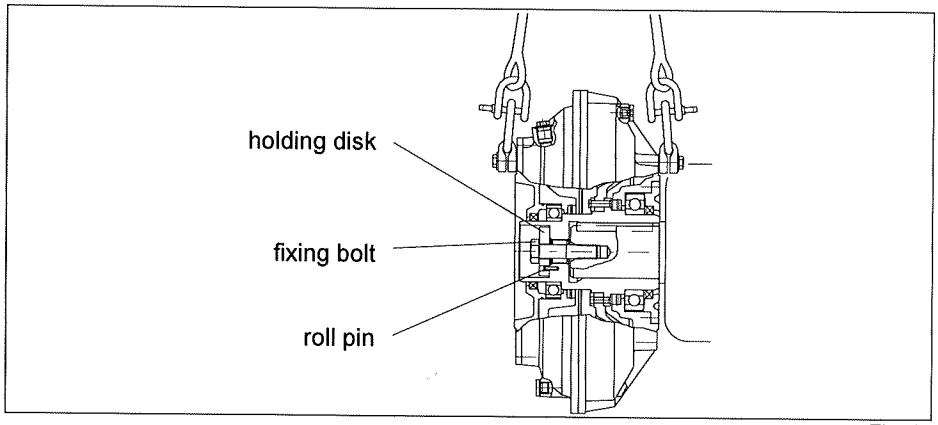

Fig. 22

- Check the proper seat of holding disk. Tighten the fixing bolt using the specified tightening torque.

→ **Chapter 6.1, page 29**

EX-PROTECTION! / ATTENTION!

The connecting coupling hub has to be secured axially! Usually this is achieved by means of a set screw pressing on the key. Axial butting to a shaft collar and lock by means of a holding disk and fixing bolt is also possible. Provide a spacer ring between hub and shaft collar, if necessary.

- Fix the hub to a suitable lifting appliance.
- Careful warming up of the connecting coupling hub (to approx. 80 °C) facilitates mounting.
- Mount the flexible connecting coupling hub on the relevant shaft journal.
- Tighten the set screw in the connecting coupling hub, if necessary.
- Move the connecting coupling hub with the relevant machine next to the turbo coupling. Observe correct number and proper seat of flexible elements in the connecting coupling!
- Fix the machine slightly.
- Align the drive.
- Report the mounting (see **Chapter 14**)
- If the turbo coupling is connected with a flexible pad coupling of type EPK, check that sheet-metal holder (item 1860) and ring (item 1810) do not touch.

→ **Chapter 9, page 40**

→ **Chap. 20.1.3 page 101**

EX-PROTECTION! / ATTENTION!

- **Report the mounting** (see **Chapter 14**).

7.4 Mounting devices

The following mounting devices are available at Voith Turbo for turbo couplings of basic type T:

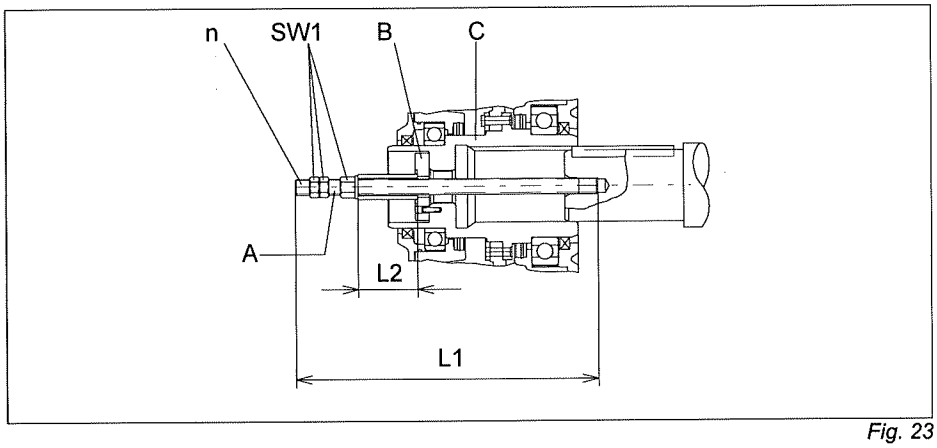

Fig. 23

A: mounting spindle
B: original holding disk
C: coupling hub
L1: total length
L2: length of spacer tube
n: dimension of mounting spindle thread
SW1: wrench size across flats

Coupling sizes	L1	L2	n	SW1
274	520	135	M10 M12 M16 M20	17 19 24 30
366, 422	520	190	M10 M12 M16 M20	17 19 24 30
487, 562, 650, 750	780	245	M16 M20 M24 M30	24 30 36 46
866, 1000, 1150	1150	480	M20 M24 M30 M36 M42	30 36 46 55 65

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8 Installation of Basic Coupling Type TN

DANGER!
Please observe, in particular, Chapter 4 (Safety) when working on the turbo coupling!

ATTENTION!
The use of unsuitable working means or methods may cause damage to property.

When mounting the coupling prevent the use of

- **pressure plates,**
- **hammers,**
- **welding torches.**

The application is an **outer wheel drive**. Mount the primary coupling flange on the motor shaft. Then connect the turbo coupling with the primary coupling flange and couple it with the driven machine shaft through a flexible connecting coupling.

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8.1 Mounting

- Have tools available according to **Chapter 7.1**.
- Make the necessary preparations according to **Chapter 7.2**.

→ page 32

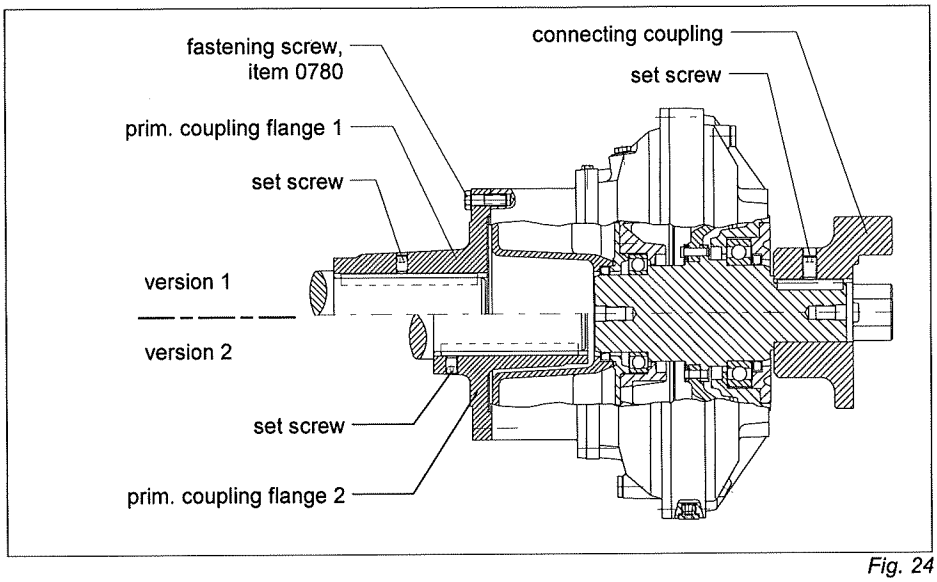

Fig. 24

- Mount the primary coupling flange on the motor shaft securing it with the relevant set screw in axial direction. Careful warming-up of primary coupling flange (to approx. 80 °C) facilitates mounting.
- Mount the connecting coupling hub on the coupling shaft securing it with the relevant set screw in axial direction.
- Position the turbo coupling in front of the primary coupling flange.
- In the event of **complete balancing**, balancing marks (e.g. 0/0, 1/1, 2/2 etc.) are provided at the outer periphery of turbo coupling and the primary coupling flange. **Observe that these balancing marks match!**

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ATTENTION!
Prior to tightening the bolts (item 0780) push the external spigot of turbo coupling manually into internal spigot of primary coupling flange.
Do not tighten bolts (item 0780) before the two flange surfaces touch each other without any gap, otherwise there is a risk to damage the centerings!

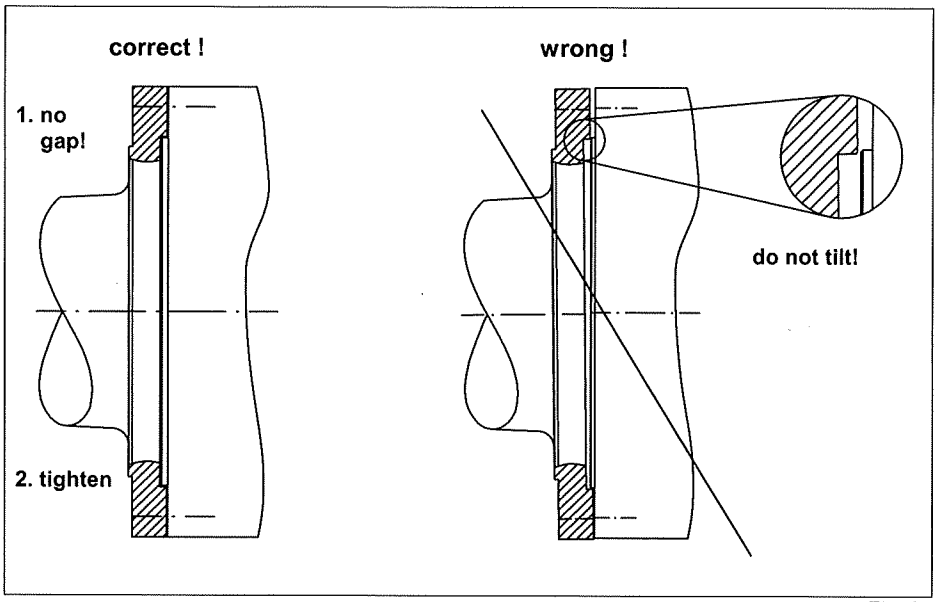

Fig. 25

- Fix the turbo coupling to the primary coupling flange using the relevant screws (item 0780).
- Insert the flexible element in the connecting coupling hub.

→ **Tightening torque: Chapter 6.3, page 30**

WARNING!
Fix the slings (chains, ropes etc.) only to the drive motor!
Fixing the slings to the coupling may cause damage.

- Move the mounted drive motor/turbo coupling unit next to the driven machine and bolt the drive motor slightly.
- Align the drive.

→ **Chapter 9**

EX-PROTECTION! / ATTENTION!
- **Report the mounting** (see **Chapter 14, page 67**).

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9 Alignment

DANGER!
Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

9.1 Flexible connecting couplings

- A flexible connecting coupling couples the turbo coupling with a shaft journal.
- Following alignment some misalignment remains between turbo coupling and shaft journal. The flexible connecting coupling absorbs this misalignment..

EX-PROTECTION!
Connecting couplings delivered by Voith meet the requirements for use in potentially explosive atmospheres.
If connecting couplings are used which are not Voith supply, an ex-proof approval is required, otherwise there is a risk of explosion!

9.1.1 Connecting couplings on input side (Outer wheel drive)

Connecting couplings available at Voith Turbo for turbo couplings of basic type T:

Flexible roller coupling
type **ERK**:

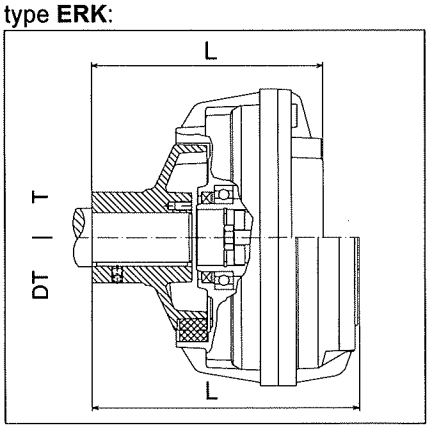

Fig. 26

Flexible pad coupling
type **EPK**:

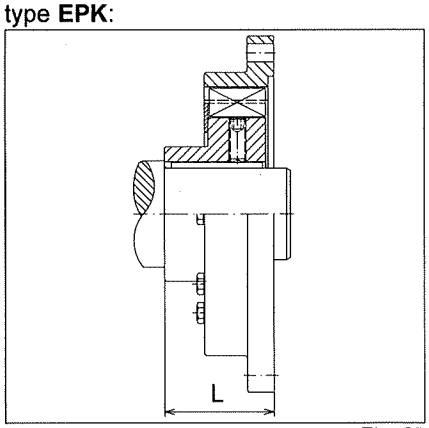

Fig. 27

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Flexible element coupling
type **EEK-M**:

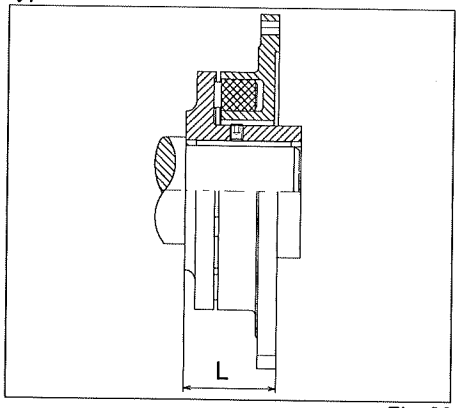

Fig. 28

Flexible element coupling
type **EEK-E**:

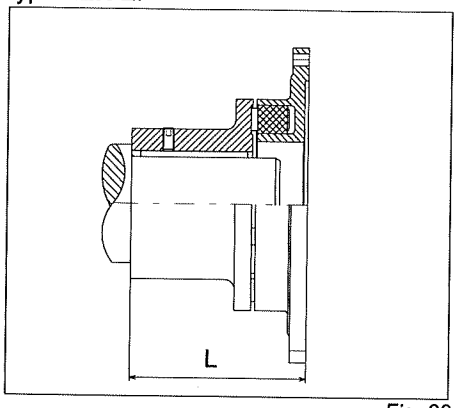

Fig. 29

Flexible cam coupling
type **ENK-SX**:

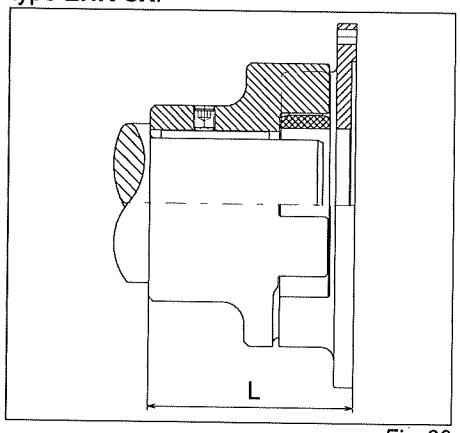

Fig. 30

Flexible cam coupling
type **ENK-SV**:

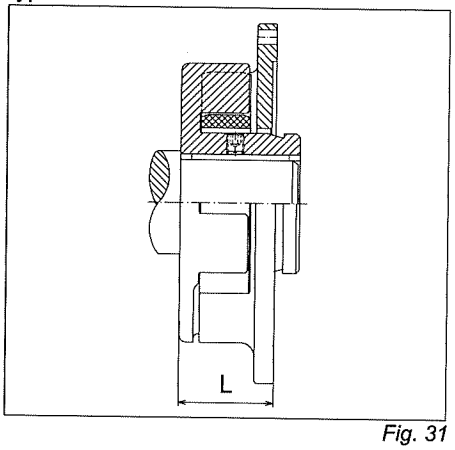

Fig. 31

9.1.2 Connecting couplings on output side (Outer wheel drive)

Connecting couplings available at Voith Turbo for turbo couplings of basic type TN:

Flexible connecting coupling
type **Nor-Mex G**:

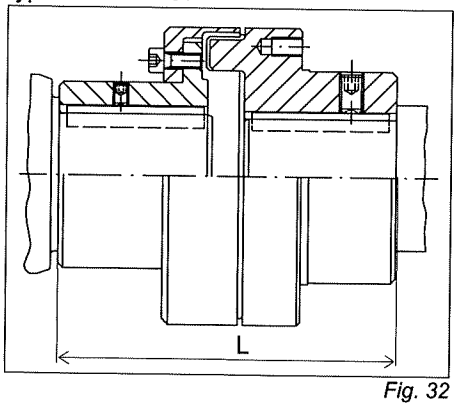

Fig. 32

9.2 Laid lengths and type allocations turbo coupling / flexible connecting coupling

Laid lengths L for flexible connecting couplings, as shown in **chapter 9.1**:

	Laid length L in mm						
Coupling size and type	**ERK with coupling**	**EPK**	**EEK-E**	**EEK-M**	**ENK-SX**	**ENK-SV**	**Nor-Mex G**
154 T...	143 +1	-	-	-	-	-	-
154 DT...	165 +1	-	-	-	-	-	-
206 T...	183 +1	-	-	-	-	-	-
206 DT...	223 +1	-	-	-	110.5 ±1.5	56.5 ±1.5	-
274 T...	255 +1	78 ±1	-	-	158.5 ±2	67 ±2	-
274 DT...	295 +1	78 ±1	159 ±2	67 ±2	158.5 ±2	67 ±2	-
366 T...	-	78 ±1	159 ±2	67 ±2	158.5 ±2	67 ±2	176 ±1
422 T...	-	102 ±1	173 ±2	72 ±2	173 ±2	72 ±2	198 ±1.5
487 T...	-	106 ±1	190 ±2	88 ±2	190 ±2.5	87.5 ±2.5	221 ±1.5
562 T...	-	116 ±1	221 ±2	103 ±2	221 ±2.5	102.5 ±2.5	267 ±2
650 T...	-	152 ±1.5	274 ±2.5	126 ±2.5	274 ±2,5	125,5 ±2,5	310 ±2.5
750 T...	-	163 ±1.5	-	-	276 ±2,5	127,5 ±2,5	-
866 T...	-	189 ±1.5	-	-	-	-	-
1000 T...	-	210 ±1.5	-	-	-	-	-
1150 T...	-	210 ±1.5	-	-	-	-	-
1150 DT...	-	210 ±1.5	-	-	-	-	-

Table 9

ATTENTION!
To avoid any axial constraining forces, it is absolutely necessary to adhere to the laid lengths! Please observe, in particular, displacements due to temperature changes.

EX-PROTECTION!
If shaft ends axially protrude the connecting coupling hub, measure the dimensions to make sure that a distance of 6mm to the turbo coupling is kept.

9.3 Alignment tolerances

EX-PROTECTION!

- **Undue misalignments cause material damage.**
- **It is necessary to meet the values specified for radial and axial runout at all operating conditions.**
- **Please observe, in particular, displacements due to temperature changes.**

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Note!

The smaller the radial and angular displacement between turbo coupling and shaft journal the

- higher the lifetime and reliability of the unit,
- the better is smooth running.

Maximum permissible **alignment tolerances** apply to:

- **radial runout** in the radial plane of flexible elements (maximum permissible radial deflection of dial gauge!)
- **axial runout**, measured over the largest connecting coupling diameter (maximum permissible axial deflection of dial gauge!).

Maximum permissible alignment tolerances for the **radial and axial deflection of dial gauge** when using the connecting couplings shown in **chapter 9.1**:

Coupling sizes	Speed range in min^{-1}			
	0...750	750...1200	1200...1800	1800...3600
154 to 274	0.4 mm	0.4 mm	0.3 mm	0.2 mm
366 to 487	0.6 mm	0.4 mm	0.3 mm	0.2 mm
562 to 1150	0.8 mm	0.6 mm	0.4 mm	0.3 mm

Table 10

The values mentioned above describe the maximum permissible **radial and axial deflection of dial gauge**!

ATTENTION!

Observe maximum permissible speed!

Do not exceed maximum permissible speed! You will find maximum permissible speed on the cover sheet of this instruction manual.

→ **Maximum speed: See cover sheet**

9.4 Alignment

Note!

For alignment support the motor feet using shims or foil sheets. It would be advantageous to use claws with adjusting screws on the foundation for lateral movement of the drive unit.

Alignment methods and its accuracy:

Method	Accuracy
LASER optical	very accurate
dial gauges	accurate
feeler gauge, depth gauge, Caliper gauge	less accurate

Table 11

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Suggestions how to fit dial gauges:

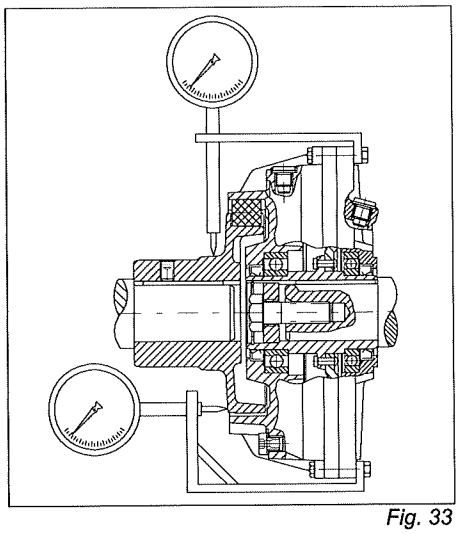

Fig. 33

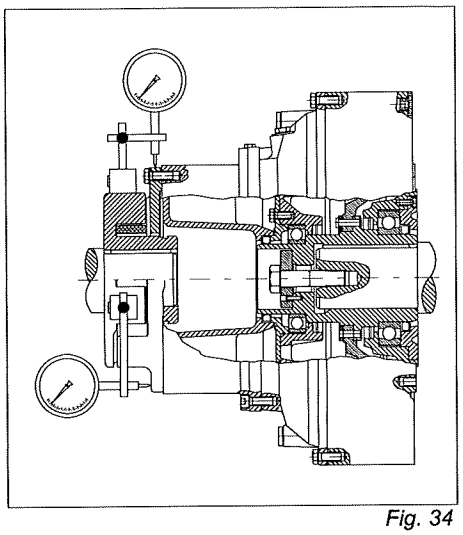

Fig. 34

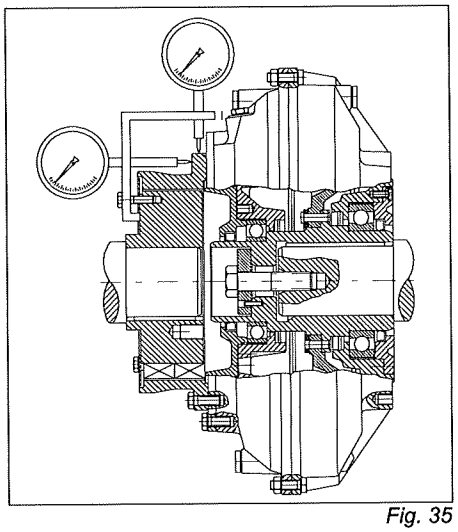

Fig. 35

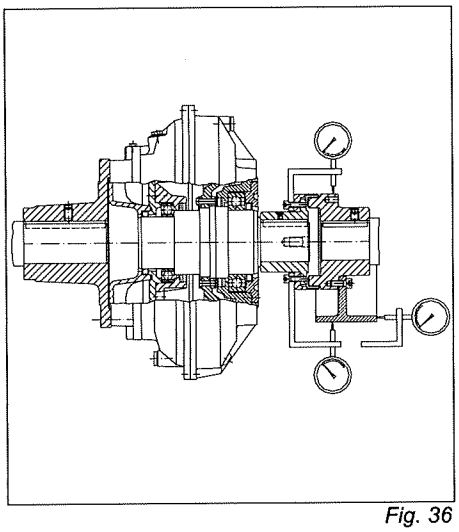

Fig. 36

How to proceed:

→ **Chapter 7 or 8, page 31 or 37**

- Mount the turbo coupling.
- Align input with output shaft.
- Fix input and output unit on the foundation.

→ **Alignment tolerances: Chapter 9.3, page 42**

- Check alignment after tightening all screws, correct alignment, if necessary. Misaligned connecting couplings result in an irregular gap in the periphery.

→ **Chapter 14, page 67**

- Document alignment.

10 Operating Fluids

ATTENTION!

- **Use only the operating fluid mentioned on the cover sheet of this operating manual.**
- **Unsuitable operating fluids may damage the turbo coupling permanently!**
- **Consult Voith Turbo if you want to use an operating fluid not mentioned.**

ATTENTION!

Operating fluids are detrimental to health and may pollute the environment. Dispose of used operating fluid via an authorized collecting station in accordance with the national statutory provisions.
Make sure that no operating fluid reaches the sewage system, soil or water!

DANGER!

The operating fluid could spray off from defective components or fusible plugs, seriously injuring persons!

Maintain the turbo coupling regularly!
Experts only are allowed to work on the turbo coupling!

10.1 Requirements to be fulfilled by the operating fluid mineral oil

- Viscosity class ..... ISO VG 32 to DIN 51519 *)
- Starting viscosity ..... less than 15000 mm^2s^{-1} (cSt)
- Pourpoint ..... the limit is 4 °C below actual minimum ambient temperature or lower
- Flash point ..... greater than 180 °C and at least 40 °C above nominal response temperature of fusible plugs
- Fire point ..... at least 50 °C above max. surface temperature (see **chapter 1**)
  (only relevant for couplings used in hazardous areas (Ex))
- Resistance to aging ..... aging-resistant refined product
- Compatibility with seals ..... NBR (Nitril-Butadien caoutchouc) and FPM/FKM (fluor caoutchouc)

Advantageous additional qualities

- FE 8: D7.5 / 80-80 Abrasion of rolling elements < 30mg
  Abrasion of cage < 100mg

*) for special cases ISO VG 10 – 46 usable

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10.1.1 Usable operating fluids

- Hydraulic oils HLP 32 to DIN 51524, Part 2 *)
- Lubricating Oil CLP 32 to DIN 51517, Part 3
- Steam turbine oils LTD 32 to DIN 51515, Part 1 *)
- HD engine oils SAE 10 W
- ATF type A Suffix A (TASA) and type Dexron II, IID, IIE, III, MERCON
- M-891205 and M 921253

*) for special cases ISO VG 10 – 46 usable

10.1.2 Proposed operating fluids

Manu-facturer	Designation	Pour-point in °C	Flash point in °C	Fire point in °C	Class	FE8-test satisfied
Addinol	Hydraulik-Oil HLP 32	-21	195		HLP	
Agip	Agip Oso 32	-30	204		HLP	
	Agip Blasia 32	-29	215		CLP	
Aral	Degol BG 32	-27	200	250	CLP	
Avia	Avia Fluid RSL 32	-27	214	237	HLP	
	Gear RSX 32 S	-33	210	231	CLP	
BP	Energol HLP-HM 32	-30	216		HLP	
Castrol	Hyspin SP32	-28	200		HLP	ja
	Hyspin AWS 32	-27	200		HLP	
CEPSA	HIDROSIC HLP 32	-24	204		HLP	
	EP 125	-30	206		HLP	
ExxonMobil	Nuto H32	-24	212		HLP	
	DTE 24	-27	220		HLP	
	Mobil SHC 524	-54	234	234	HLP	
Fuchs	Renolin MR10	-30	210		HLP	
	Renolin B10	-24	205		HLP	
Klüber	Lamora HLP 32	-18	200		HLP	
Kuwait	Q8 Haydn 32	-30	208	232	HLP	
Petroleum	Q8 Holst 32	-30	208	234	HLP	
Optimol	Hydo MV 32	-38	209	234	HLP	
Ravenol	Hydr.- Oil TS32	-24	220		HLP	
Shell	Tegula V32	-33	211		HLP	ja
SRS -	Wintershall Wiolan HS 32	-24	220	240	HLP	
Salzbergen	Wintershall Wiolan HF 32	-27	200	240	HLP	ja
Texaco	Rando HD 32	-30	196	246	HLP	
Total	Azolla ZS 32	-27	210	220	HLP	

Table 12

The above oil list is a recommendation and does not claim to be complete.

ATTENTION!

- **The values mentioned for the pourpoint, flash and fire point are approximate values and data originating from the oil suppliers. These may vary and Voith Turbo will not accept any warranty claims!**
  Country-specific production of basic oil may result in deviating values.
- **In the event of critical applications, we suggest to consult the respective oil supplier!**

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10.2 Proposed operating fluids for special requirements

Operating fluid for the use in the food industry

Manufacturer	Description	Pourpoint in °C	Flashpoint in °C	Class
Klüber	Summit HySyn FG 32	-45	>230	HLP

Note: The USDA H1-Registration meets the FDA Requirements.

Fire-resistant operating fluid

Supplier	Description	Pourpoint in °C	Flashpoint in °C	Class
Voith Turbo GmbH & Co. KG	HIFluid	-33	305	HFD-U

Note: Voith-HIFluid is a fire-resistant fluid of the viscosity class ISO VG 46 and contains neither chlorinated hydrocarbons nor phosphorus acid ester. The density of the fluid is lower than the density of water.

Biodegradable operating fluid

Supplier	Description	Pourpoint in °C	Flashpoint in °C	Class
Voith Turbo GmbH & Co. KG	EPFluid	-36	230	HEES

Note: Voith-EPFluid is a fast biodegradable fluid of the viscosity class ISO VG 46 to VDMA 24568. The water risk class is 1 and the density of the fluid is lower than the density of water.

10.3 Requirements to be fulfilled by the operating fluid water

ATTENTION!
Water filing is only allowed in a coupling of type TW !

- Seal compatibility ..... NBR (Nitril-Butadien caoutchouc)
- pH-value ..... 5...8

The water used should
- be free from an solid particles,
- contain only a low amount of salt,
- should contain only a low concentration of other additives.

10.3.1 Usable operating fluids

Usually these requirements are satisfied by drinking water.

→ You will find the **type designation** of your **turbo coupling** on the **cover sheet** of this operating manual.

10.3.2 Operating fluid water used for turbo couplings with centrifugal valves (types TW...F...)

For turbo couplings with centrifugal valves it is necessary to add a low amount of grease to the water. The grease guarantees permanent function of centrifugal valves. In the as delivered condition the corresponding amount of grease is already in the working chamber of coupling.

ATTENTION!
On refill of turbo couplings with centrifugal valves (types TW...F...) it is necessary to add a low amount of grease to the water!

- **Required amount of grease:**

Coupling size	366	422	487	562	650	750	866
Amount of grease	80 g	100 g	120 g	150 g	180 g	210 g	240 g

Table 13

- **Requirements to be fulfilled by the grease:**

Consistency class	2 to NLGI
Thickeners	anorganic thickener (gel), when the added water is non-alkaline
Service temperature	-20...+120 °C
Material compatibility	NBR (Nitril-Butadien caoutchouc)

Table 14

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- **Proposed greases:**

Supplier	Designation
Agip	GR NF
Aral	Aralub HTR 2
Autol	PRECIS Bentonit grease
Avia	Aviation 2 EP
BP	Energrease HTG 2
ELF	Staterma Mo 2
ESSO	HT Grease 275
Fuchs	Renogel FHT 2
Klüber	Pentamo GHY 133
Mobil	Mobiltemp SHC 100
Oest	High melting-point grease 4854
Optimol	Optitemp HT 2
Shell	Darina Grease 2
Texaco	Thermatex FRA 1
Total	Caloris 2
Valvoline	High melting-point grease w-k
Wintershall	Wiolub HTF 940

Table 15

The above grease list is a recommendation and does not claim to be complete.

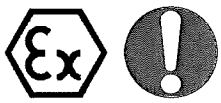
11 Fill, Filling Check and Draining

- The quantity and type of operating fluid used determines the turbo coupling behavior substantially.
- A too large quantity leads to a higher load on the drive motor during start-up and to a higher stall torque.
- A too low filling leads to a higher thermal load of coupling and to a lower stall torque.

DANGER!
Please observe, in particular chapter 4 (Safety) when working on the turbo coupling !

CAUTION!
- **Operating fluids may cause irritations or inflammation when in contact with skin and mucous membranes.**
- **Please always wear protective glasses for any work to be done in connection with the operating fluid!**

- **Should you get any operating fluid in your eyes, rinse them immediately using a lot of water and consult a physician without delay!**
- **After you finished your work, clean your hands carefully with soap.**
- **Begin any work only after the coupling has cooled down to below 40 °C, otherwise there is a risk of burning!**



EX-PRROTECTION! / ATTENTION!
- **Impurities in the operating fluid cause an increased wear of the coupling and bearing damages. Then explosion protection is no longer given. Make sure that any containers, funnels, filling tubes etc., used for filling the coupling, are clean.**

ATTENTION!
- **Comply with the quantity to be filled in mentioned on the cover sheet.**
- **Do not overfill! This would lead to an undue high internal pressure in the coupling, which may destroy the coupling.**
- **Fill and drain the turbo coupling only after it has cooled down.**
- **Do not mix the different types of operating fluids.**
- **Use only the operating fluid mentioned on the cover sheet of this operating manual.**
- **Ensure that the original sealing rings used are in sound condition.**

Note!
You will find the tightening torques in **chapter 6** from **page 29**, please observe **Fig. 19** on **page 29**.

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11.1 Coupling fill

Note!
- Turbo couplings are delivered without fill.
- The operating fluid included in the scope of supply is shipped in a separate container.

→ **Fill level:** See **cover sheet**

11.1.1 How to fill couplings installed in horizontal position

- Couplings of size 154 - 274:
  Turn coupling until the filler plug (item 0390) is on top.

  Couplings of size 366 - 1150:
  Turn coupling until the filler plug (item 0390) closest to the sightglass (item 0396) is on top.
- Unscrew the filler plug.
- Remove the top fusible plug (item 0395 or item 260) for pressure compensation.
- In the event of a refill of turbo couplings with centrifugal valves and the operating fluid water (types TW...F...) fill in a specified quantity of grease into the coupling working chamber.

→ **Quantity:** See **Chapter 10.3.2, page 48**

- Fill in the specified operating fluid quantity (→ **Chapter 10**) through a fine screen (mesh size ≤ 30µm) through the filler plug opening.
- Tighten the filler plug.
- If the coupling is provided with a sight glass (item 0396), tighten the fusible plug.

→ **Operating fluid** and **fill quantity** see **cover sheet**

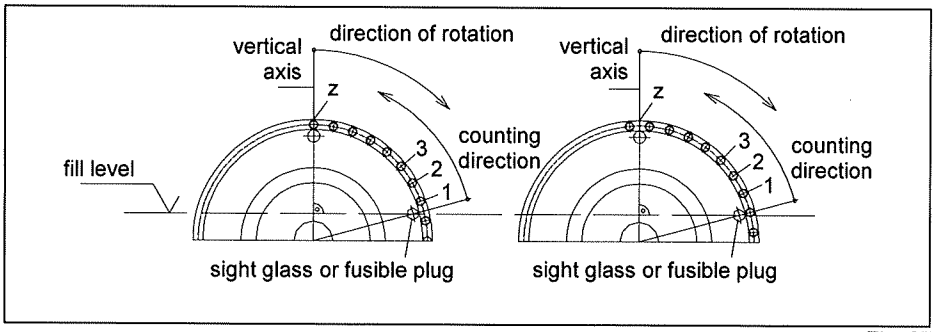

Fig. 37

- Turn the coupling until the operating fluid is just visible at the sight glass (if available) or until the operating fluid can be seen at the opening of the (still) unscrewed fusible plug, but is not yet leaking out.
- Determine the **number z** of flange screws from the sight glass or fusible plug to the vertical axis. The first screw is the one in counting direction, **after** the intersection line through the sight glass and/or fusible plug.

Z = ____

- For later filling level checks, record the **number z** of screws determined and additionally mark the coupling guard.

→ **Assembly control report: Chapter 14.1, page 68**

- If not yet done, tighten the fusible plug.
- After a test run (with guard!) check the coupling for leaks.

→ **Tightening torques: Chapter 6.2, page 30**

11.1.2 How to fill couplings installed in vertical position

Shell (item 0190) positioned on top: Outer wheel (item 0300) positioned on top:

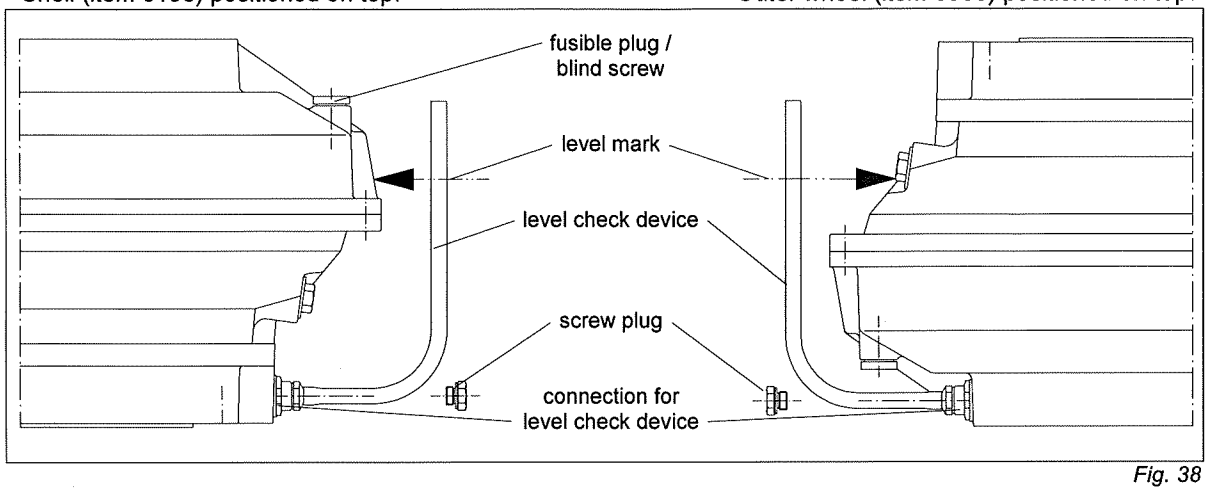

Fig. 38

- Remove the two top screws (either two fusible plugs or two blind screws).
- Remove the screw plug.
- Fill in the specified operating fluid quantity through a fine screen (mesh size ≤ 30µm) into a screw opening. The other screw opening is provided for pressure compensation.
- Re-close screw holes on top using the screws (items 0260, 0265, 0394, or 0395). Rotate coupling with nominal speed for a short period of time to let the operating fluid spread regularly.
- Turn out two screws on top once again.

→ The **level check device** is available as **accessory** at Voith Turbo for couplings from **size 366**

- Fix the level check device to the connection provided for this purpose.
- Provide the level mark at the coupling or guard for later level checks.
- Remove the level check device.
- Tighten the slackened screws.
  Tightening torque for the screw plug: **30 Nm** (M14x1.5).
- After a test run (with guard!) check the coupling for leaks.

11.2 Filling check

You will find the **fill rate** provided on the **cover sheet** of this operating manual.

11.2.1 Level check for couplings installed in horizontal position

Note!

– From **size 366** turbo couplings are equipped with a sight glass in the outer wheel; the position of sight glass is marked by an arrow.

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- If a sight glass does not exist, turn the coupling until a fusible plug is on top. Then remove this fusible plug. → **Fig. 37: page 51**
- Turn the coupling until the operating fluid is just visible at the sight glass or the operating fluid is not yet leaking out at the opening of unscrewed fusible plug.
- Determine the **number z** of flange screws from the sight glass or fusible plug up to the vertical axis. The first screw is the one in counting direction, **after** the intersection line through the sight glass or fusible plug. → **Number z: Chapter 11.1, page 51**
- Compare the number of screws determined with the number of screws determined during filling. Please observe the mark additionally provided on the coupling or guard.
- Correct the filled-in quantity in case of any variations!
- If a fusible plug has been unscrewed, retighten the same. → **Tightening torques: Chapter 6.2, page 30**
- After a test run (with guard!) check the coupling for leaks.

11.2.2 Level check for couplings installed in vertical position

→ **Fig. 38, page 52**

Note!

- B The level of couplings from **size 366** is checked using a level check device. This level check device is available at Voith Turbo as accessory.
- Couplings up to **size 274** are to be drained for level check and then to be refilled.

- Unscrew a top screw (fusible plug or blind screw) for ventilation. → **Fig. 38, page 52**
- Remove the screw plug.
- Fit the level check at the connection provided for this purpose.
- Compare the level with the mark provided during filling. → **Chapter 11.1.2, page 52**
- In case of variations, correct the fill level accordingly!
- Remove the level check device.
- Tighten slackened screws.
  Tightening torque for the screw plug: **30 Nm** (M14x1.5).
- After a test run (with guard!) check the coupling for leaks.

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11.3 Draining the coupling

ATTENTION!
Improper disposal of operating fluid may cause most severe environmental damage! On disposal please observe the applicable laws and the manufacturers or suppliers instructions!

- Provide suitable containers to collect the operating fluid.

11.3.1 Draining of couplings without delay chamber installed in horizontal position

- Turn the coupling until one fusible plug is at the lowest point.
- Unscrew this fusible plug.
- For venting purposes, remove one filler or fusible plug on the opposite side.
- After draining the coupling, retighten the screws. Only use original sealing.

→ **Tightening torques: Chapter 6.2, page 30**

11.3.2 Draining of couplings with delay chamber installed in horizontal position

- Turn the coupling until one fusible plug is at the lowest point.
- Unscrew this fusible plug.
- For venting purposes, remove one filler or fusible plug on the opposite side.
- Wait until the coupling working chamber is drained.

Coupling size 274:	Coupling sizes 366 to 1150:
■ Retighten fusible and filler plugs. ■ Switch on drive motor for approximately half a minute to one minute. The operating fluid in the delay chamber drains into the working chamber. **Observe the safety regulations!** ■ Unscrew the fusible plug again.	■ Remove nozzle screw (item 0455 / 0456). ■ Turn the coupling until the nozzle screw opening is at the lowest point. ■ Wait until the delay chamber is drained. ■ Tighten the nozzle screw.

Table 16

- Turn the coupling until the fusible plug opening is at the lowest point.
- After draining the rest out of the coupling working chamber, retighten the screws.

→ **Tightening torques: Chapter 6.2, page 30**

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11.3.3 How to drain couplings installed in vertical position

- For venting purposes, remove one blind screw or fusible plug on the top side of coupling.

→ **Fig. 38, page 52**

Up to coupling size 274:	From coupling size 366:
■ Unscrew one bottom blind screw or fusible plug.	■ Remove the connection of level check device.

Table 17

- Retighten screws after draining the coupling.
  Tightening torque for the connection: **80 Nm** (M24x1.5).
  Tightening torque for the screw plug: **30 Nm** (M14x1.5).

Note!
On account of the design, complete draining is not possible when the coupling is installed!

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12 Commissioning

DANGER!
Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

Improper commissioning may cause personal injuries, or harm to property and the environment!

Experts only are allowed to perform commissioning, in particular first starting of the turbo coupling!

Secure the installation against unintentional switching on!

EX-PROTECTION! / ATTENTION!

- **Check whether the coupling, according to the marking, is approved for use in potentially explosive atmospheres.**
- **Equip the coupling with a protective cover (e.g. perforated plate, size of holes approx. 10-12 mm). This protective cover needs to be designed to:**
  - **prevent intrusion of damaging foreign matter (stones, corrosive steels etc.).**
  - **withstand the impacts to be expected without excessive damages, thus preventing contact of the coupling with the guard. Especially couplings with aluminium surfaces are not to contact corrosive steel or iron parts.**
  - **catch spraying solder of fusible plugs.**
  - **collect operating fluid leaking out to prevent contact with parts (motor, belt) which might ignite or catch fire.**
  - **provide sufficient ventilation to maintain the maximum surface temperature specified.**
    A perforated plate with 65% hole section enclosing the coupling on all sides does not cause reduction of ventilation (where necessary, consult Voith).
  - **guarantee safe distance against hazardous points or situations (DIN EN ISO 13857).**
- **The turbo coupling is not equipped with insulated ball and roller bearings! Current passage and stray currents are possible from the machines connected (e.g. VFD).**
- **To avoid static charging or load prevent turbo coupling installation with an insulation on both sides.**
- **Provide equipotential bonding between input and output.**
- **Provide units with possible overspeed with a device preventing overspeed safely (for example: brake or back stop).**

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DANGER!

Loose clothes, long hair, jewelry, rings or loose parts could get stuck and be drawn in or wound up causing serious injuries , damage of the turbo coupling and harm to the environment.

Only work with close clothes!
Fix long hair underneath some headgear!
Do not wear jewelry (e.g. chains, rings etc.)!
Never operate the coupling without protective cover!

ATTENTION!

- **Never operate the turbo coupling without operating fluid!**
- **On account of the type of bearings used for standard turbo couplings size 366, 422, 487, 562, 650, 750, 866, 1000 and 1150 at least one standstill is required within a period of 3 months.**
- **On account of the type of bearings used for standard turbo couplings size 154, 206 and 274, at least one standstill is required once a week.**

EX-PROTECTION! / ATTENTION!

- **Check, whether the flexible connecting coupling touches.**
- **Check reference dimensions of connecting couplings prior to commissioning (see chapter 13.2.1).**
- **If you use a BTS-Ex to limit the maximum surface temperature, make sure not to exceed the maximum permissible temperature of the turbo coupling when switching on the motor.**
- **After installation and filling, put the coupling into operation, observe any irregularities.**
- **Document commissioning (see commissioning report, Chapter 14.2).**

→ **Technical Data: Chapter 1, page 5**

EX-PROTECTION! / Note!

- At the periphery the couplings are provided with an identifying mark according to Directive 94/9/EG and EN13463. The identifying mark specifies the potentially explosive atmosphere and the operating conditions permitted.

Example: CE Ex II 2D c 180°C X

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Note!

- The turbo coupling may be used for any direction of rotation.
- The direction of rotation of driven machine may be specified! The direction of rotation of motor must be in accordance with the specified direction of rotation of driven machine!
- If the motor is started with star/delta connection, switchover from star to delta connection should be effected after maximum 2...5sec.
- In the event of a multi-motor drive you should determine the load of individual motors. Great differences in motor load may be balanced by an appropriate adjustment of the respective coupling fill levels. **However, do not exceed maximum permissible coupling fill level!**

13 Maintenance, Repair

Definition according to IEC 60079:

Maintenance and Repair: A combination of all activities conducted in order to maintain an object in a condition or to re-condition the article in a way that satisfies the requirements of the respective specification and secures the required functions.

Inspection: An activity containing the careful examination of an object which aims to a reliable statement as to the condition of this object. This examination is performed without disassembly or, if required, with partly disassembly supplemented by measures, such as e.g. measurements.

Visual test: A visual test is an examination which detects visible defects, such as e.g. missing screws or bolts, without using accessive devices or tools.

Short-range examination: An examination, where, in addition to the visual test, also such defects, as e.g. loose screws or bolts, are detected which can only be seen when using accessive devices, such as e.g. mobile stair steps (if required) and tools. Usually short range examinations do not require to open the housing or to electrically disconnect the utility.

Detail test: An examination which, in addition to the aspects of the short range examination, detects such defects, as e.g. loose connections which can only be found by opening the housing and/or by using tools and test devices, if required.

- Only skilled, trained and authorized personnel ore persons trained by Voith Turbo are allowed to execute repair measures.
- Components may only be replaced by original spare parts.
- Regularly clean devices used in explosion hazardous areas. The operator specifies the intervals according to ambient conditions at site, e.g. at dust deposit of approx. 0.2...0.5 mm.
- Following maintenance and/or repair re-attach all barriers and notes which have been removed in its original position.

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DANGER!

Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

Due to improper action and insufficient access persons may fall and be seriously injured!
Care for permanently free access to the turbo coupling!

Death, serious or minor injuries, harm to property or environment may be the consequence of improper servicing and maintenance.

Qualified experts only are allowed to perform servicing and maintenance works!

Switch off the unit the coupling is installed into and secure the switch against switching on.

For all work performed on the turbo coupling ensure that both, drive motor and driven machine have stopped running and startup is absolutely impossible!

Mount all safety casings and safety devices immediately after completion of servicing and maintenance works and check their function!

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Maintenance plan:

Time	Maintenance work
Routine inspection every 500 operating hours, every 3 months, at the latest	inspect the unit for irregularities (Visual test: Tightness, noise, vibrations). Check foundation bolts of the installation, if required tighten with specified torque
3 months after commissioning, at the latest, then every year	Check electrical unit for sound condition, if temperature monitoring is required in **Chapter 1** (detail examination).
Connecting couplings EEK, ENK, Nor-Mex G: **3 months after commissioning at the latest, then annually, however, after 4000 operating hours at the latest or different to 13.2.2**	Check flexible elements (item 1820) for wear and **replace them by original spare parts when the wear limit is reached**, since metallic contact of the connecting coupling halves may cause sparking. **There is hazard of fire and explosion!** (see **Chapter 13.2** and **20**).
Connecting couplings ERK, EPK: **3 months after commissioning at the latest, then annually or different to 13.2.2**	Check flexible elements (item 1820) for wear and **replace them by original spare parts when the wear limit is reached**, since flexible elements may break when worn.
After 3 years or 5 years (in case of ERK and EPK couplings) use	Replace flexible elements by sets of original spare parts.
If mineral oil is used as operating fluid: Every 15000 operating hours	- Change the operation fluid or check it for aging and - Determine remaining servicelife (see records, **Chapter 14**)! Consult the operating fluid supplier with regard to the permissible values (see **Chapter 10** and **11**).
on response of a fusible plug	change all fusible plugs and the operating fluid (→ **Chapter 13.4**). check operating conditions (Chapter **1**). check devices provided for temperature monitoring (see **Chapter 18**: MTS, BTS(ex), BTM).
In case of impurity	Cleaning (→ **Chapter 13.1**).
After contact with materials against which NBR (Nitril-Butadien-caoutchouc) and PUR (polyuretane) are not or only partially resistant.	Replace flexible elements by sets of original spare parts.

Table 18

Maintenance works and routine inspections are to be performed according to report. Document maintenance works (report sample see **Chapter 14.3**).

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EX-PROTECTION!
The following additional maintenance works are required for ex-proof couplings:

Maintenance intervals	Maintenance work
In case of impurities or a dust layer of max. 5 mm It is the customer's own responsibility to define maintenance intervals in accordance with the ambient conditions	Cleaning (→ **Chapter 13.1**).
Maintenance interval see chapter 1	Replace roller bearings (see **Chapter 13.3.3**).

Table 19

EX-PROTECTION!
- **Maintenance works according to schedule are required in order to guarantee proper operation in the meaning of Ex protection.**
- **Remove any combustible dust deposit on the turbo couplings immediately.**
- **If the unit is not cleaned in regular intervals there is a risk of fire and explosion!**
- **For perfect coupling ventilation it is necessary to check and clean the protective cover in regular intervals.**
- **On response of fusible plug cover the opening caused by response immediately or close it, to prevent intrusion of combustible dust into the coupling.**

13.1 Outside cleaning

ATTENTION!
- **Please observe that the cleaning agent is compatible with the NBR and FPM/FKM sealing materials used!**
- **Do not use a high-pressure cleaning apparatus!**
- **Be careful with gaskets. Avoid high pressure water jet and compressed air.**

- Clean the coupling with a grease solvent, if required.

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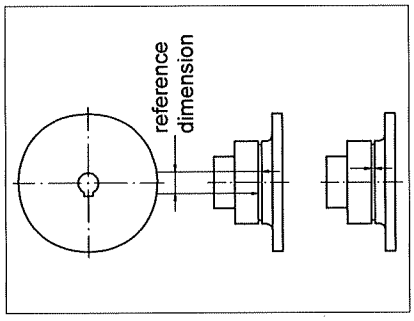
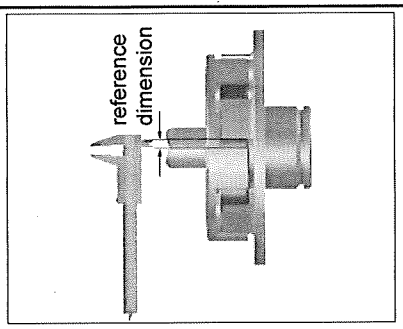
13.2 Flexible connecting coupling

13.2.1 Control of flexible elements wear

→ Chapter 9.1, page 40

Connecting coupling of type ERK, EEK, EPK, Nor-Mex G:	Connecting coupling of type ENK:
	
■ Turn turbo coupling until flexible elements touch without load.	
■ Mark opposite points on hub and flange or the 2nd hub.	■ Measure driver distance in direction of rotation at the outer diameter of hub.
■ Turn turbo coupling in opposite direction until flexible elements touch without load.	
■ Measure distance of markings in peripheral direction at outer diameter of hub or at ring in the area of the outer diameter.	■ Measure driver distance in direction of rotation at the outer diameter of hub.
■ Document reference dimension.	■ The reference dimension is the smallest value of both measurements.
	■ Document reference dimension.

→ Chapter 14, page 67

Perm. reference dimensions of flexible connecting couplings in mm

Coupling size	ERK	EPK	EEK-E EEK-M	ENK-SX ENK-SV	Nor-Mex G
154	< 6				
206	< 6			> 14	
274	< 8		< 8	> 14	
366		< 12	< 8	> 15	< 12
422		< 12	< 8	> 16	< 12
487		< 12	< 9	> 16	< 11
562		< 12	< 11	> 13	< 10
650		< 12	< 10	> 13	< 7
750		< 12			
866		< 12			
1000		< 12			
1150		< 12			

Table 20

Note!
Extremely rapid wear of flexible elements might be a sign of **improper alignment!**

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13.2.2 Maintenance intervals

If, based on the previous wear, wear of 80% of the table value can be expected until the next control, exchange the flexible elements or shorten the maintenance intervals accordingly.
Consider additional wear on account of changed operating conditions.

ATTENTION!
Realign the unit, if the coupled machines were displaced on replacement of flexible elements.

13.3 Bearings

13.3.1 Bearing lubrication when using mineral oil as operating fluid

Please observe the following in order to guarantee bearing lubrication:

ATTENTION!
- **On account of the type of bearing used for standard turbo couplings from size 366, at least one standstill is required within a period of 3 months.**
- **On account of the type of bearings used for standard turbo couplings up to size 274, at least one standstill is required once a week.**

Note!
- Couplings of **all sizes** can be provided with special bearings allowing continuous operation and are filled with a lifetime grease.

13.3.2 Bearing lubrication when using water as operating fluid

The turbo coupling bearings provided for the operating medium water are filled with a lifetime lubricating grease. Subsequent lubrication is not required.

13.3.3 Replacement of bearings / regreasing

EX-PROTECTION!
On overhaul of the turbo coupling, experts ordered by Voith have to replace / regrease the bearings.

→ **Replacement of roller bearings: Chapter 1, page 5**

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13.4 Fusible plugs

- The fusible plugs protect the turbo coupling against damage due to thermal overload.
- When the nominal response temperature is reached, the solder core of fusible plugs melts and the operating fluid escapes.

→ **Nominal response temperature of fusible plugs**: See **cover sheet**

Fusible plugs are identified by
- the engraved nominal response temperature in °C,
- a color coding:

Nominal response temperature	Color coding
95 °C	without (tinned)
110 °C for operating fluid water	yellow
125 °C	brown
140 °C	red
160 °C	green
180 °C	blue

Table 21

ATTENTION!
- **Use original fusible plugs only with the required nominal response temperature (see cover sheet), as well as the required version SSS or SSS-X (see chapter 1)!**
- **Do not replace any fusible plugs by blind screws!**
- **Do not alter the arrangement of fusible plugs.**
- **There is a MTS- or a BTS switching element or a blind screw opposite of the sight glass (position is marked by an arrow).**
- **Insert a weight-tolerated BTM blind screw opposite to the BTM switching element in order to not create any unbalance.**
  Do not insert the BTM switching element opposite a light-weight sightglass or blind screw. Risk of unbalance !
- **For operating fluid water only fusible plugs with a response temperature of 110 °C are permitted!**

→ **Tightening torques: Chapter 6.2, page 30**

- After one fusible plug responded, replace all fusible plugs, change the operating fluid.

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13.4.1 Fusible plugs in couplings not suitable for usage in potentially explosive atmospheres

Number and position of fusible plugs, blind screw and switching elements for outer wheel drive (inner wheel drive):

Coupling size and type	Outer wheel (item 0300)								Shell (item 0190)					
	Fusible plug item 0395		Blind screw item 0394		MTS-, BTS-BTM [3]-switching element [2]		Sight-glass [4] item 0396		Fusible plug item 0260		Blind screw item 0265		MTS-, BTS-switching element [2]	
154 T...	1	(1 [1])	-	(2)	-	(1)	-		-	(-)	-	(-)	-	(-)
154 DT...	2	(2 [1])	-	(2)	-	(1)	-		-	(-)	-	(-)	-	(-)
206 T...	1	(1 [1])	-	(2)	-	(1)	-		-	(-)	1	(1)	1	(-)
206 DT...	2	(2 [1])	-	(2)	-	(1)	-		-	(-)	-	(-)	-	(-)
274 T...	1	(1 [1])	-	(2)	-	(1)	-		-	(-)	1	(1)	1	(-)
274 DT...	2	(2 [1])	-	(2)	-	(1)	-		-	(-)	-	(-)	-	(-)
366 T...	-	(-)	5	(1)	1	(1)	1		1	(1)	1	(1)	-	(-)
422 T...	-	(-)	7	(1)	1	(1)	1		2	(2)	-	(-)	-	(-)
487 T...	-	(-)	3	(3)	1	(1)	1		2	(2)	-	(-)	-	(-)
562 T...	-	(-)	3	(3)	1	(1)	1		2	(2)	-	(-)	-	(-)
650 T...	-	(-)	5	(5)	1	(1)	1		3	(3)	1 [5]	(-)	-	(-)
750 T...	-	(-)	5	(5)	1	(1)	1		2	(2)	2	(2)	-	(-)
866 T...	-	(-)	5	(5)	1	(1)	1		3	(3)	1 [5]	(-)	-	(-)
1000 T...	-	(-)	3	(3)	1	(1)	1		4	(4)	-	(-)	-	(-)
1000 TW...	3	(3)	-	(-)	-	(-)	1		-	(-)	4	(4)	1	(1)
1000 DT...	6	(6)	1	(1)	1	(1)	1		-	(-)	-	(-)	-	(-)
1150 T...	-	(-)	5	(5)	1	(1)	1		4	(4)	-	(-)	-	(-)
1150 DT...	8	(8)	3	(3)	1	(1)	1		-	(-)	-	(-)	-	(-)

Table 22

1) Radial arrangement.
2) The MTS, BTS or BTM switching element is inserted instead of a blind screw.
3) The blind screw opposing the BTM has to be replaced by the compensation weight.
4) Position is marked by an arrow.
5) Only for annular chamber (type T...S...).

ATTENTION!
The fusible plugs of couplings type "TW" of size 366, 422, 487, 562, 650, 750, 866 and 1150 are arranged in the outer wheel.

If a brake is used, select the position of the fusible plugs so that they do not spray onto the brake.
Check same and, if need be, exchange the fusible plugs with opposing blind screws.

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13.4.2 Fusible plugs in couplings suitable for usage in potentially explosive atmospheres

Number and position of fusible plugs, blind screw and switching elements for outer wheel drive (inner wheel drive):

Coupling size and type	Outer wheel (item 0300)						Shell (item 0190)					
	Fusible plug item 0395		Blind screw item 0394		MTS-/BTS-switching element [3]	Sight-glass [5] item0396	Fusible plug item 0260		Blind screw item 0265		MTS-/BTS-switching element [3]
154 T...	1	(1 [1])	-	(2)	-	-	-	(-)	-	(-)	-
154 DT...	2	(2 [1])	-	(2)	-	-	-	(-)	-	(-)	-
206 T...	1	(1 [1])	-	(2)	-	-	-	(-)	1	(1)	-
206 DT...	2	(2 [1])	-	(2)	-	-	-	(-)	-	(-)	-
274 T...	1	(1 [1])	-	(2)	-	-	-	(-)	1	(1)	-
274 DT...	2	(2 [1])	-	(2)	-	-	-	(-)	-	(-)	-
366 T...	2	(2)	3	(3)	1	1	-	(-)	2	(2)	-
422 T...	4	(4)	3	(3)	1	1	-	(-)	2	(2)	-
487 T...	2	(4)	1	(1 [2])	1	1	-	(-)	2	(2)	-
562 T...	2	(4)	1	(1 [2])	1	1	-	(-)	2	(2)	-
650 T...	3	(2)	2	(3)	1	1	-	(-)	3	(3)	-
650 T...S...	3	(2)	2	(3)	1	1	-	(-)	4	(4)	-
650 T... [4]	-	(2)	5	(3)	1	1	3	(-)	-	(3)	-
650 T...S... [4]	-	(2)	5	(3)	1	1	3	(-)	1	(4)	-
750 T...	2	(-)	3	(5)	1	1	-	(2)	2	(-)	-
866 T...	3	(-)	2	(5)	1	1	-	(3)	3	(-)	-
866 T...S...	3	(-)	2	(5)	1	1	-	(3)	4	(1)	-
866 T... [4]	-	(-)	5	(5)	1	1	3	(3)	-	(-)	-
866 T...S... [4]	-	(-)	5	(5)	1	1	3	(3)	1	(1)	-
1000 T...	-	(-)	3	(3)	1	1	4	(4)	-	(-)	-
1000 DT...	6	(6)	1	(1)	1	1	-	(-)	-	(-)	-
1150 T...	4	(-)	1	(5)	1	1	-	(4)	4	(-)	-
1150 DT...	8	(8)	3	(3)	1	1	-	(-)	-	(-)	-

Table 23

1) Radial arrangement.
2) The blind screw has to be inserted in the outer wheel opposite the sightglass (position is marked by an arrow).
3) The MTS or BTS switching element is inserted instead of a blind screw.
4) Only valid if a BTS-Ex switch unit is used.
5) Position is marked by an arrow.

ATTENTION!
If a brake is used, select the position of the fusible plugs so that they do not spray onto the brake.
Check same. In case of any deviation, consult Voith.

Note!
A thermal monitoring system can prevent that operating fluid is sprayed off (see **chapter 18, page 81**). Thermal monitoring systems are available at Voith Turbo as accessories.

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14 Assembly Control-, Commissioning and Maintenance Report

DANGER!
Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

Document all assembly works in the assembly control report (**Chapter 14.1**).
Document the commissioning in the commissioning report (**Chapter 14.2**).

EX-PROTECTION! / ATTENTION!
Document any maintenance works of the flexible connecting coupling in the maintenance report for the flexible connecting coupling (Chapter 14.3.1).
Document any maintenance works of the turbo coupling in the maintenance report provided for general maintenance (chapter 14.3).

Use copies of the originals, if necessary.

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14.1 Assembly control report

Affirm control or accomplishment of the works by an "**X**" or enter the required values.

Voith turbo coupling
Size/ type (**Chapter 17**):
Serial No. (**Chapter 17**):
Coupling approved for hazardous areas yes ☐ / no ☐

Operating fluid of turbo coupling
Fill: ltr.
Manufacturer:
Designation:

Motor
Serial-No.
Input speed rpm
Rated power kW

Assembly works have been done:
Name:
Date:
Signature:

Driven machine / gearbox
Serial-No.

Assembly – control step	Explanations	Completion notice / dimensions
Inspection of fixing bolt length (item 0050)	see order documents	☐
Measure concentricity [1] of drive machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Measure diameter [1] of drive machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Measure concentricity [1] of driven machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Measure diameter [1] of driven machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Input (drive) diameter [1]	Chapter **1**	Set: [mm] ACTUAL: [mm]
Output diameter [1]	Chapter **1**	Set: [mm] ACTUAL: [mm]
Back clearance input side key checked (drive side)	Chapter **7.2**	☐
Back clearance output side key checked (driven side)	Chapter **7.2**	☐
Key runs smoothly in keyway of input hub	Chapter **7.2**	☐
Key runs smoothly in keyway of output hub	Chapter **7.2**	☐
Input of shaft-hub connection checked. Balancing method corresponds to DIN ISO 8821 and ISO 8821	Chapter **7.2**	Method used: ☐ semi-inserted key ☐ fully-inserted key
Output of shaft-hub connection checked. Balancing method corresponds to DIN ISO 8821 and ISO 8821	Chapter **7.2**	Method used: ☐ semi-inserted key ☐ fully-inserted key
Input side shaft and hub cleaned and provided with parting agent	Chapter **7.2**	☐
Output side shaft and hub cleaned and provided with parting agent	Chapter **7.2**	☐
Connecting coupling hub Set screw (item 1845) tightened with torque	Torque Chapter **6.1**	☐
Fixing bolt (item 0050) tightened with torque	Torque Chapter **6.1**	☐
When installing type TN : Are balancing marks of primary coupling flange in correct position ?	Chapter **8.1**	☐
Mounting dimension "L" measured	Chapter **9.2**	Set: [mm] ACTUAL: [mm]

Table 24

[1] Dimensions of shaft or hub to be connected by means of shaft-hub connection.

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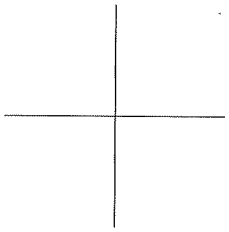
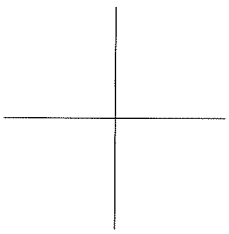
Assembly – control step	Explanations	Completion notice / dimensions
Foundation bolts tightened	Chapter **9.4**	☐
Mounting of coupling Bolts (item 1830) tightened	Chapter **6.3**	☐
MTS / BTS / BTM (if required); position checked accord. to operating manual	Chapter **1**, **18**	☐
MTS / BTS / BTM (if required) tested for electrical function	Chapter **1**, **18**	☐
Protective system installed accord. to recommendation	Chapter **12**	☐
Equipotential bonding between input and output effective	Chapter **12**	☐
Coupling filled with operating fluid	Chapter **11**	☐
Only for horizontally installed couplings: Screw number "**Z**" determined for filling	Chapter **11.1**	**Z=** screws
Only for vertically installed couplings: Fill level control device used. Fill level marking attached to coupling.	Chapter **11.1.2**	☐
Alignment of turbo coupling checked	Enter alignment values	☐
Concentricity of motor shaft o.k.		☐

Enter alignment values (see **Chapter 9.3**):

Viewing motor towards driven machine	RADIAL	AXIAL
cross-mark where applicable - data from gauge ☐ data from shaft center displacement ☐ - gauge runs on turbo coupling ☐ gauge runs on machine shaft ☐ - AXIAL values measured on Ø: . . . . . mm		

Displacements during operation (are to be indicated by unit manufacturer):
Observe displacements resulting from temperature increase or mechanical movement.
Only enter values which may alter values specified above.

- Radial (e.g. different thermal expansion input / output) . . . . . mm
- Axial (e.g. by angular displacements) . . . . . mm
- Linear expansion (for mounting tolerance dimension "L", e.g. shaft expansion . . . . . mm

Table 25

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14.2 Commissioning report

Affirm control or accomplishment of the works by an "**X**" or enter the required values.

Voith turbo coupling
Size / type (**Chapter 17**):
Serial No. (**chapter 17**):

Coupling approved for hazardous areas: yes ☐ / no ☐

Commissioning was carried out
at ____ Oper. hrs

Name:
Date:
Signature:

Commissioning – control step	Explanations	Completion notice
Inspections prior to switching on the driving motor:		
Mounting - test steps executed Completed assembly test report, Chap. **14.1**	Chapter **14.1**	☐
Applies only to coupling used in hazardous areas: Checked whether the coupling, according to marking, is approved for hazardous areas.	Chapter **3.2**	☐
Only for horizontally installed couplings: Fill level checked - Screw number "**Z**" determined for filling	Chapter **11.2**	☐ / Z= . . . . . Screws
Only for vertically installed couplings: Fill level control device used. Fill level compared with previously attached fill level marking	Chapter **11.2.2**	☐ / Difference= . . . . . mm
A protective cover (properties see **Chapter 12**) attached around the turbo coupling.	Chapter **12**	☐
Checked whether the installation is earthed with a grounding cable ($16mm^2$).		☐
Applies only to installations where overspeed is possible: Installation equipped with a device which safely prevents overspeed (e.g. brake or back-run safety mechanism).	Chapter **6**	☐
Next coupling standstill for maintenance works determined.	Chapter **12**	☐
Geprüft, ob es im Bereich der elastischen Verbindungskupplung zu metallischen Berührungen kommt.	Chapter **9.1**, Chapter **13.2**	☐
Bei den Verbindungskupplungen das Kontrollmaß geprüft.	Chapter **13.2**	☐
Applies only to use of a BTS-Ex as temperature monitoring system: On motor switching-on ascertained that the maximum admissible turbo coupling temperature is not exceeded!	Chapter **1**	☐
Foundation bolts checked		☐
Inspections during test run:		
Motor run-up is normal		☐
Coupling is tight Floor and environment checked for oil moistening, oil did not leak		☐
Machine running is normal		☐
Normal noises		☐
Inspections after switching off the driving motor:		
Coupling is tight Floor and environment checked for oil moistening, oil did not leak		☐
Switching units for temperature monitoring [1] checked, if applicable		
Visual test done	[1]	☐
Dust deposits removed	[1]	☐
Electric system checked	[1]	☐

Table 26

[1] See separate instruction manual / Chapter **18**.

14.3 Maintenance report for general maintenance

Affirm control or accomplishment of the works by an "**X**" or enter the required values.

Voith turbo coupling

Size / type (**Chapter 17**):	
Serial No. (**chapter 17**):	
Coupling approved for hazardous areas:	yes ☐ / no ☐

Maintenance works have been done

at		Oper. hrs
Name:		
Date:		
Signature:		

Maintenance – control step	**Explanations**	**Completion notice**
Check for irregularities (In intervals of **500 h**, every **3 months**, at the latest)		
- Coupling is tight Floor and environment checked for oil moistening, oil did not leak		☐
- Machine running is normal		☐
- Normal noises		☐
- Protective cover checked	Chapter **12**	☐
- Foundation bolts checked		☐
Switching units for temperature monitoring [1] checked, if applicable (every **3 months**)		
- visual test done	[1]	☐
- dust deposits removed	[1]	☐
- electric system checked (after **3 months**, then **every year**)	[1]	☐
Operating fluid (every **15000 h**)		
- Operating fluid checked		☐
- Remaining operating period determined		☐ / . . . . . hours
- Operating fluid exchanged	Chapter **11**	☐
Roller bearings (**after every interval** see chapter **1**)		
- roller bearings replaced	Chap. **13.3.3**	☐
Coupling cleaned (**after every dirt contamination**)		
- Cleaned	Chap. **13.1**	☐

Table 27

[1] See separate instruction manual / Chapter **18**.

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14.3.1 Maintenance report for flexible connecting coupling

Affirm control or accomplishment of the works by an "**X**" or enter the required values.

Voith turbo coupling
Size / type (**Chapter 17**):
Serial No. (**chapter 17**):

Coupling approved for hazardous areas: yes ☐ / no ☐

Maintenance works have been done
at | Oper. hrs
Name:
Date:
Signature

Installed flexible connecting coupling (see cover sheet):

	ERK	EPK	EEK-E EEK-M	ENK-SV ENK-SX	Nor-Mex G
Replace flexible elements after max [months]	60	60	36	36	36
perm. refer. dimension (see chapter **13.2.1**):					
80% value [mm]					

Maintenance works		EEK, ENK, Nor-Mex G ERK, EPK connecting couplings						
Maintenance work		Commissioning new flex. element	Control, replace, if nec.	Control, replace, if nec.	Control, replace, if nec.	Control, replace, if nec.	Control, replace, if nec.	Replace
Operating period [months]		0	3	12	24	36	48	60
Flex. element 1 (New condition)	Actual ref. dimension							
	Name							
	Date							
	Signature							
Reduced operating period [months] (see chapter **13.2.2**)								
Flex. element 2 (1st exchange)	Actual ref. dimension							
	Name							
	Date							
	Signature							
Reduced operating period [months] (see chapter **13.2.2**)								
Flex. element 3 (2nd exchange)	Actual ref. dimension							
	Name							
	Date							
	Signature							
Reduced operating period [months] (see chapter **13.2.2**)								

Table 28

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15 Coupling Disassembly

DANGER!
Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

Unauthorized or unintentional switching on of the machine may cause most serious, even lethal injuries !

Before you start working on the turbo coupling, switch off the main switch of the drive motor and secure same against switching on.

For all work performed on the turbo coupling ensure that both, drive motor and driven machine have stopped running and startup is absolutely impossible!

Note!
This section describes the disassembly of turbo couplings of **basic type T**. Couplings of **basic type TN** are disassembled in reverse order according to **chapter 8, page 37**.

15.1 Preparation

- Prepare suitable tools and lifting appliances; observe the turbo coupling weight!

Note!
The cover sheet indicates the turbo coupling weight. The weight is also stamped on the outer diameter of coupling flange, if it exceeds 100 kg.

WARNING!
Damaged load suspension devices or those with insufficient carrying capacity may break under load, with the consequence of most serious or even fatal injuries!

Check the lifting appliances and load suspension devices for
- **sufficient carrying capacity (weight see cover sheet),**
- **sound condition.**

- Fix the coupling to a suitable lifting appliance.

→ **Lifting appliances: Chapter 4.4**

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15.2 Removal

Note!
We recommend to use the **mounting and removal devices** for removal of turbo couplings, these are available as accessories from Voith Turbo for couplings from **size 274**.

Coupling size 154 and 206:

- Remove the fixing bolt.
- Remove the coupling by inserting a suitable and slightly oiled screw into the internal thread of holding disk.

→ **Removal devices: Chapter 15.3 and 15.4**

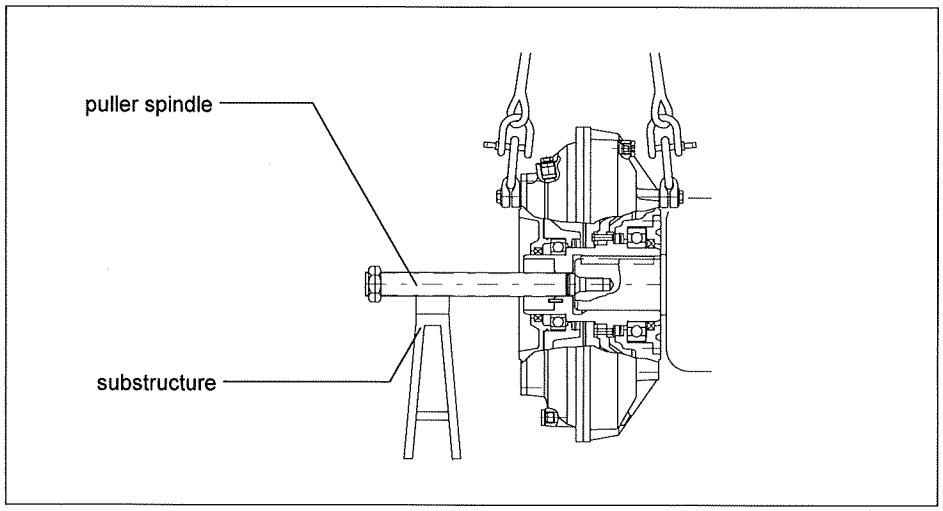

Fig. 39

Coupling size 274:	Coupling sizes 366 to 1150:
■ Remove circlip, fixing bolt and holding disk. ■ Put the threaded ring, supplied together with the removal device, into the coupling hub. ■ Secure the threaded ring using the circlip. ■ Apply a lubricant to the thread of puller spindle. ■ Insert the puller spindle in the internal thread of threaded ring.	■ Remove fixing bolt and holding disk. ■ Apply lubricant to the thread of puller spindle. ■ Insert the puller spindle in the thread of coupling hub.

Table 29

- Support the puller spindle by a substructure.
- Remove the coupling using the puller spindle.

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15.3 Mechanical removal devices

Mechanical removal devices available at Voith Turbo for turbo couplings of basic type T:

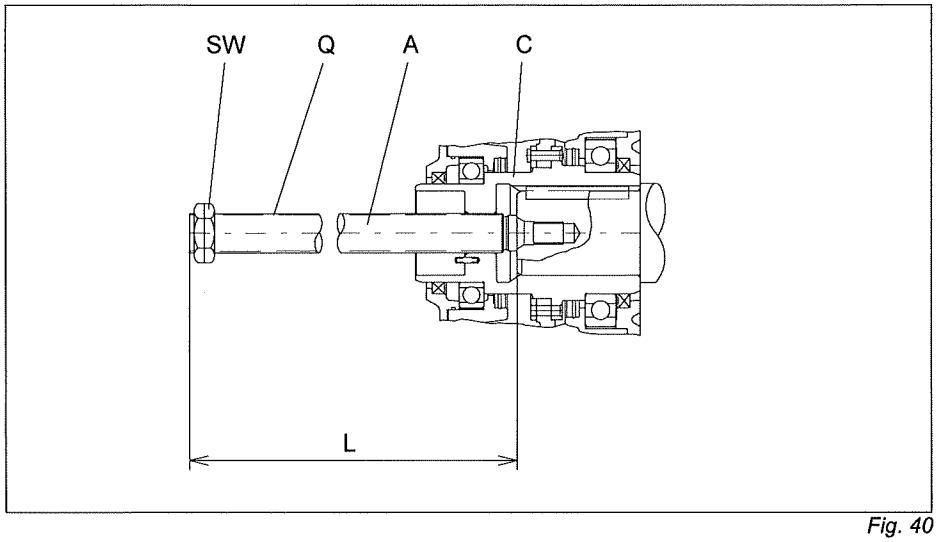

Fig. 40

A: puller spindle
C: coupling hub
L: total length
Q: dimension of thread of puller spindle
SW: wrench size across flats

Coupling sizes	L	Q	SW
274	360	G ¾	36
366	350	G 1	46
422, 487	460	G 1-¼	55
562, 650	650	G 1-½	60
750, 866, 1000, 1150	1000	G 2-¼	55

Table 30

Note!
To facilitate removal, Voith Turbo has **hydraulic removal devices** available for couplings from **size 422**.

→ **Hydraulic removal devices: Chapter 15.4, page 76**

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15.4 Hydraulic removal devices

Hydraulic removal devices available at Voith Turbo for turbo couplings of basic type T:

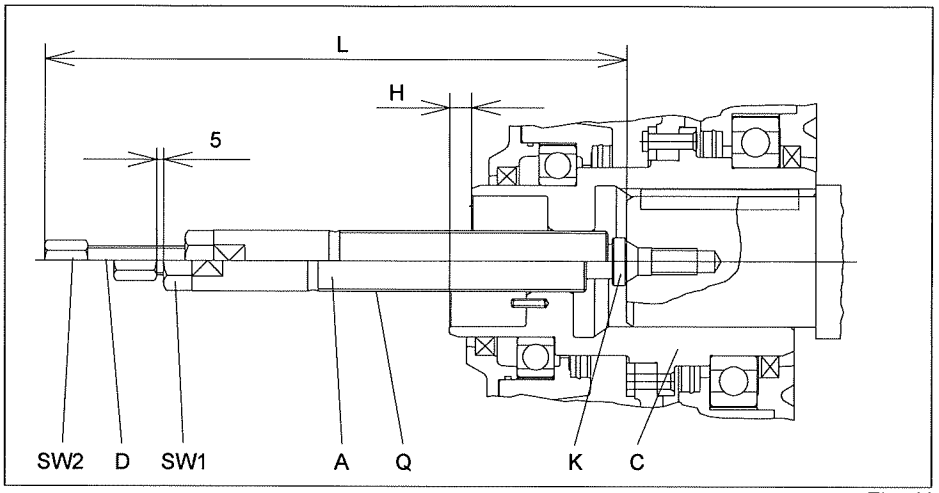

Fig. 41

A: puller spindle
C: coupling hub
D: thrust bolt
H: stroke
K: piston
L: total length
Q: dimension of thread of puller spindle
SW1: wrench size across flats (spindle)
SW2: wrench size across flats (thrust bolt)

Coupling sizes	L	H	Q	SW1	SW2
422, 487	406	15	G 1-¼	36	24
562, 650	580	15	G 1-½	36	–
750, 866, 1000, 1150	1141	15	G 2-¼	36	36

Table 31

How to proceed:

1. Remove thrust bolt (D).
2. Apply lubricant to the thread of puller spindle (A) and to the thread of thrust bolt (D).
3. Screw puller spindle (A) via hexagon SW1, up to the stop, in the thread of coupling hub (C).
4. Support puller spindle (A) by a substructure.

WARNING!
If dimension 5 mm is undercut, there is the risk of thread wearout (thread seizing).
The pressure chamber of the hydraulic removal device is under high pressure and must not be opened!

5. Insert thrust bolt (D), stop 5mm before the limit stop.
6. Remove thrust bolt (D).
7. Screw puller spindle (A) via SW1 hexagon, up to the stop, into the thread of coupling hub (C).
8. Repeat steps 4 to 7 until the puller spindle moves in easily, then remove it through SW1

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16 Malfunctions – Remedial Action

DANGER!
Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

The following table is intended to help finding the cause of failures or problems quickly and to take remedial action, if necessary.

Malfunction	Possible cause(s)	Remedial action	
Starting behavior of driven machine is not as expected.	Coupling is not filled with the correct quantity of operating fluid.	Check and correct the quantity filled in.	→ **Chapter 11, page 50 pp.**
	The operating conditions have changed.	Consult Voith Turbo [1].	
Driven machine does not reach the specified speed.	Driven machine is blocked or overloaded.	Eliminate blocking or the cause of overload.	
	Coupling is not filled with the correct quantity of operating fluid.	Check and correct the quantity filled in.	→ **Chapter 11, page 50 pp.**
Drive motor does not reach normal operation within the expected time.	Changeover from star to delta too late.	Changeover from star to delta should be effected after 2...5s, at the latest.	
	Drive motor is electrically or mechanically not in order.	Have the drive motor checked by authorized personnel.	
Operating fluid leaks out of the coupling	A fusible plug responded due to overload (excess temperature).	Clarify the overload cause. Replace **all** fusible plugs and change the operating fluid.	→ **Chapter 13.4, page 64**
	The coupling is leaking.	Eliminate the leak, check, in particular, tightening torques and seal rings of fusible and filler plugs as well as sight glasses and, if necessary, check the switching element of thermal switch unit. If you should not be able to eliminate the leak, please consult Voith Turbo [1].	

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Malfunction	Possible cause(s)	Remedial action	
An existing thermal switch unit (MTS, BTS or BTM) responded.	The coupling was overloaded.	Clarify the cause for coupling overload and avoid further overload.	→ **Chapter 18, page 81**
		Check and correct the fill level.	→ **Chapter 11.2, page 52**
	Thermal monitoring unit (MTS, BTS or BTM) is defective.	Check monitoring unit	→ **Chapter 18, page 81**
Uneven running of the unit. (increased vibration)	Foundation fixing is loose.	Retighten foundation fixing.	
		Align the unit.	
	The unit is not aligned.	Align the unit.	→ **Chapter 9, page 40**
	Unit is not balanced.	Clarify the cause and eliminate unbalance.	
	Flexible elements of connecting coupling are defective.	Replace the flexible elements in sets. Align the unit, if necessary.	→ **Chapter 13.2, page 62**
	Bearings are damaged.	Eliminate the bearing damage; consult Voith Turbo [1] in the event of a bearing damage on the turbo coupling.	
	Loose screw connections	Check coupling components for damages, replace same, if necessary.	
		Check unit alignment.	
		Fasten screws and bolts with specified tightening torque.	
Please consult Voith Turbo [1] in the event of a malfunction which is not included in this table.			

Table 32

[1] see **chapter 17, page 80**.

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Malfunction	Possible cause(s)	Remedial action
Premature wear of flexible element	Alignment error	Eliminate cause for alignment error. Align unit again. Check wear of flexible elements.
	Impermissible temperatures	Eliminate cause for excessive temperature. Replace flexible element. Align unit again, if necessary.
	Contact with aggressive media.	Check coupling components for damages, replace same, if necessary. Replace flexible elements Align unit again, if necessary. Eliminate cause for contact with aggressive media.
	Excessive torque.	Eliminate cause for excessive torque. Check fill level. → **Chapter 11.2, page 52**
Roller wear / breakage of connecting coupling EEK, ENK, Nor-Mex G	Flexible elements worn	Replace damaged coupling components. Align unit again. Shorten maintenance intervals
	Excessive torque	Check coupling design. Consult Voith Turbo [1]. Install new coupling. Align unit again.
Please consult Voith Turbo [1] in the event of a malfunction which is not included in this table.		

Table 33

[1] see **chapter 17, page 80**.

17 Queries, Orders placed for Service Engineers and Spare Parts

In the event of
- queries
- orders placed for service engineers
- spare parts orders

we need...

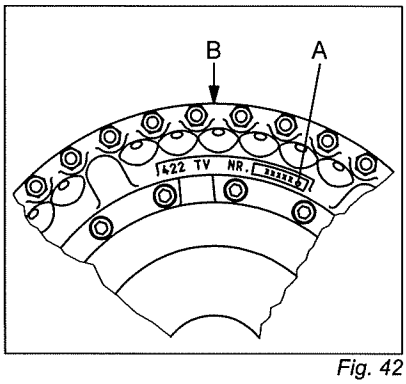

Fig. 42

...the **serial number** and type designation of turbo coupling.

→ You will find the **serial number** and type designation either on the **outer wheel / shell (A)** or at the coupling **periphery (B)**.

→ The **serial no.** is marked with figure stamps.

→ for couplings to be used in potentially explosive atmospheres, you will find the **Ex-identification** at the coupling **periphery (B)**.

If an **order is placed for a service engineer** we need, in addition,
- the turbo coupling site,
- the address of a contact person,
- details of the occurred problem.

In the event of a **spare parts order** we need, in addition,
- the destination of spare parts shipment.

Please contact:

Voith Turbo GmbH & Co. KG
Voithstr. 1
74564 Crailsheim, Germany
Tel. +49 7951 32-1881
Fax. +49 7951 32-480
startup.components@voith.com

Outside business hours:

Voith Turbo GmbH & Co. KG
Tel. +49 7951 32-1666
Fax. +49 7951 32-903
coupling-service@voith.com
www.voith-coupling-service.com

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18 Temperature Monitoring

EX PROTECTION!

The thermal switching elements MTS and BTS may be used in potentially explosive areas to monitor the temperature. The signals indicate pre-alarm. MTS and BTS do not limit the maximum surface temperature.

BTS-Ex is available as safety element for limitation of the maximum surface temperature and can be used as thermal switch-off device.
In this case, too, never replace the existing fusible plugs by fusible plugs with different nominal response temperatures or by blind screws.

Never override safety devices!

DANGER!
Electric voltages may kill or severely injure you!
An electric expert has to properly carry out the connection to the electric supply network in consideration of both the system voltage and the maximum power consumption!
The system voltage has to be in conformity with the system voltage indicated on the nameplate!
There has to be a corresponding electric fuse on the network side!

18.1 MTS mechanical thermal switch unit for pre-warning

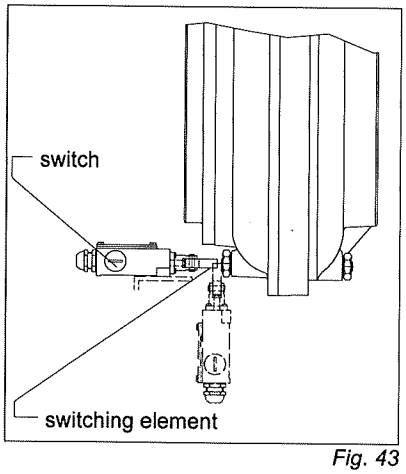

Fig. 43

Function:
On excess temperature, the switching element releases a pin. During rotation, the pin activates a switch. This signal, for example, may trip an alarm or switch off the drive motor. The switching element needs to be replaced.

→ **Operating manual 3626-011800 is available for MTS (see web page).**

ATTENTION!
In case of inner wheel drive and blocking of driven machine, the function is no longer guaranteed!

The MTS is available for turbo couplings of all sizes.
For arrangement, please refer to table in **Chapter 13.4.1**.
The switch is available in two designs:
- enclosed [degree of protection IP 65],
- suitable for use in potentially explosive atmospheres
  type of protection: ⟨Ex⟩ II 2G EEx d IIC T6 (PTB 03 ATEX 1067 X).
  ⟨Ex⟩ II 2D IP65 T 80°C (PTB 03 ATEX 1067 X).

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18.2 BTS non-contacting thermal switch unit

18.2.1 BTS non-contacting thermal switch unit for pre-warning

→ **Operating Manual 3626-011500 is available for BTS (see web page).**

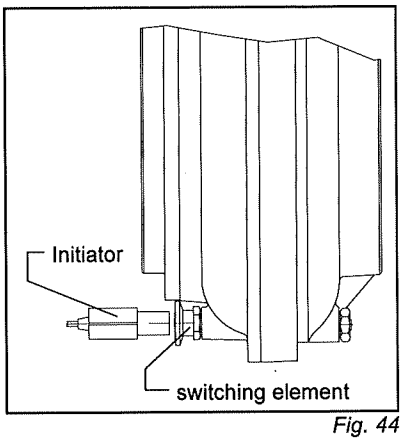

Fig. 44

Function:
On excess temperature, the switching element gives a specific signal to the initiator. This signal is transferred to an evaluator and may, for example
- trip an alarm
- or switch-off the drive motor.

After cooling-down of the coupling, the switching element is ready for service again, it does not have to be replaced.

The BTS is provided for turbo couplings from **size 206**.

For arrangement, please refer to table in **Chapter 13.4.1**.
Switching element and initiator are
– cast in plastic,
– insensitive to dirt,
– suitable for use in potentially explosive atmospheres
type of protection: ⟨Ex⟩ II 2G EEx ia IIC T6 (PTB 00 ATEX 2048 X).
⟨Ex⟩ II 1D Ex iaD 20 T...°C (ZELM 03 ATEX 0128 X).

EX PROTECTION!
Since the control circuit of evaluator is not intrinsically safe, provide an appropriate isolating switch amplifier between evaluator and initiator!

Isolating switch amplifier type KFD2-SOT2-Ex2 (24 V DC)
– type of protection: ⟨Ex⟩ II (1) GD [EEx ia] IIC (PTB 00 ATEX 2035).

Isolating switch amplifier type KFA6-SOT2-Ex2 (230 V AC)
– type of protection: ⟨Ex⟩ II (1) G [EEx ia] IIC (PTB 98 ATEX 2164).

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18.2.2 BTS-Ex non-contacting thermal switch unit for limiting the maximum surface temperature

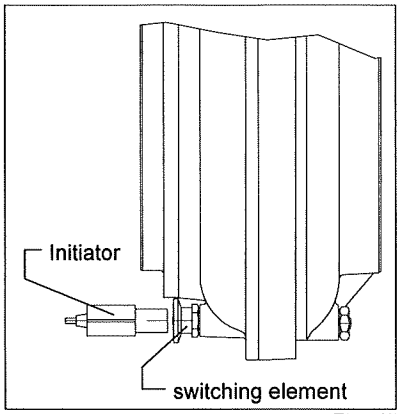

Fig. 45

Function:
On excess temperature, the switching element gives a specific signal to the initiator. This signal is transferred to an isolating switch amplifier and has to enforce switch-off of the drive motor.
Use a BTS-Ex approved by Voith for this application.
After cooling-down of the coupling, the switching element is ready for service again, it does not have to be replaced.

EX-PROTECTION!
→ Observe separate operating manual 3626-019600 of BTS-Ex! (see web page).

The BTS-Ex is provided for turbo couplings from **size 366**.

For arrangement, please refer to table in **Chapter 13.4.2**.

The BTS-Ex is provided to be used in potentially explosive atmospheres as per Directive 94/9/EC in Device Group II, Device Category 2G and 2D (Ex II 2GD).

EX-PROTECTION!
The BTS-Ex for limiting the maximum surface temperature is approved with the components supplied by Voith according to BTS-Ex operating manual, only.
Use of original Voith spare parts is imperative in case of replacement.

The evaluator serves to transmit control commands from potentially explosive atmospheres into non-explosive areas and to safely isolate intrinsically safe and non-intrinsically safe circuits.

Make sure not to exceed the maximum permissible temperature of turbo coupling when switching on the motor.

→ Technical Data: Chapter 1, page 5

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18.3 BTM non-contacting thermal measuring unit for pre-warning

→ **Operating Manual 3626-019800 is available for BTM (see web page).**

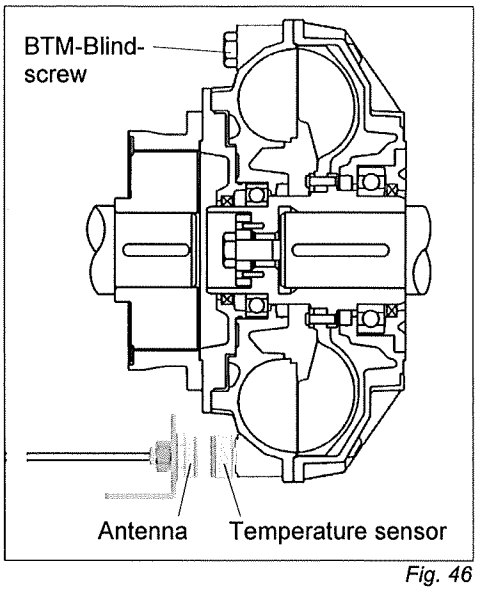

Fig. 46

Function:
The temperature sensor permanently transmits a measuring signal to the antenna. This signal is forwarded to an evaluator with 4 channels.
The measured temperatures of every channel are indicated on the evaluator. In addition, the measured temperatures are output as 4-20 mA-signals.

Furthermore, two relay outputs are available per measuring channel with switching thresholds (e.g. prewarning, tripping) adjustable via the keyboard on the evaluator.

The BTM is provided for turbo couplings from **size 366**.

For arrangement, please refer to table in **Chapter 13.4.1**.

DANGER!
The BTM is not provided for use in potentially explosive areas as per Directive 94/9/EC.

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19 Spare Parts Information

Considering the great variety, please find in the following only the basic turbo coupling designs with constant fill.

Notes!

- **Spare parts:**
  Spare parts must comply with the requirements determined by Voith.
  This is guaranteed when original spare parts are being used.
  Installation and/or use of non-original spare parts may negatively change the mechanical properties of the **Voith Turbo coupling** and thus have an adverse impact on the safety.
  Voith is not liable for damages resulting from use of non-original spare parts.

- You will find the type of your turbo coupling on the cover sheet of this operating manual.
- If the scope of supply includes a flexible connecting coupling, you will also find the type of flexible connecting coupling on the cover sheet of this operating manual. Please find the allocation alternatives of turbo coupling and flexible connecting coupling in **chapter 9.2**.
- Please observe **chapter 5.2** (Type designation) and **17** (Queries, Orders placed for Service Engineers and Spare Parts).

EX-PROTECTION!
If the coupling is used in potentially explosive atmospheres (as per Directive 94/9/EC), then only use of original parts is allowed which are relased for use in hazardous areas.

DANGER!
Do not modify or retrofit the coupling on your own authority!
Do not retrofit using equipment or utilities of other manufacturers!
Modifications or conversions without preceding written approval of M/s Voith will result in the loss of warranty!

Please observe, in particular, chapter 4 (Safety) when working on the turbo coupling!

ATTENTION!
A professional overhaul or repair can only be guaranteed by the manufacturer!

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19.1 Spare parts for type 154 T

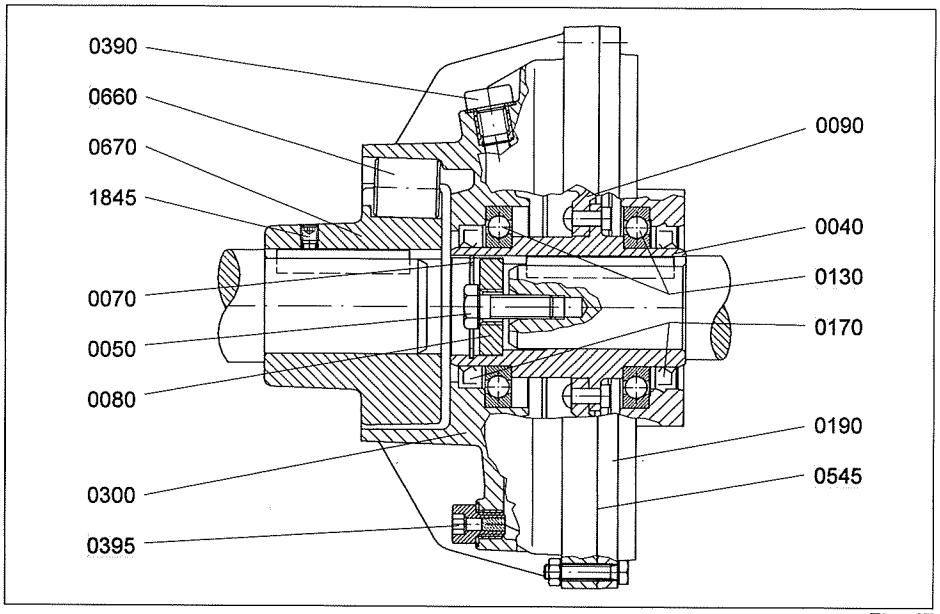

Fig. 47

19.2 Spare parts for types 206 - 274 T

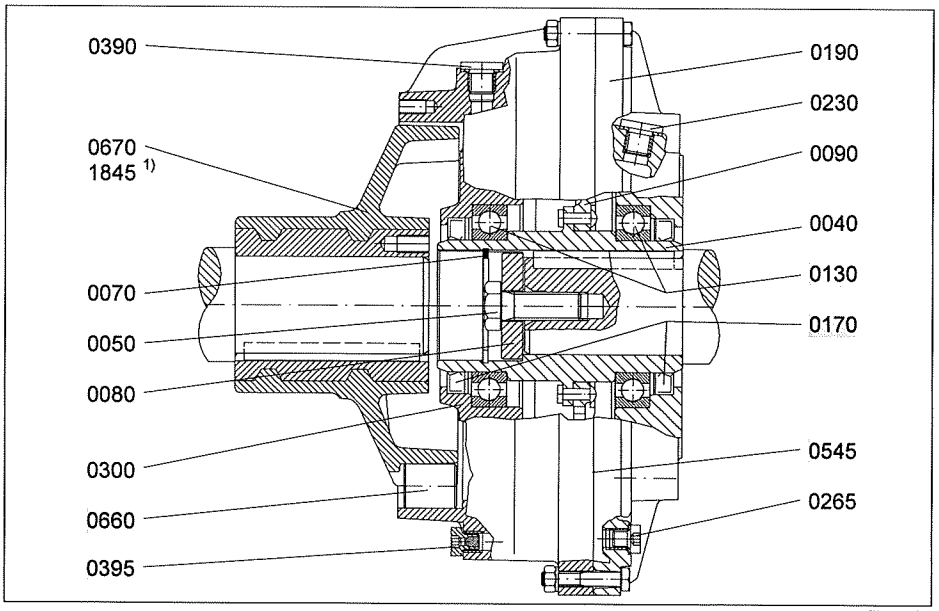

Fig. 48

Example for connecting coupling type **ERK**.

→ Connecting couplings: **Chapter 20, page 100**

1) Not shown!

Screws and Standard parts				Wearing parts				Coupling main parts			
Pos.-Nr.	Description	154 T	206 274 T	Pos.-Nr.	Description	154 T	206 274 T	Pos.-Nr.	Description	154 T	206 274 T
0050	Fixing bolt	x	x	0130	Grooved ball bearing	x	x	0040	Coupling hub	x	x
0070	Circlip	x	x	0170	Radial shaft seal ring	x	x	0080	Holding disk	x	x
0230	Filler plug		x	0395	Fusible plug	x	x	0090	Inner wheel	x	x
0265	Blind screw		x	0545	Flat seal	x	x	0190	Shell	x	x
0390	Filler plug	x	x	0660	Flexible element	x	x	0300	Outer wheel	x	x
1845	Set screw	x						0670	Hub	x	x

19.3 Spare parts for types T and TN

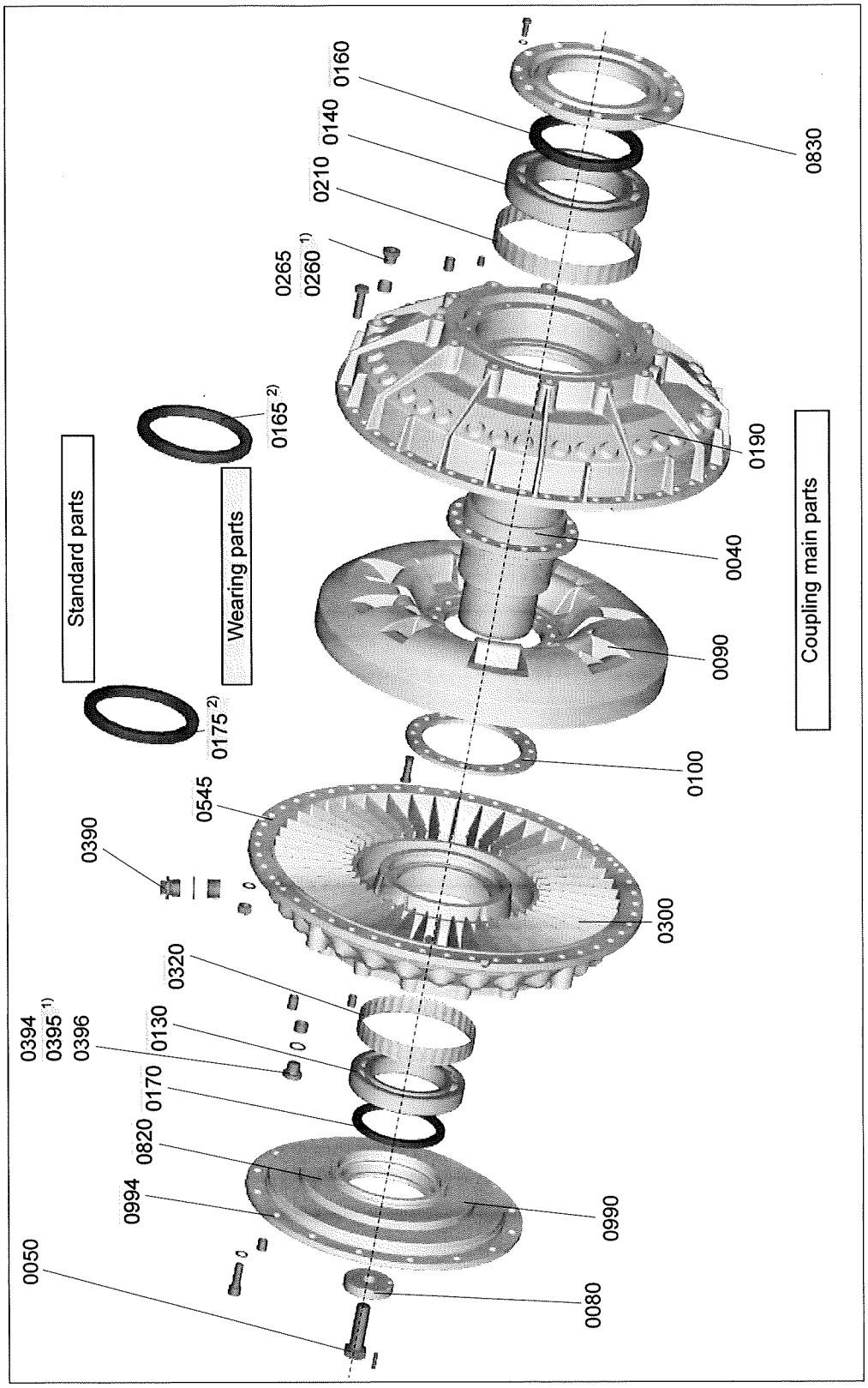

Fig. 49

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19.3.1 Spare parts for types 366 - 1150 T

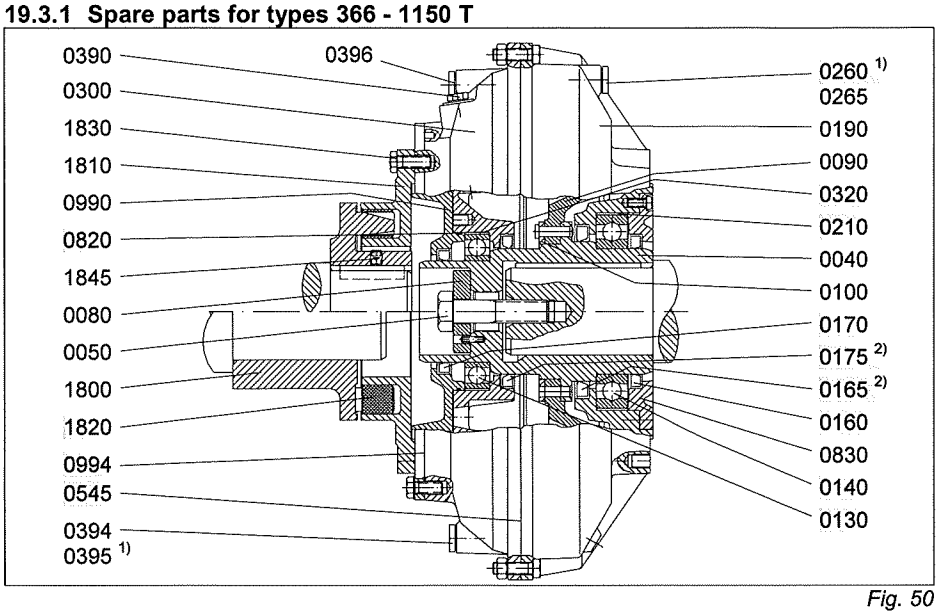

Fig. 50

Upper Part:
Representation exemplary with connecting coupling type **EPK**.

Lower Part:
Representation exemplary with connecting coupling type **EEK-E**.

19.3.2 Spare parts for types 366 - 650 TN

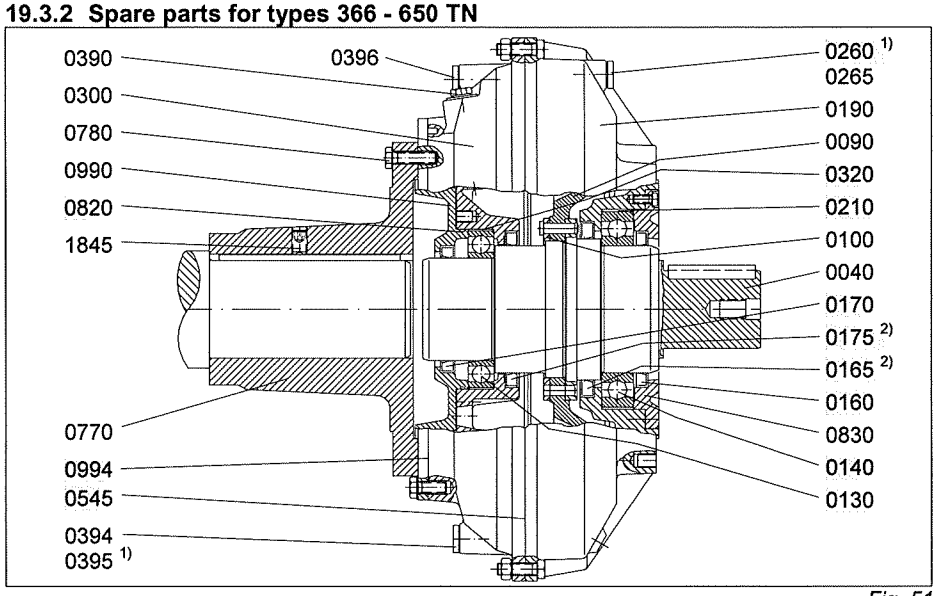

Fig. 51

→ Connecting couplings: **Chapter 20, page 100**

1) For arrangement and quantity, please refer to tables in **Chapter 13.4.**
2) Only for continuous operation or operating fluid water (TW...).

Screws and Standard parts				Wearing parts				Coupling main parts			
Item-No.	Description	T	TN	Item-No.	Description	T	TN	Item-No.	Description	T	TN
0050	Fixing bolt	x		0130	Grooved ball bearing	x	x	0040	Coupling hub / -shaft	x	x
0265	Blind screw	x	x	0140	Grooved ball bearing	x	x	0080	Holding disk	x	
0390	Filler plug	x	x	0160	Radial shaft seal ring	x	x	0090	Inner wheel	x	x
0394	Blind screw	x	x	0165	Radial shaft seal ring	x	x	0100	Rivet-/screw-/clamping ring	x	x
0396	Sight glass	x	x	0170	Radial shaft seal ring	x	x	0190	Shell	x	x
0780	Hexagon Screw		x	0175	Radial shaft seal ring	x	x	0300	Outer wheel	x	x
1830	Hexagon Screw	x		0210	Tolerance ring	x	x	0770	Primary coupling flange		x
1845	Set screw	x	x	0260	Fusible plug	x	x	0830	Sealing ring cover	x	x
				0320	Tolerance ring	x	x	0990	Connecting cover	x	x
				0395	Fusible plug	x	x	1800	Hub	x	
				0545	Flat seal	x	x	1810	Ring / Flange	x	
				0820	O-ring	x	x				
				0994	Flat seal	x	x				
				1820	Flexible element	x					

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19.4 Spare parts for types 274 TV/TVV

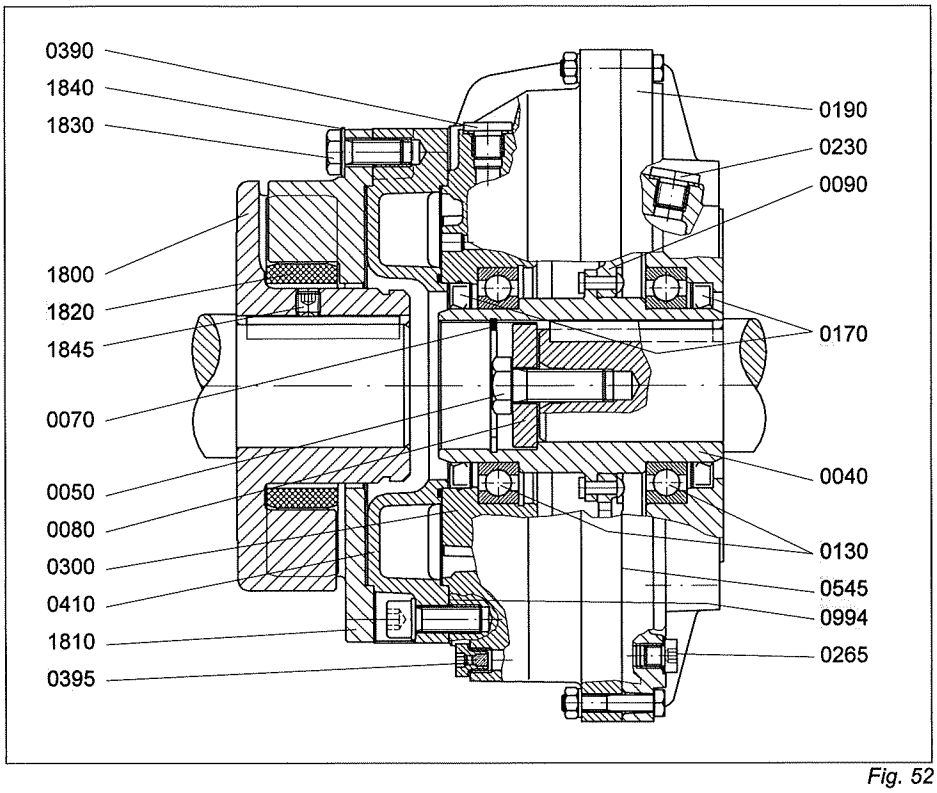

Fig. 52

→ Example of connecting coupling type **ENK-SV**.

→ Connecting couplings: **Chapter 20**, **page 100**

Screws and Standard parts				Wearing parts				Coupling main parts			
Pos.-Nr.	Description	274 TV	274 TVV	Pos.-Nr.	Description	274 TV	274 TVV	Pos.-Nr.	Description	274 TV	274 TVV
0050	Fixing bolt	x	x	0130	Grooved ball bearing	x	x	0040	Coupling hub	x	x
0070	Circlip	x	x	0170	Radial shaft seal ring	x	x	0080	Holding disk	x	x
0230	Filler plug	x	x	0395	Fusible plug	x	x	0090	Inner wheel	x	x
0265	Blind screw	x	x	0545	Flat seal	x	x	0190	Shell	x	x
0390	Filler plug	x	x	0994	Flat seal	x	x	0300	Outer wheel	x	x
1830	Hexagon Screw	x	x	1820	Flexible element			0410	Delay chamber	x	x
1840	Spring washer	x	x					1800	Hub	x	x
1845	Set screw	x	x					1810	Ring / Flange	x	x

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19.5 Spare parts for types TV/TVV and TVN/TVVN

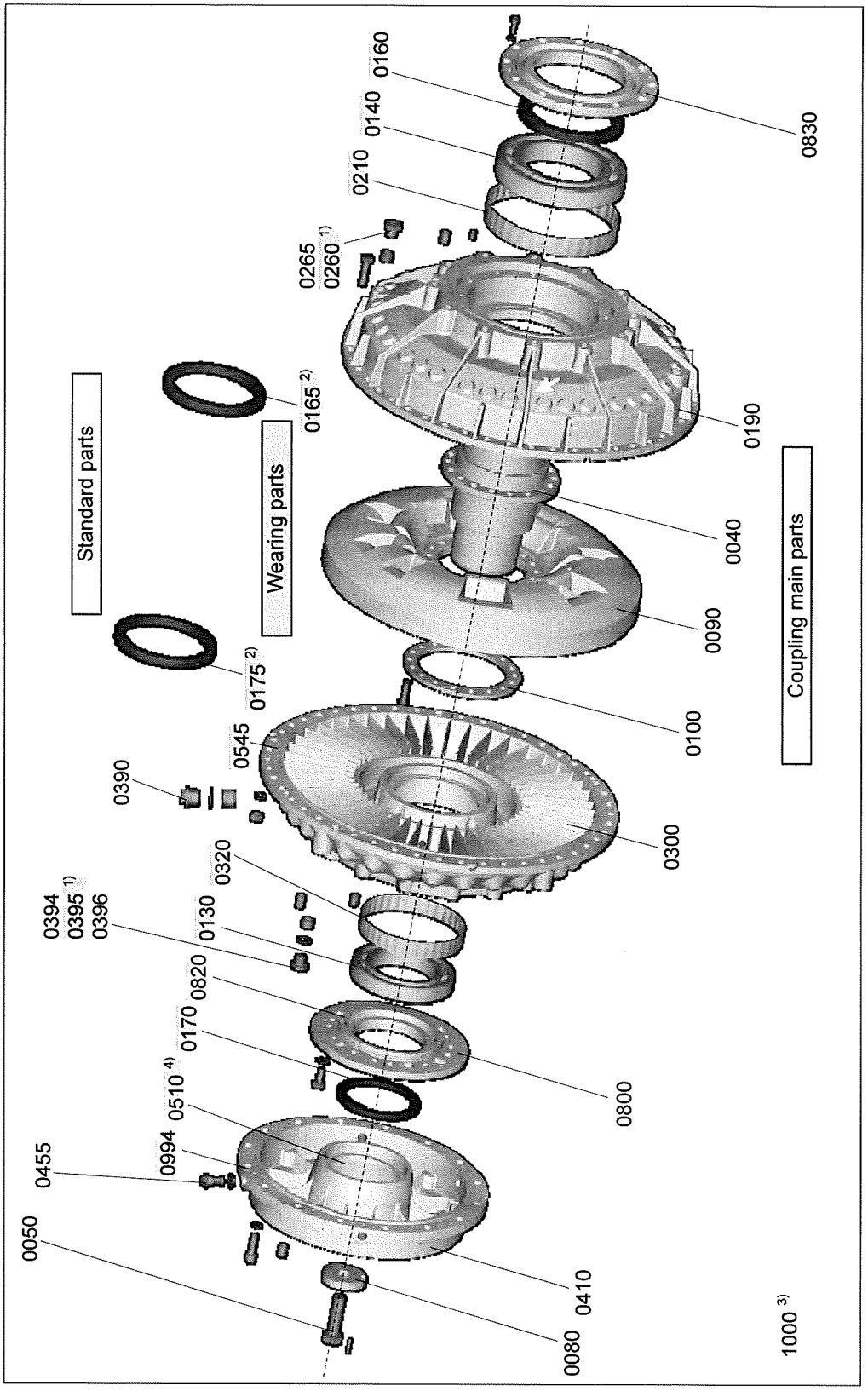

Fig. 53

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19.5.1 Spare parts for types 366 - 1150 TV/TVV

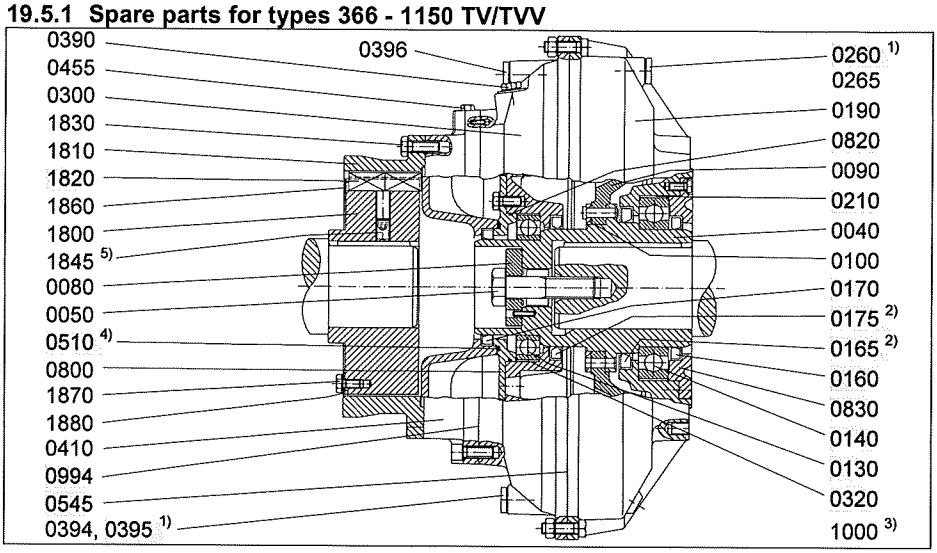

Fig. 54

Representation exemplary with connecting coupling type **EPK**.

19.5.2 Spare parts for types 366 - 650 TVN/TVVN

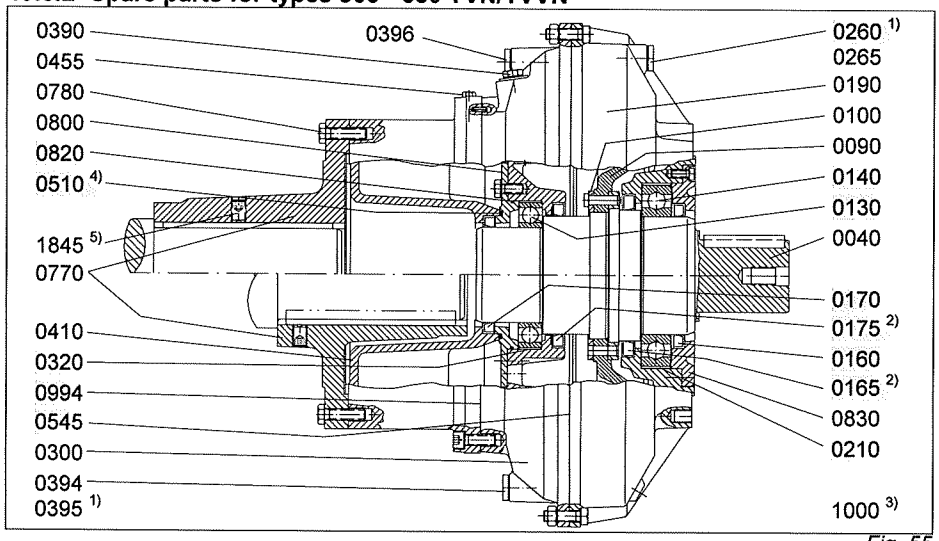

Fig. 55

Upper Part:
Flange design 1
(Long laid length)

Lower Part:
Flange design 2
(Short laid length)
For type TVVN only.

→ Connecting couplings: **Chapter 20, page 100**

1) For arrangement and quantity, please refer to tables in **Chapter 13.4**.
2) Only for continuous operation or operating fluid water (TW...).
3) For type T...F... only, not shown as illustration!
4) For sizes 366 and 422 inserted in delay chamber groove.
5) In case of not ex-proof coupling: Set screwt optional for connecting couplings ENK-SV, ENK-SX and EPK.
For ex-proof coupling: Set screw is standard

Screws and Standard parts				Wearing parts				Coupling main parts			
Pos.-Nr.	Description	TV TVV	TVN TVVN	Pos.-Nr.	Description	TV TVV	TVN TVVN	Pos.-Nr.	Description	TV TVV	TVN TVVN
0050	Fixing bolt	x		0130	Grooved ball bearing	x	x	0040	Coupling hub / -shaft	x	x
0265	Blind screw	x	x	0140	Grooved ball bearing	x	x	0080	Holding disk	x	
0390	Filler plug	x	x	0160	Radial shaft seal ring	x	x	0090	Inner wheel	x	x
0394	Blind screw	x	x	0165	Radial shaft seal ring	x	x	0100	Rivet-/screw-/clamping ring	x	x
0396	Sight glass	x	x	0170	Radial shaft seal ring	x	x	0190	Shell	x	x
0455	Nozzle screw	x	x	0175	Radial shaft seal ring	x	x	0300	Outer wheel	x	x
0780	Hexagon Screw		x	0210	Tolerance ring	x	x	0410	Delay chamber	x	x
1830	Hexagon Screw	x		0260	Fusible plug	x	x	0770	Primary coupling flange		x
1845	Set screw		x	0320	Tolerance ring	x	x	0800	Bearing support cover	x	x
1870	Hexagon Screw	x		0395	Fusible plug	x	x	0830	Sealing ring cover	x	x
1880	Spring washer	x		0510	O-ring	x	x	1000	Valve insert (Type T...F...)	x	x
				0820	O-ring	x	x	1800	Hub	x	
				0545, 0994	Flat seal	x	x	1810	Ring / Flange	x	
				1820	Flexible element	x		1860	Sheet-metal holder	x	

19.6 Spare parts for types TVVS and TVVSN

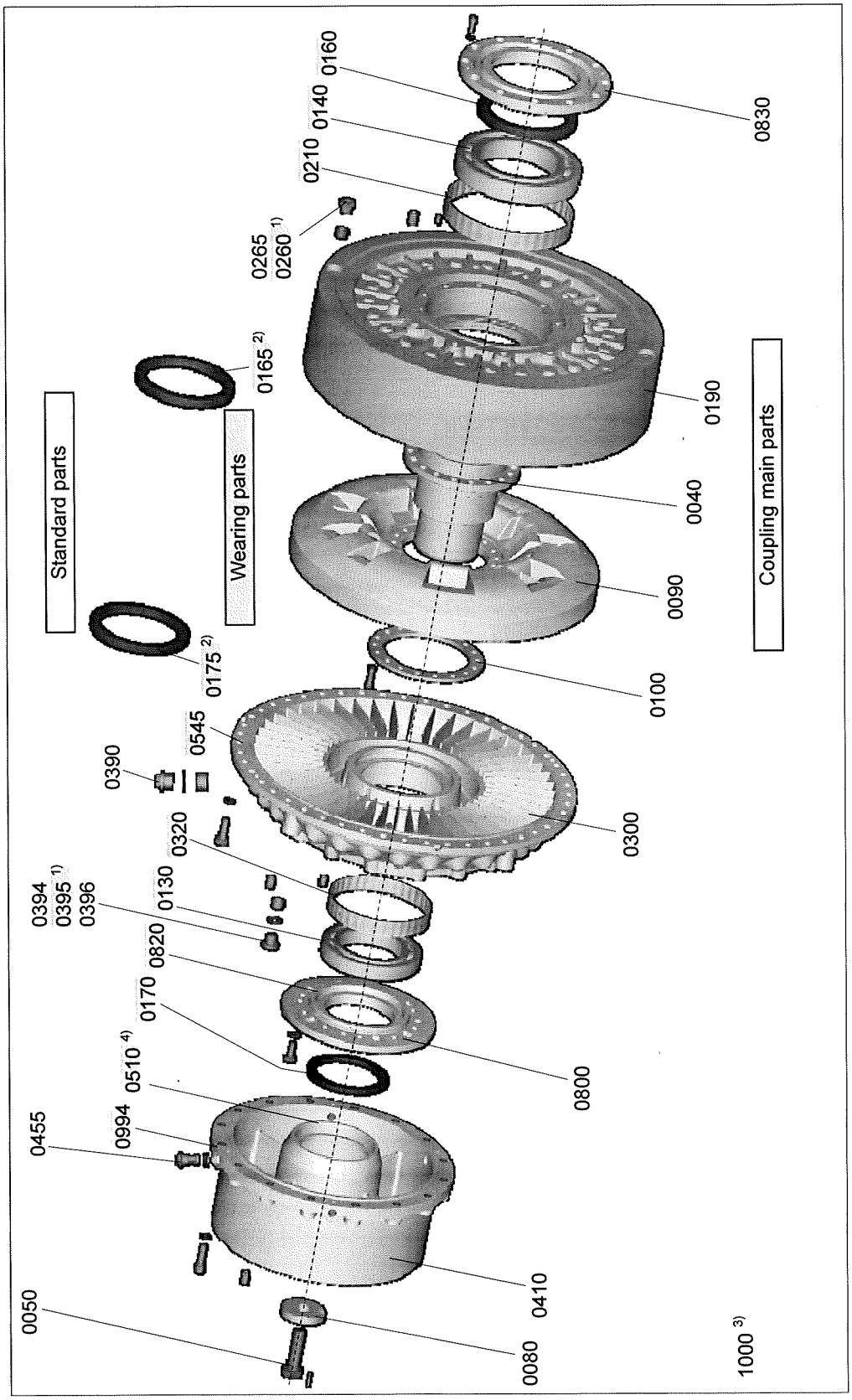

Fig. 56

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19.6.1 Spare parts for types 422 - 1150 TVVS

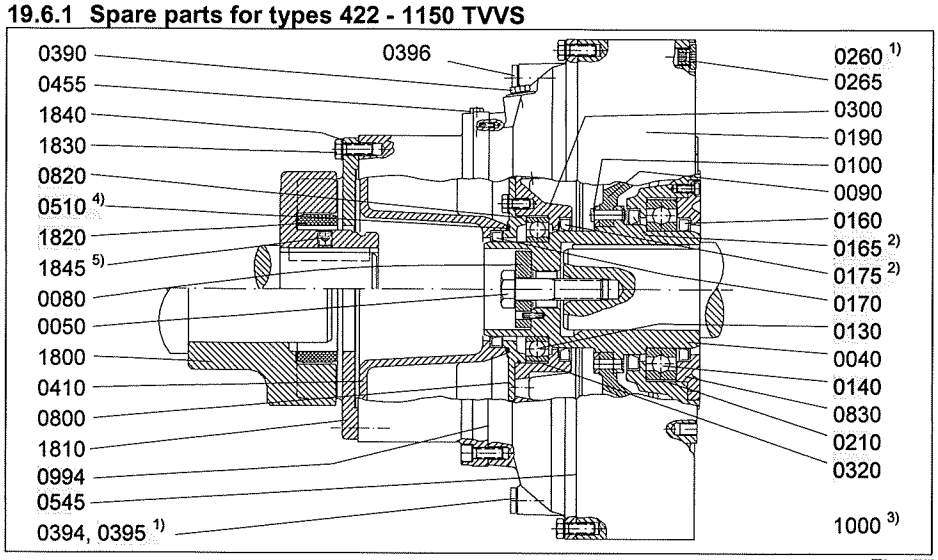

Fig. 57

Upper Part:
Representation exemplary with connecting coupling type **ENK-SV**.

Lower Part:
Representation exemplary with connecting coupling type **ENK-SX**.

19.6.2 Spare parts for types 422 - 650 TVVSN

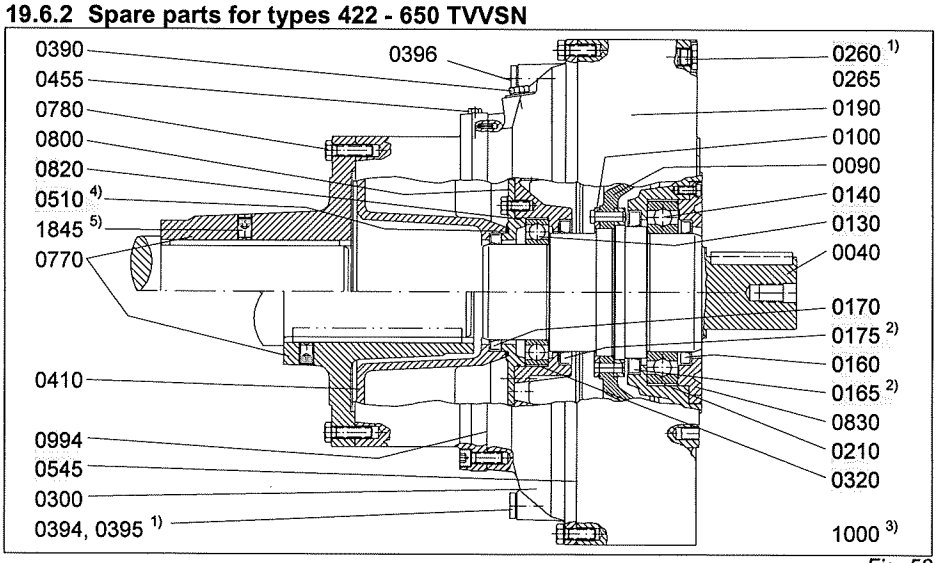

Fig. 58

Upper Part:
Flange design 1
(Long laid length)

Lower Part:
Flange design 2
(Short laid length)

→ Connecting couplings: **Chapter 20, page 100**

1) For arrangement and quantity, please refer to tables in **Chapter 13.4**.
2) Only for continuous operation or operating fluid water (TW...).
3) For type T...F... only, not shown as illustration!
4) For size 422 inserted in delay chamber groove.
5) In case of not ex-proof coupling: Set screwt optional for connecting couplings ENK-SV, ENK-SX and EPK.
For ex-proof coupling: Set screw is standard

Screws and Standard parts				Wearing parts				Coupling main parts			
Pos.-Nr.	Description	TVV-S	TVV-SN	Pos.-Nr.	Description	TVV-S	TVV-SN	Pos.-Nr.	Description	TVV-S	TVV-SN
0050	Fixing bolt	x		0130	Grooved ball bearing	x	x	0040	Coupling hub / -shaft	x	x
0265	Blind screw	x	x	0140	Grooved ball bearing	x	x	0080	Holding disk	x	
0390	Filler plug	x	x	0160	Radial shaft seal ring	x	x	0090	Inner wheel	x	x
0394	Blind screw	x	x	0165	Radial shaft seal ring	x	x	0100	Rivet-/screw-/clamping ring	x	x
0396	Sight glass	x	x	0170	Radial shaft seal ring	x	x	0190	Shell	x	x
0455	Nozzle screw	x	x	0175	Radial shaft seal ring	x	x	0300	Outer wheel	x	x
0780	Hexagon Screw		x	0210	Tolerance ring	x	x	0410	Delay chamber	x	x
1830	Hexagon Screw	x		0260	Fusible plug	x	x	0770	Primary coupling flange		x
1840	Spring washer	x		0320	Tolerance ring	x	x	0800	Bearing support cover	x	x
1845	Set screw	x	x	0395	Fusible plug	x	x	0830	Sealing ring cover	x	x
				0510, 0820	O-ring	x	x	1000	Valve insert (Type T...F...)	x	x
				0545, 0994	Flat seal	x	x	1800	Hub	x	
				1820	Flexible element	x	x	1810	Ring / Flange	x	

19.7 Spare parts for type 154 DT

Example connecting coupling type **ERK**.

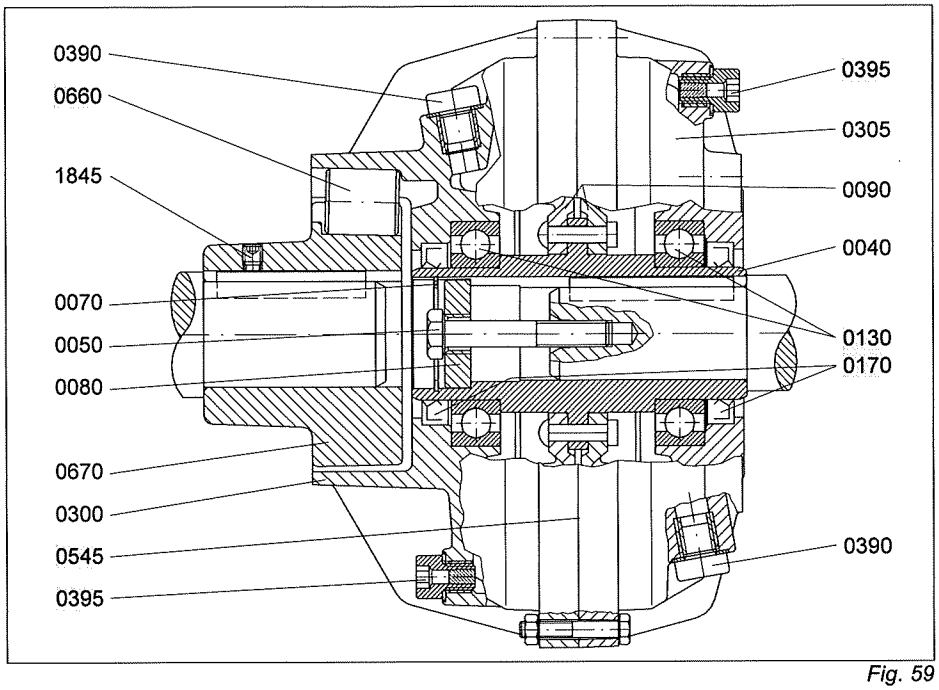

Fig. 59

→ Connecting couplings: **Chapter 20, page 100**

Screws and Standard parts		Wearing parts		Coupling main parts	
Item-No.	**Description**	**Item-No.**	**Description**	**Item-No.**	**Description**
0050	Fixing bolt	0130	Grooved ball bearing	0040	Coupling hub
0070	Circlip	0170	Radial shaft seal ring	0080	Holding disk
0390	Filler plug	0395	Fusible plug	0090	Inner wheel
1845	Set screw	0545	Flat seal	0300	Outer wheel
		0660	Flexible element	0305	Outer wheel
				0670	Hub

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19.8 Spare parts for types 206 DT and 274 DT/DTV

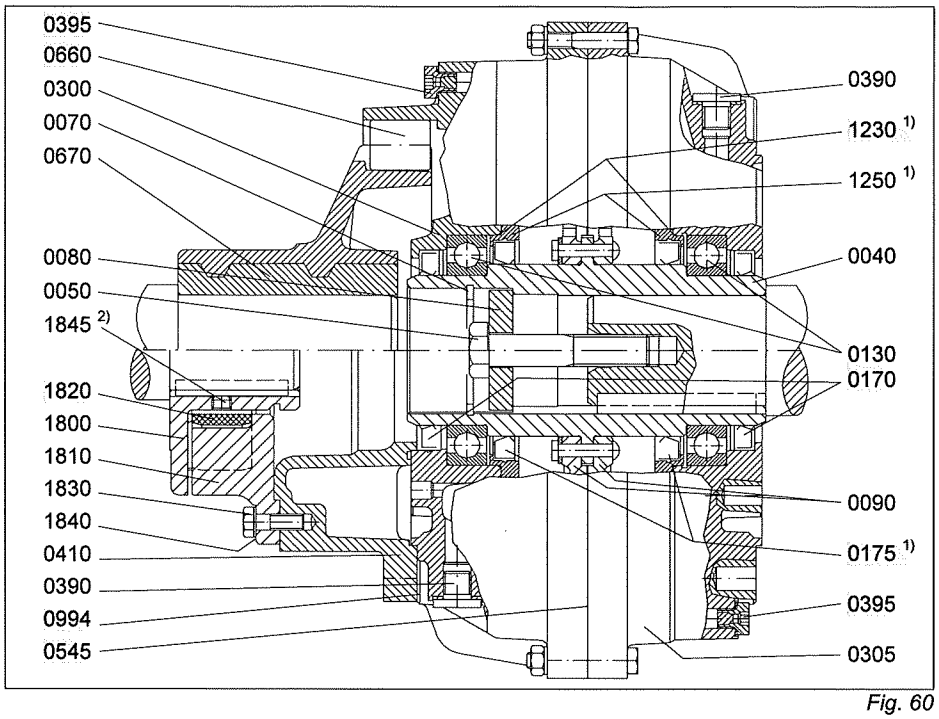

Fig. 60

Upper Part:
Representation of type **DT** with connecting coupling type **ERK**.

Lower Part:
Representation of type **DTV** with connecting coupling type **ENK-SV**.

1) Only for continuous operation or operating fluid water (DTW...).

2) In case of not ex-proof coupling: Set screwt optional for connecting couplings ENK-SV.
For ex-proof coupling: Set screw is standard.

→ Connecting couplings: **Chapter 20, page 100**

Screws and Standard parts			Wearing parts				Coupling main parts			
Pos.-Nr.	Description	DT / DTV	Pos.-Nr.	Description	DT	DTV	Pos.-Nr.	Description	DT	DTV
0050	Fixing bolt	x	0130	Grooved ball bearing	x	x	0040	Coupling hub	x	x
0070	Circlip	x	0170	Radial shaft seal ring	x	x	0080	Holding disk	x	x
0390	Filler plug	x	0175	Radial shaft seal ring	x	x	0090	Inner wheel	x	x
1830	Hexagon Screw	x	0395	Fusible plug	x	x	0300	Outer wheel	x	x
1840	Spring washer	x	0545	Flat seal	x	x	0305	Outer wheel	x	x
1845	Set screw	x	0660	Flexible element	x	x	0410	Delay chamber		x
			0994	Flat seal		x	0670	Hub	x	x
			1230	O-ring	x	x	1250	Oil retaining ring	x	x
			1820	Flexible element	x	x	1800	Hub	x	x
							1810	Ring / Flange	x	x

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19.9 Spare parts for types 1150 DT/DTV

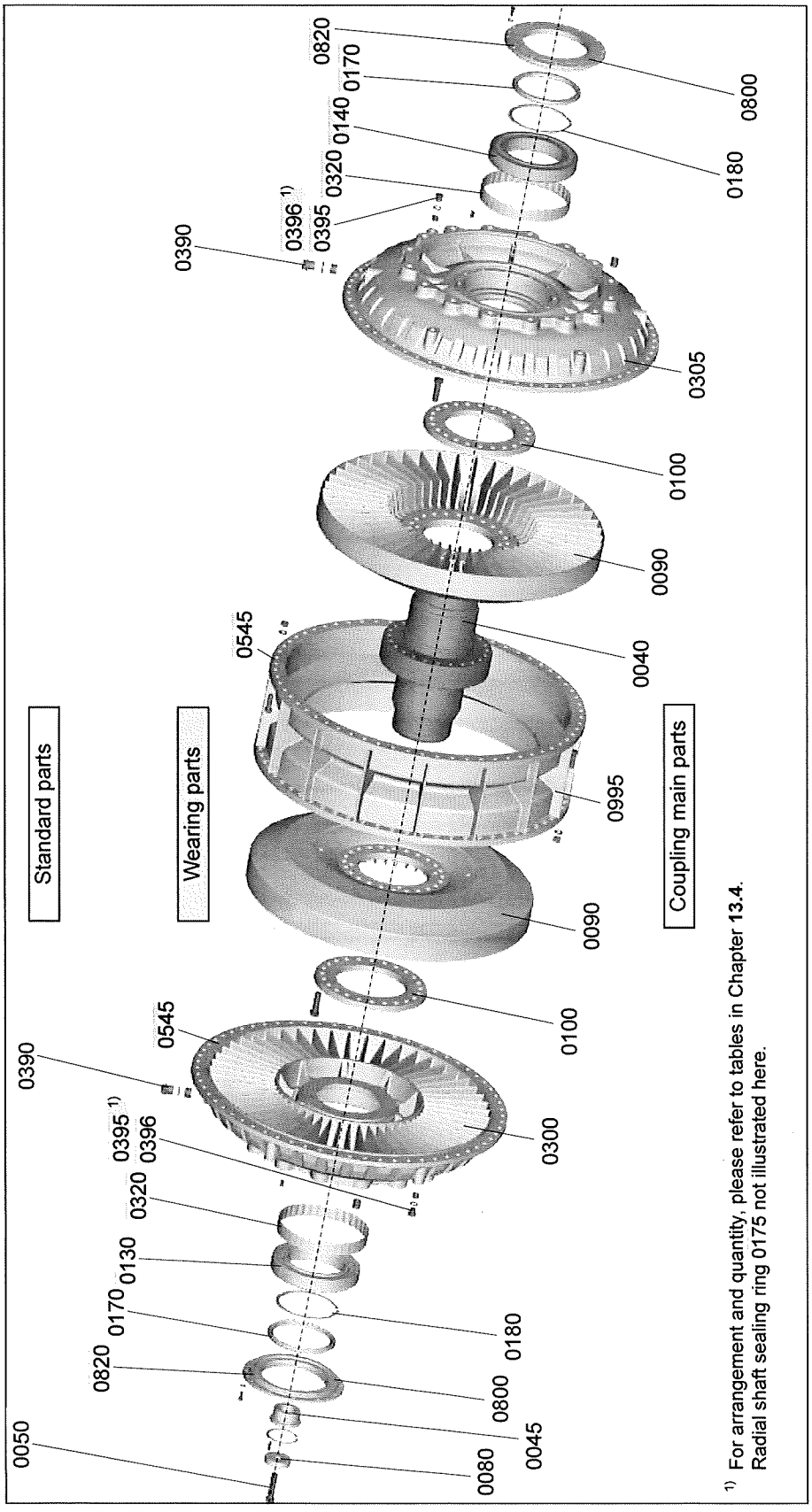

Fig. 61

1) For arrangement and quantity, please refer to tables in Chapter **13.4**.
Radial shaft sealing ring 0175 not illustrated here.

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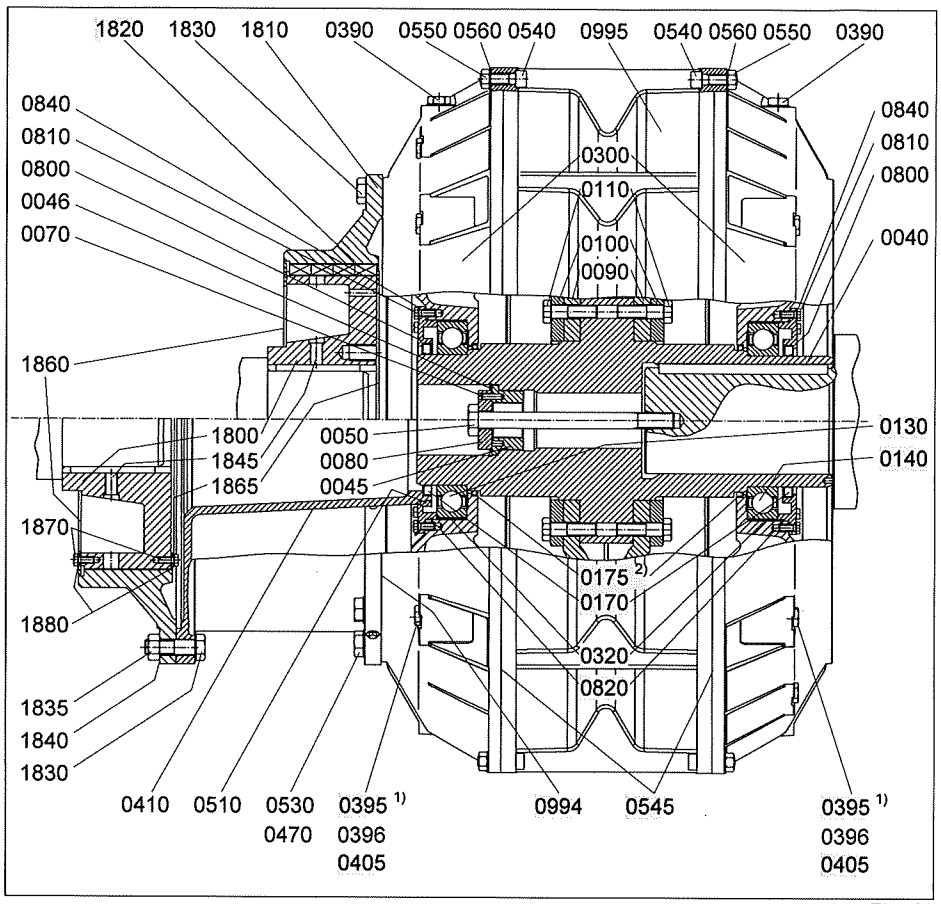

Upper Part:
Example of type **DT** with connecting coupling type **EPK**.

Lower Part:
Example of type **DTV** with connecting coupling type **EPK**.

Fig. 62

→ Connecting couplings: **Chapter 20, page 100**

[1] For arrangement and quantity, please refer to tables in **Chapter 13.4**.
[2] Only for continuous operation or operating fluid water (DTW...).

Screws and Standard parts				Wearing parts				Coupling main parts			
Pos.-Nr.	Description	DT	DTV	Pos.-Nr.	Description	DT	DTV	Pos.-Nr.	Description	DT	DTV
0046	Circlip	x	x	0130	Grooved ball bearing	x	x	0040	Coupling hub	x	x
0050	Fixing bolt	x	x	0140	Grooved ball bearing	x	x	0045	Threaded ring	x	x
0070	Roll pin	x	x	0170	Radial shaft seal ring	x	x	0080	Holding disk	x	x
0110	Hexagon Screw	x	x	0175	Radial shaft seal ring	x	x	0090	Inner wheel	x	x
0390	Filler plug	x	x	0320	Tolerance ring	x	x	0100	Clamping ring	x	x
0396	Sight glass	x	x	0395	Fusible plug	x	x	0300	Outer wheel	x	x
0470	Spring washer	x	x	0405	Sealing ring	x	x	0410	Delay chamber		x
0530	Hexagon Screw	x	x	0510	Sealing ring		x	0800	Sealing ring cover	x	x
0540	Hexagon Screw	x	x	0545	Flat seal	x	x	0995	Intermediate piece	x	x
0550	Hexagon Nut	x	x	0820	O-ring	x	x	1800	Hub	x	x
0560	Spring washer	x	x	0994	Flat seal		x	1810	Ring / Flange	x	x
0810	Hexagon Screw	x	x	1820	Flexible element	x	x	1860	Sheet-metal holder	x	x
0840	Spring washer	x	x					1865	Sheet-metal holder 2	x	x
1830	Hexagon Screw	x	x								
1835	Hexagon Nut		x								
1840	Spring washer		x								
1845	Set screw	x	x								
1870	Hexagon Screw	x	x								
1880	Spring washer	x	x								

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20 Spare parts information Connecting couplings

20.1 Connecting couplings on the input side

20.1.1 Flexible cam coupling type ENK

Outer shaft hub, type **ENK-SX**

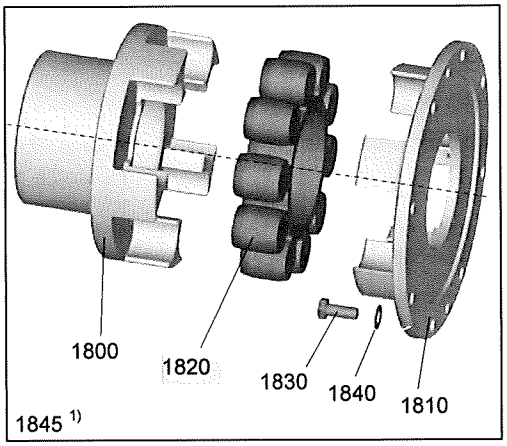

Fig. 64

Inner shaft hub, type **ENK-SV**

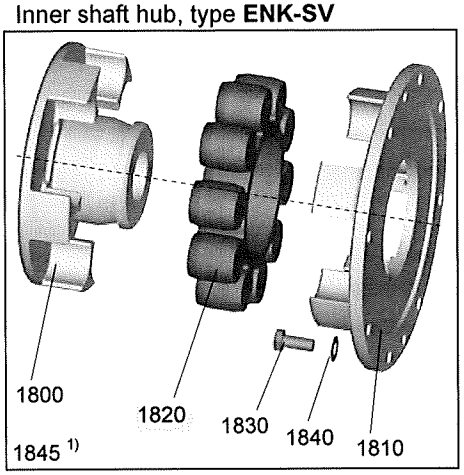

Fig. 63

1) Set screw not shown here, see **Fig. 30** and **31** on page **41**.

20.1.2 Flexible element coupling type EEK

Outer shaft hub, type **EEK-E**

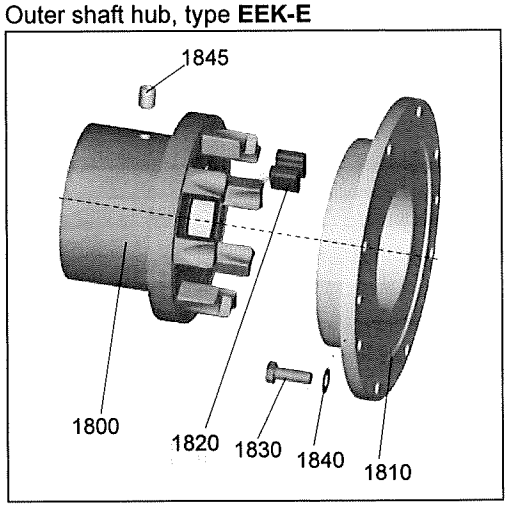

Fig. 66

Inner shaft hub, type **EEK-M**

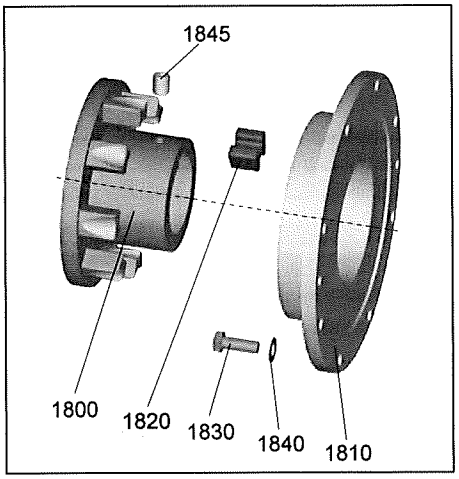

Fig. 65

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20.1.3 Flexible packet coupling type EPK

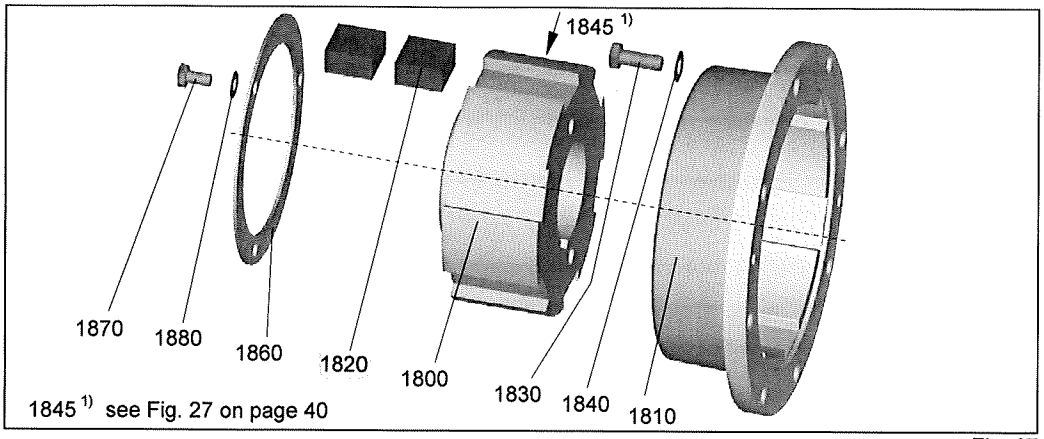

Fig. 67

Screws and Standard parts					Wearing parts		Coupling main parts				
Item-No.	Description	ENK	EEK	EPK	Item-No.	Description	Item-No.	Description	ENK	EEK	EPK
1830	Hex. screw	x	x	x	1820	Flexible element	1800	Hub	x	x	X
1840	Spring washer	x	x	x			1810	Ring / Flange	x	x	x
1845	Set screw	x	x	x			1860	Sheet-metal holder			x
1870	Hex. screw			x							
1880	Spring washer			x							

20.2 Connecting coupling on the output side

20.2.1 Coupling Nor-Mex G

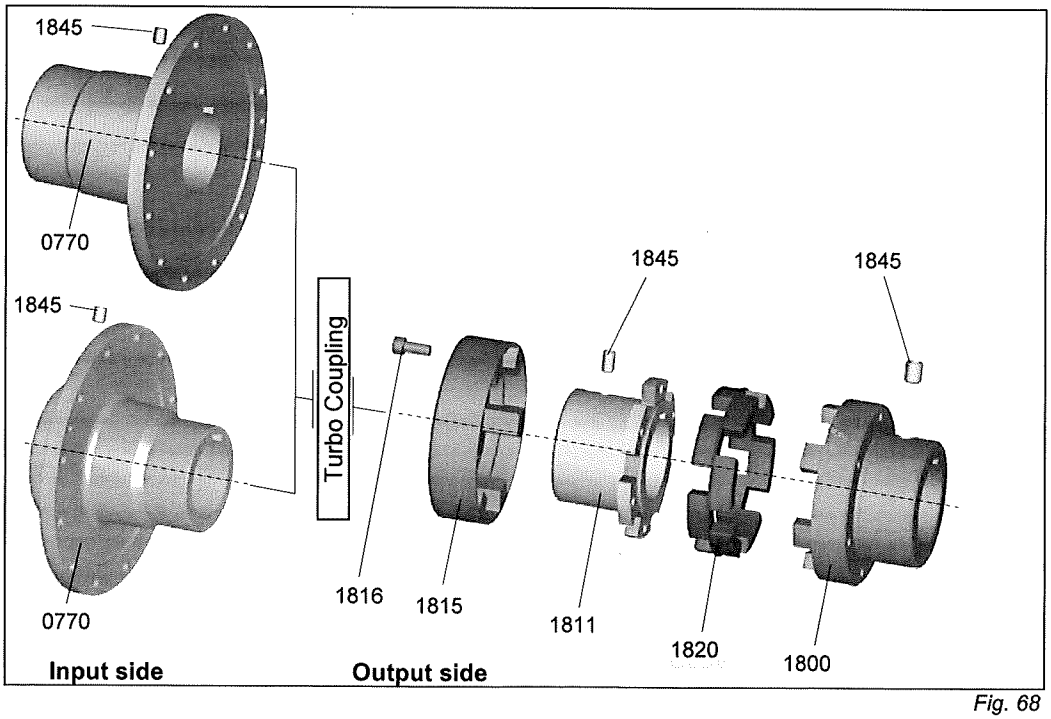

Fig. 68

Screws and Standard parts		Wearing parts		Coupling main parts	
Item-No.	Description	Item-No.	Description	Item-No.	Description
1816	Socket head screw	1820	Flexible element	0770	Primary coupling flange 1
1845	Set screw			0770	Primary coupling flange 2
				1800	Hub
				1811	Flange hub
				1815	Claw ring

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