

**Installation and Operating Manual****3626-011701 en**

**T... (with GPK-X)  
Turbo Couplings with constant fill,  
Connecting Coupling Type GPK-X  
(all-metal disk pack coupling)  
including design as per Directive 94/9/EC**

**ATTENTION!**

**Please read this manual, at any rate prior to installation and commissioning and keep it for further use!**

Serial No. <sup>1)</sup>		
Coupling type <sup>2)</sup>		
Year of construction		
Mass (weight)		kg
Power transmission		kW
Input speed		min <sup>-1</sup> /rpm
Operating fluid	<input type="checkbox"/> mineral oil <input type="checkbox"/> water <input type="checkbox"/>	
Filling		dm <sup>3</sup> (litre)
Nominal response temperature of fusible plugs		°C
Type of connecting coupling	GPK-X	
Sound pressure level $L_{PA,1m}$		dB
Position	horizontal	
Drive via	outer wheel	

<sup>1)</sup> Please quote the serial number in all correspondence. (→ **chapter 15, page 64**).

<sup>2)</sup> T...: oil / TW...: water.

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# 1 Technical Data



Necessary information for use in potentially explosive atmospheres:


CE  - Marking:		
Ambient temperature, if deviating from -25°C T <sub>a</sub> +40°C		°C
max. surface temperature (T <sub>3</sub> = 200°C, T <sub>4</sub> = 135°C, or deviating)		°C
Temperature monitoring	<input type="checkbox"/> MTS <sup>1)</sup> for pre-warning <input type="checkbox"/> BTS <sup>2)</sup> for pre-warning <input type="checkbox"/> BTS-Ex <sup>2)</sup> 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 <sup>3)</sup>		dm <sup>3</sup> (litre)
Fusible plug (SSS)	<input type="checkbox"/> SSS <input type="checkbox"/> SSS-X	
Overload (see <b>chap. 4.6</b> ), 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.	<input type="checkbox"/> yes <input type="checkbox"/> no	
After motor switch-on, monitoring of output speed has to become effective after		s (sec)
Diameter input <sup>4)</sup>		mm
Diameter output <sup>4)</sup>		mm
Replacement of roller bearings		h

Table 1

- 1) MTS: Mechanical thermal switch unit (see **chapter 16.1**).
- 2) BTS: Non-contacting thermal switch unit (see **chapter 16.2**).
- 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:



## 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 18 <sup>th</sup> 2010
Name of the undersigned	Mr. B. Morlock, General Manager - Start-up Components
Signature	

**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... (with GPK-X)  
Turbo Couplings with constant fill,  
Connecting Coupling Type GPK-X  
(all-metal disk pack coupling)

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.

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

Signature 

## 3 Preface

### 3.1 General information

This manual will support you in using the turbo coupling with connection coupling type **GPK-X** 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 transports the coupling, works on the coupling or commissions the same.**

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:

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Voith Turbo reserves the right for modifications.



### 3.2 Proper use

- The turbo coupling with constant fill (type of connecting coupling **GPK-X**) 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!



## 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 com- bustible 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 infor- mation	efficient in operation	

Table 2

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

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

## 4.2 As delivered condition

- The complete turbo coupling is delivered in assembled condition.
- The turbo coupling is without filling. If the scope of supply includes the operating fluid, it will be delivered in a separate container.
- The hubs with disk packs, possibly with brake drum, are supplied separately; the stub shaft is mounted.
- The clamping device to pretension the disk packs is screwed in and not tensioned. The nuts are adjusted to keep the disk packs at distance and not to overstretch these.
- A set of fusible plugs are supplied as spares.

→ **Packing see Chapter 4.3, page 11**

### 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 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 <b>6 months</b> in closed hall	- Device to suit transportation - Weather protection through means of transportation - Packed in PE foil
2	- Transport by sea - Storage up to <b>6 months</b> 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 web plate (Akylux). Shimmed with PVC-foil in case of joint plates
3	- Transport by sea - Storage up to <b>12 months</b> in closed hall	- like 2
4	- Transport by sea - Storage up to <b>24 months</b> 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.

**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 parking 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 disks 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 representations 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:**

<b>Manufacturer</b>	<b>Designation</b>
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!**

## 4.4 Lifting

### **DANGER!**

#### **Slings 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, 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!

**Sling a rope around the couplings on the delay chamber side.**  
Secure the rope against slipping off!

→ Pictures  
17 and 18,  
page 35

**Proper suspending of a Voith turbo coupling (exemplary):**

Screw suitable swivel (thread size as for item 1830, 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:**



Picture exemplary. Shown lifting of a T-coupling

Fig. 1



**DANGER!**

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:



Picture exemplary. Shown lifting of a T-coupling

Fig. 2

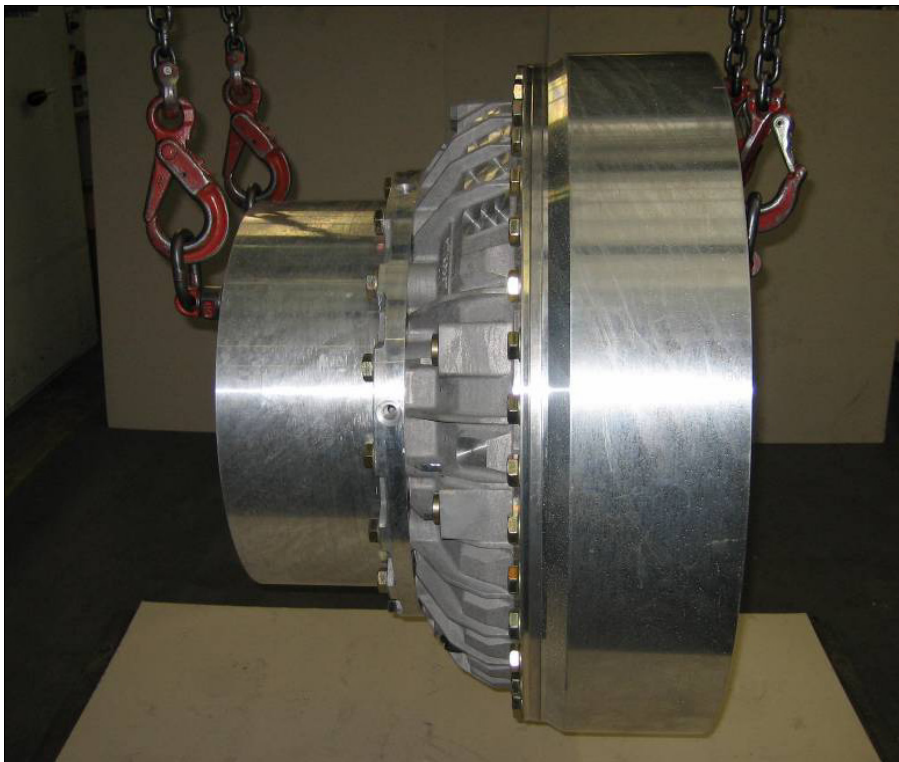
**DANGER!**

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



Picture exemplary. Shown lifting of a T-coupling

Fig. 3



Picture exemplary. Shown lifting of a T-coupling

Fig. 4

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

## 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!



### DANGER!

#### – 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 your work only after the coupling has cooled down below 40°C, otherwise there is a risk of burns!

Care for sufficient lightning during works performed 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!

#### – 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!

#### – 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!

#### – 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.

→ Protective cover see chapter 10

→ Protective cover see chapter 10



→ Sound pressure level see cover sheet



– **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!

#### 4.5.1 Fire extinguishing means

In case of fire act as follows:

- Extinguish the fire using **ABC-powder** or **carbon dioxide**.
- **Never use water to extinguish a fire!**



– 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 dismantling, the methane content has to be controlled locally using appropriate devices. Prior to starting and during performance of these works 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.

## 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!

### 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 4

- **Technical Data:**  
Chapter 1,  
page 4
- **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!
- **For monitoring devices, see**  
Chapter 16,  
page 65
- **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!
- **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!



**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 4
- 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).

## 4.7 Transportation

### 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.



→ Chapter 10,  
page 45

### 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 8

## 5 Voith Turbo Couplings with Constant Fill

### 5.1 Function

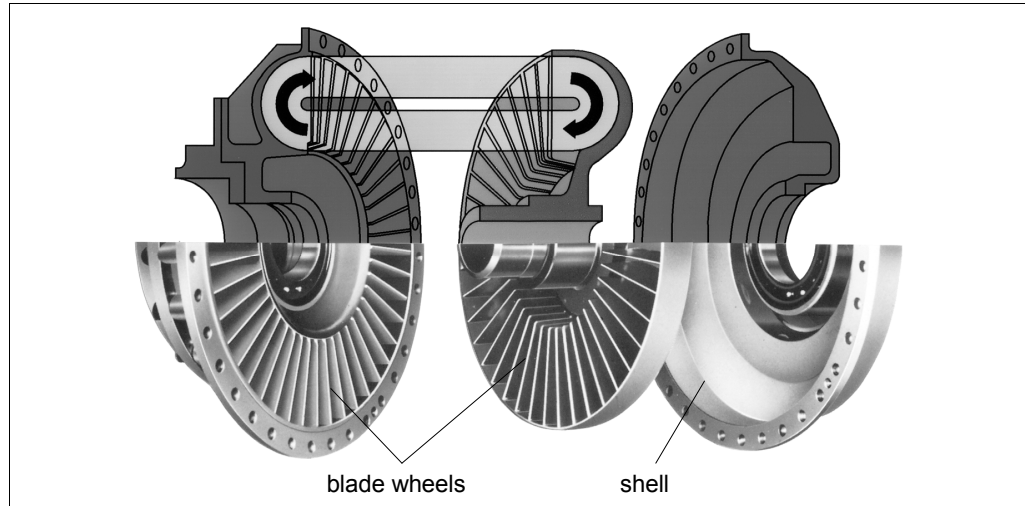


Fig. 5

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:

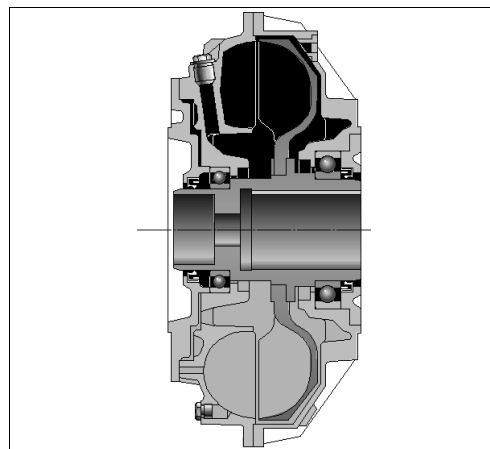


Fig. 6

– **Standstill:**

The total operating fluid is resting statically in the coupling.

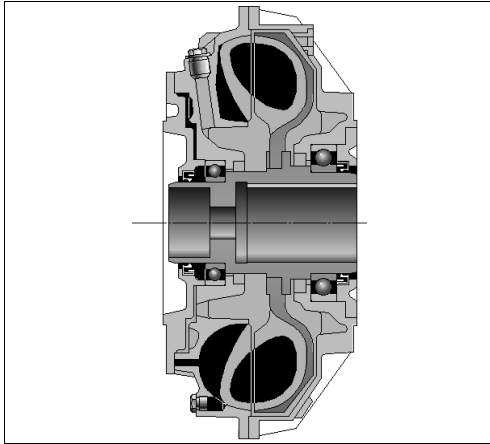


Fig. 7

**– 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.

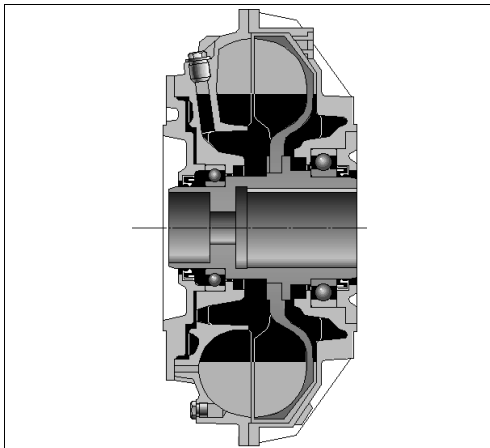


Fig. 8

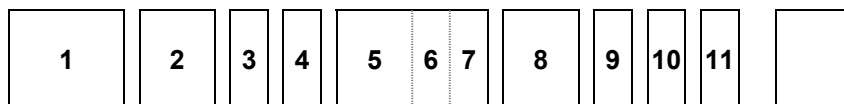
**– Normal operation:**

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.

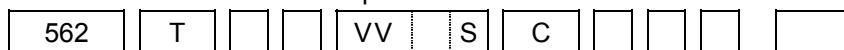
**5.2 Type designation**

For hydrodynamic couplings with constant fill, type of connecting coupling **GPK-X**, the type designation is determined as follows:

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



Example: 562 TVVSC



- |           |   |
|-----------|---|
| <b>1</b>  | <b>Coupling size (profile diameter in mm)</b><br>possible sizes: 366, 422, 487, 562, 650, 750, 866  |
| <b>2</b>  | <b>Number of hydrodynamic circuits</b><br>T: single-circuit coupling  |
| <b>3</b>  | <b>Material</b><br>"no code letter": Silumin<br>U: ferrous product  |
| <b>4</b>  | <b>Operating fluid</b><br>"no code letter": mineral oil<br>W: water (for antifreezing compound consult Voith)   |
| <b>5</b>  | <b>Delay chamber</b><br>V: with delay chamber<br>VV: with enlarged delay chamber  |
| <b>6</b>  | <b>Draining of delay chamber</b><br>"no code letter": time-dependent draining without dynamic refill<br>F: with centrifugal valves (standard type open on standstill)<br>Y: with dynamic refill |
| <b>7</b>  | <b>Shell</b><br>"no code letter": standard design<br>S: designed as annular chamber   |
| <b>8</b>  | <b>Design status</b><br>"old": A, B, C, E, G, H, J<br>"new": 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, ...  |
| <b>9</b>  | <b>Throttle plate</b><br>"no code letter": without throttle plate<br>D: with throttle plate   |
| <b>10</b> | <b>Design</b><br>"no code letter": standard design<br>-X: special constructional design<br>-Z: special hydrodynamic design  |
| <b>11</b> | <b>Possible supplementary information in plain text</b>   |



### 5.3 Design examples

Type TV:

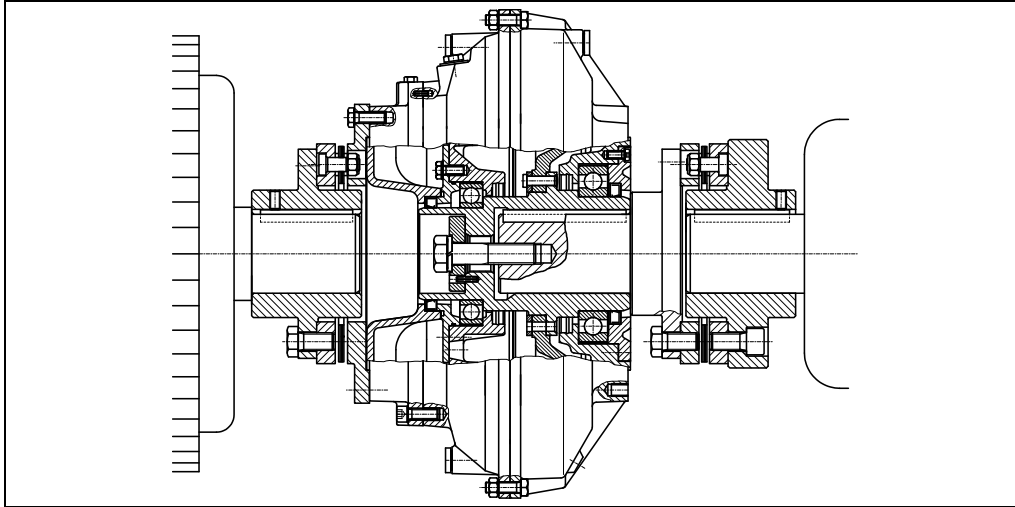


Fig. 9

Type TVV:

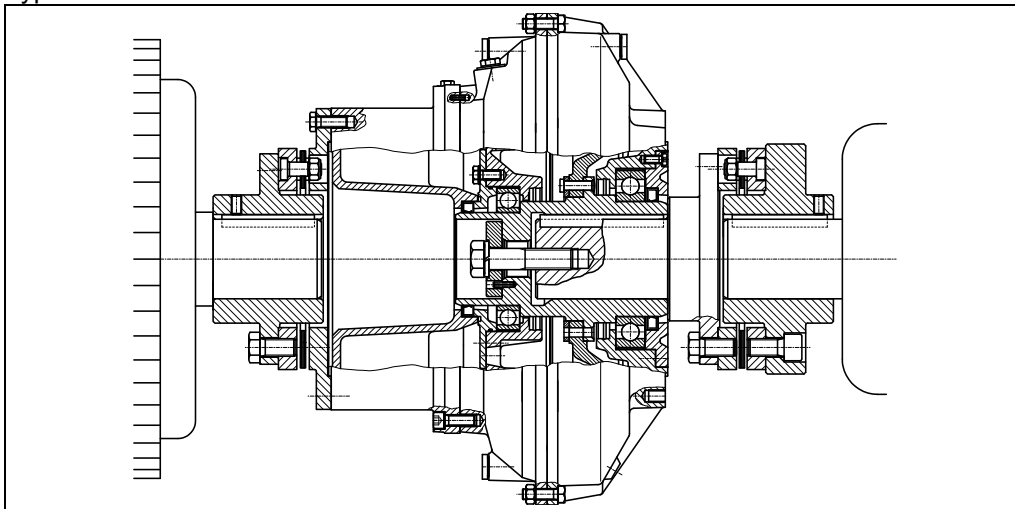


Fig. 10

Type TVVS:

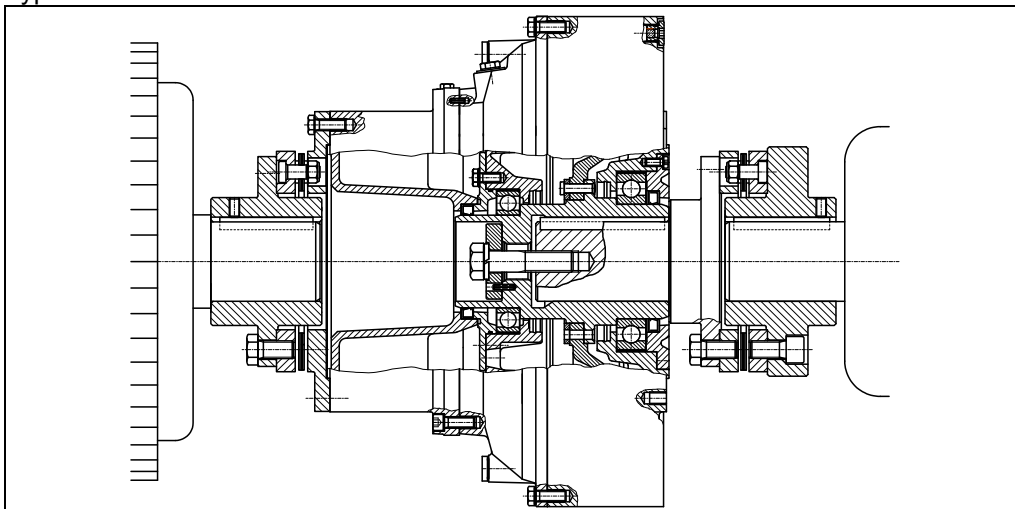


Fig. 11

## 6 Tightening Torques

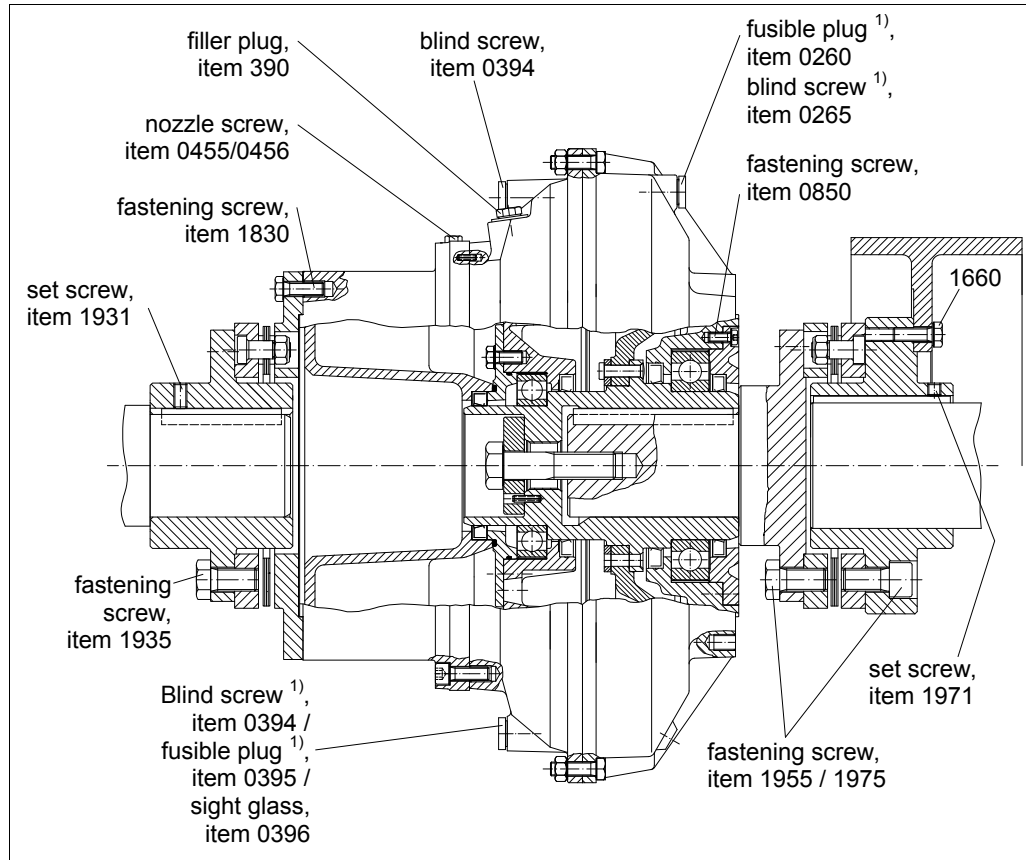


Fig. 12

<sup>1)</sup> For arrangement and quantity, please refer to tables in **Chapter 11.4**.

### 6.1 Set screws

The tightening torque applicable for set screws (item 1931 and 1971) depends on their dimension of thread:

Tightening torque in Nm						
Set screw	M6	M8	M10	M12	M16	M20
Set screw	4	8	15	25	70	130

Table 5

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

## 6.2 Fusible plugs, filler plugs and blind screws

→ Fig. 12, page 26

Coupling size	Tightening torque in Nm (dimension of thread)			
	Fusible plug, item 0395 / 0260	Filler plug, item 0390	Blindscrew, item 0394 / 0265	Sight glass, item 0396
<b>366 to 650</b>	50 (M18x1,5)	80 (M24x1,5)	50 (M18x1,5)	50 (M18x1,5)
<b>750, 866</b>	144 (M24x1,5)	235 (M36x1,5)	144 (M24x1,5)	144 (M24x1,5)

Table 6

## 6.3 Fastening screws and nozzle screws

→ Fig. 12, page 26

Coupling size	Tightening torque in Nm (dimension of thread)				
	Fastening screw <sup>1)</sup> , item 0850	Fastening screw <sup>1)</sup> , item 1660	Fastening screw <sup>1)</sup> , item 1830	Fastening screw <sup>1)</sup> , item 1935/1955/1975	Nozzle screw, item 0455, item 0456
<b>366</b>	23 (M8)	80 (M12)	68 (M12)	139 (M14)	48 (M16x1.5)
<b>422</b>	23 (M8)	80 (M12)	68 (M12)	210 (M16)	48 (M16x1.5)
<b>487</b>	23 (M8)	80 (M12)	68 (M12)	410 (M20)	48 (M16x1.5)
<b>562</b>	46 (M10)	195 (M16)	68 (M12)	580 (M22)	48 (M16x1.5)
<b>650</b>	46 (M10)	380 (M20)	135 (M16)	410 (M20)	48 (M16x1.5)
<b>750</b>	68 (M12)	380 (M20)	135 (M16)	580 (M22)	48 (M16x1.5)
<b>866</b>	23 (M8)	380 (M20)	250 (M20)	710 (M24)	48 (M16x1.5)

Table 7

<sup>1)</sup> Screws are used with a property class 8.8 or higher (to DIN EN 20898-1 / ISO 898-1)

## 7 Installation and Alignment



### **DANGER!**

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

### 7.1 Operation of GPK-X (all-metal disk pack coupling)

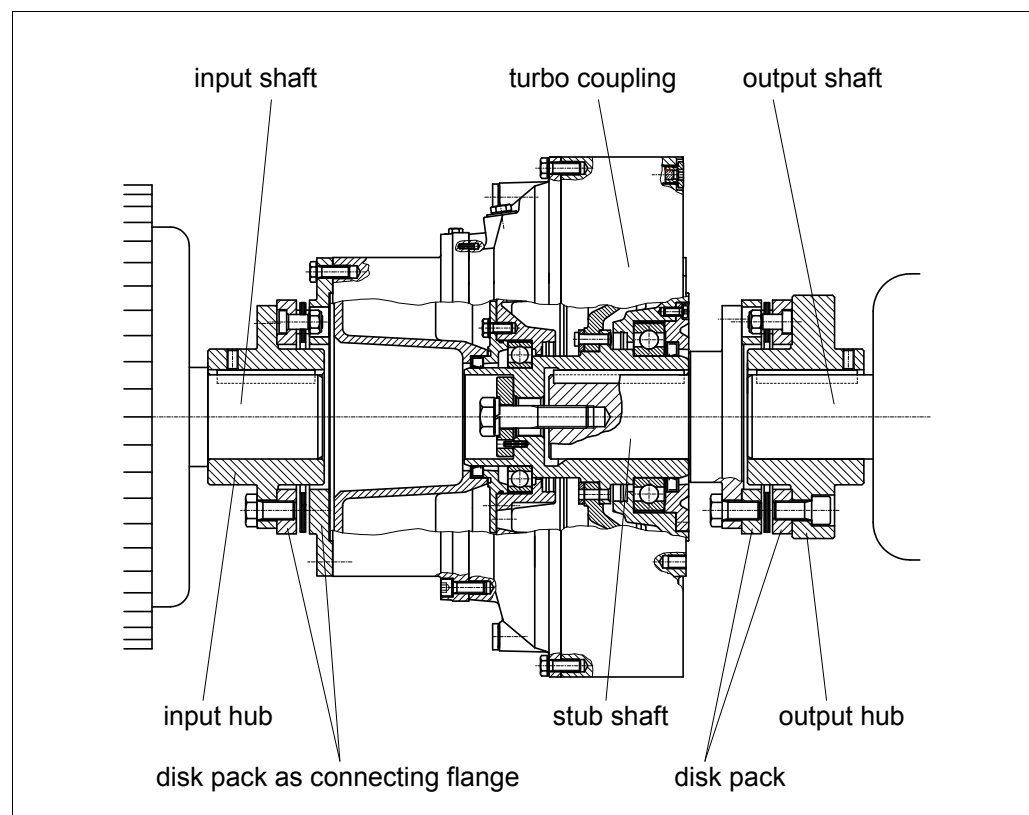


Fig. 13

- The turbo coupling weight is distributed on input and output shaft through two disk packs.
- The disk packs mounted complete with the hubs are forming the GPK-X (all-metal disk pack coupling).
- The disk packs are acting torsionally stiff in circumferential direction, are flexible in angular and axial direction.
- Shaft displacements are compensated by this flexibility.

## 7.2 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 26**

#### 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 7.7.3, page 33**

#### 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. 17 and 18 on page 35 !**
- Adjustable chains or ropes with sufficient tensile strength (see individual weights).

→ **Swivel size see Chapter 6.3, page 27 item 1830**

## 7.3 Preparations

- Check radial runout of drive motor and driven machine shaft journals.
- Clean fit surfaces at the shaft journals and hubs using emery cloth.
- Apply a thin layer of parting agent to shaft journals.
- De-grease flanges which are to be screwed for assembly.
- Clean preserved surfaces.
- Screw threads have to be oil-moistened.



**Note!**

Please use a lubricant with the following characteristics:

- operating temperature range: -20°C...+180°C,
- water and wash-out resistant,
- Protection against fretting corrosion and corrosion.
- **Proposed slip additives:**

Producer	Designation	Note
Dow Corning	Molykote G-N Plus Paste Molykote G-Rapid Plus Paste Molykote TP 42	
Fuchs	gleitmo 815	
Liqui Moly	LM 48 Mounting paste	
Dow Corning	Molykote D 321 R Anti-Friction Coating	<b>Hazardous substance!</b>
Castrol Optimol	Paste White T Paste MP 3	

Table 8



**ATTENTION!**

- Keys should be provided with a sufficient back clearance, be axially fixed and run smoothly in the keyways.)
- When designing a shaft-hub connection with a key, the hub is marked at the face side according to DIN ISO 8821:
  - H: Half key arrangement,
  - F: Full key arrangement).
 This mark should comply with the mark on the shaft.
- In case of a shaft-hub connection design with
  - a key,
  - balance to semi-inserted key agreement
  - and should the key be longer than the hub, remove the key accordingly to avoid unbalance.

- Insert the keys.
- 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 the coupling flange, if it exceeds 100 kg.



**WARNING!**

**Damaged slings (chains, ropes etc.) 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 slings for**

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

## 7.4 Mounting the input and output hub

### DANGER!

During mounting, assembly, manual turning and positioning the turbo coupling persons could bruise fingers or cut themselves on sharp edges thus getting seriously injured!

Sufficiently qualified, instructed and authorized persons only are allowed to mount the turbo coupling!



### ATTENTION!

The use of unsuitable working means and methods may cause damage to property.

When mounting prevent the use of

- pressure plates,
- hammers,
- welding torches.



### EX-PROTECTION! / ATTENTION!

Record mounting (see Chapter 12).



### Note!

The mounting process of input and output hub is the same.



## 7.5 Mounting process in case of key connection

- Fasten hub to a suitable lifting device.
- Careful heating of the hub (to approx. 80°C) facilitates mounting.
- Mount hub onto corresponding shaft journal.
- Secure hub using the set screw.

## 7.6 Mounting process in case of press fit

- Fasten hub to a suitable lifting device.
- Carefully heat the hub for shrinking on (temperature see assembly plan on the cover sheet of this instruction manual).
- Mount hub onto corresponding shaft journal.

## 7.7 Alignment

### 7.7.1 Laid lengths



#### ATTENTION!

To avoid any axial pre-load it is absolutely necessary to observe the laid lengths! Observe, in particular, displacements due to temperature changes.

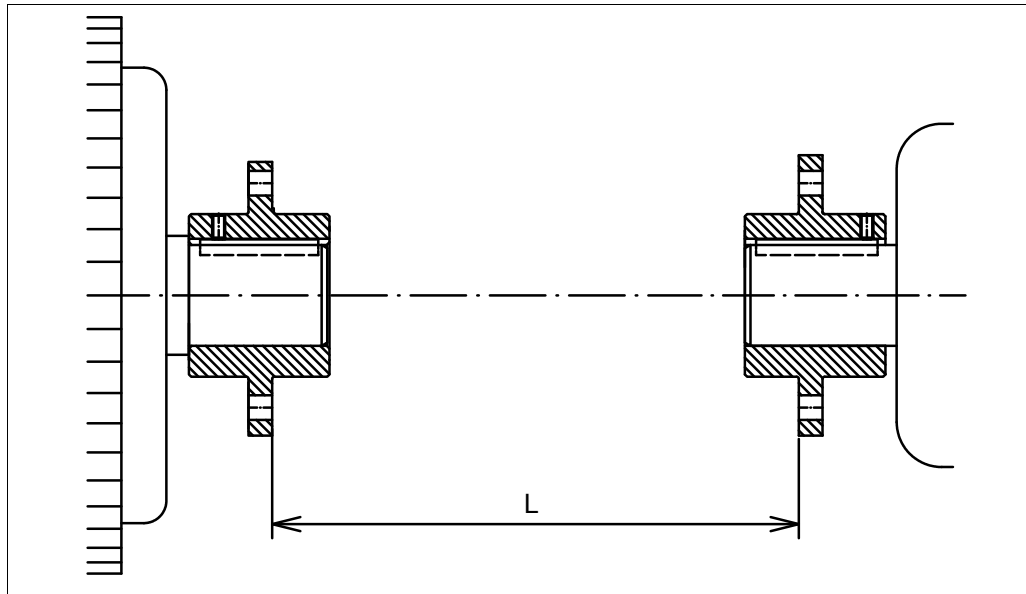


Fig. 14

Laid lengths L in mm

Coupling type	TV	TVV / TWVS
366	350,0 + 0,5	420,5 + 0,5
422	391,5 + 1,0	469,5 + 1,0
487	467,5 + 1,5	552,5 + 1,5
562	532,0 + 2,0	627,0 + 2,0
650	604,0 + 2,0	714,0 + 2,0
750	669,5 + 2,0	796,5 + 2,0
866	748,0 + 2,0	896,0 + 2,0

Table 9



**7.7.2 Alignment tolerances**

**ATTENTION!**

- Excessive misalignment may cause damage to the material.
- Observe the values for radial and axial runout under all operating conditions.
- Observe, in particular, displacements due to temperature changes.



**Note!**

- The smaller the misalignment on alignment, the
- longer the lifetime and reliability of the unit,
  - smoother the running.



The maximum permissible **alignment tolerances** apply to:

- **radial runout** in the plane of the output hub flange according to **Fig. 15** (maximum permissible radial deflection of dial gauge!)
- **axial runout** on the biggest diameter of output hub flange according to **Fig. 15** (maximum permissible axial deflection of dial gauge!)

Alignment tolerances in mm		
Coupling size	maximum permissible radial dial gauge deflection (radial)	maximum permissible axial dial gauge deflection (axial)
366, 422	1,0	0,3
487	2,0	0,7
562	3,2	1,0
650, 750, 866	4,6	1,5

Table 10

**7.7.3 Alignment**

Alignment is possible using the LASER-optical methods or manually using dial gauges. More precise results are normally obtained using the LASER-optical methods.

**Note!**

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



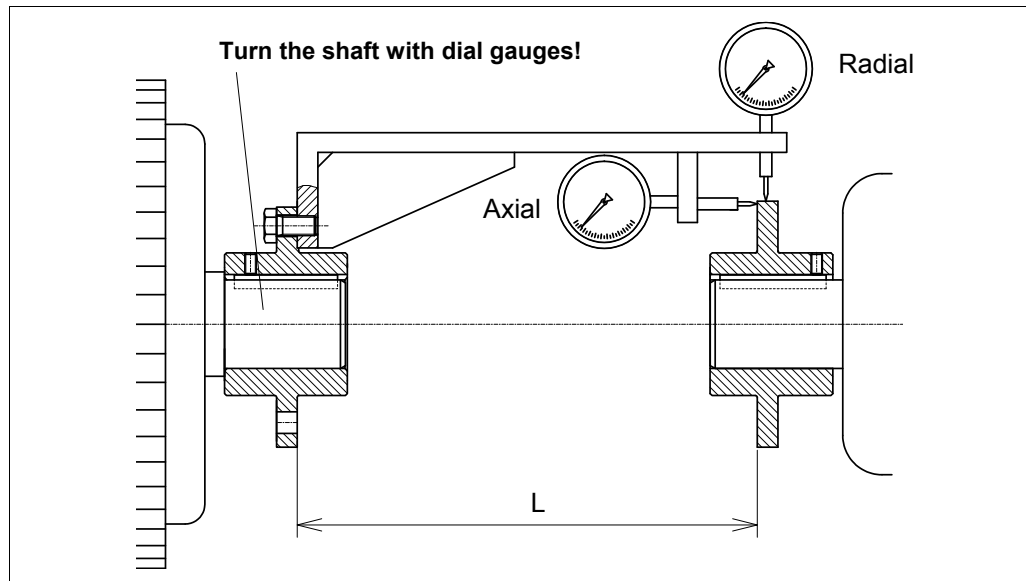


Fig. 15

- Provide the correct distance L (see **chapter 7.7.1**) between input and output unit.
- Align input and output shaft **Fig. 14** with each other, the alignment tolerances from **chapter 7.7.2** are applicable in this case.
- Fix input and output unit on the foundation.
- Check alignment after tightening all screws, correct, if necessary.

## 7.8 Turbo coupling installation

→ **Tightening  
Torques:**  
**Chapter 6.3,**  
**page 27**

- Mount disk pack to the relevant hub, observe tightening torque of screws (items 1935 and 1975)!
- The disk packs need to be prestressed to a block using a locking device. Do not fall below the reference dimensions **X** (**Fig. 16**).

Coupling size	366	422	487	562	650	750	866
Reference dimension <b>X</b>	6.8	7.6	9.7	10.3	13.2	14.1	14.8
	+0.2	+0.2	+0.3	+0.3	+0.3	+0.3	+0.4

Table 11

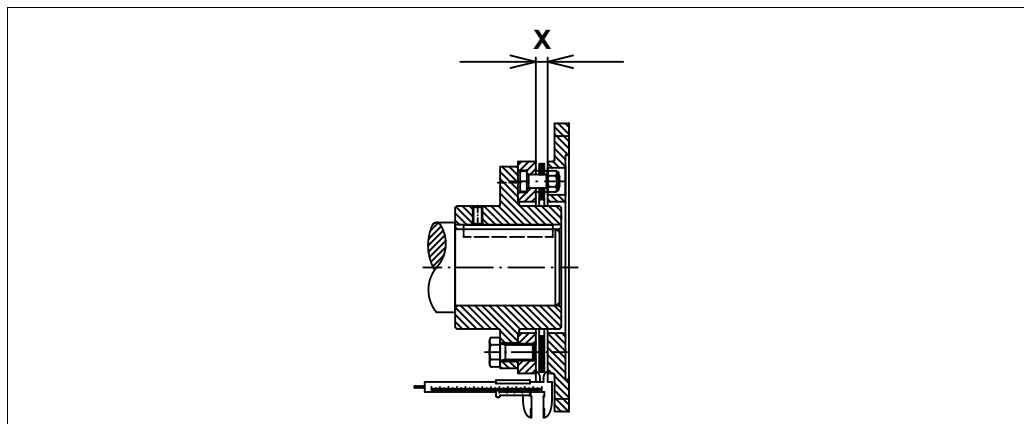


Fig. 16

### Note!

The disk packs axially prestressed provide sufficient space for radial installation.



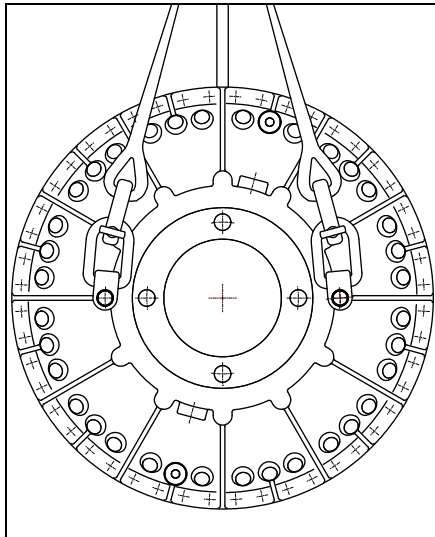


Fig. 17

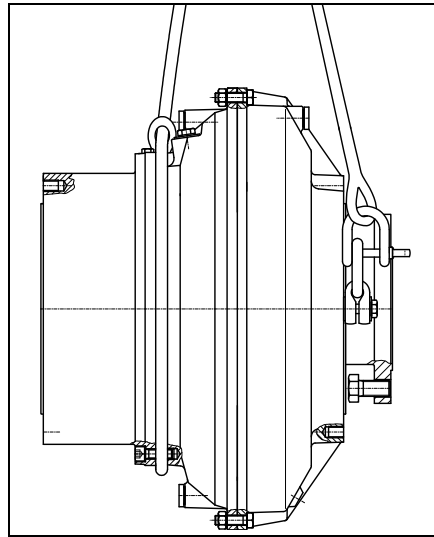


Fig. 18

- Fix the coupling with suitable slings to a suitable lifting appliance and move it to the drive unit.

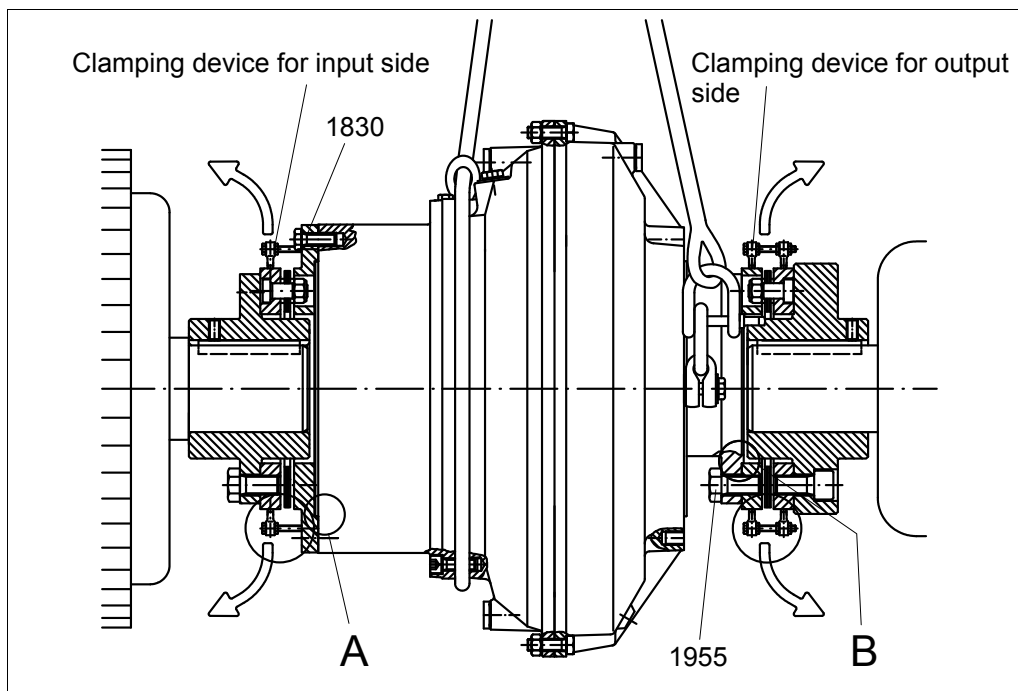


Fig. 19



**ATTENTION!**  
The fits A / B might be damaged if not assembled properly!

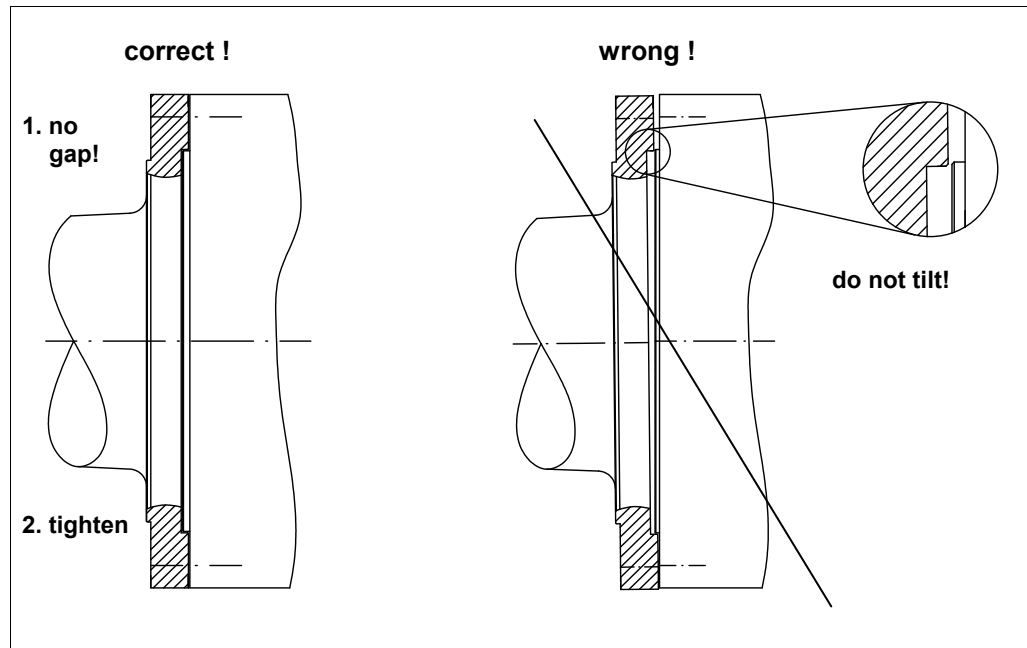


Fig. 20

- Place the turbo coupling carefully between the disk packs.
- Release the pressure on the disk packs by removing the clamping device. In this case insert the fits A / B on the flange carefully.
- Insert screws (item 1830 and 1955), do not tighten them.
- **Completely** remove **all 4** clamping devices on each side.
  - Clamping devices input side:  
**one** eye bolt, **one** straining screw and **one** nut each,
  - Clamping devices output side:  
**two** eye bolts, **one** straining screw and **three** nuts each.
- Keep the clamping devices for later use (disassembly).
- Tighten screws (item 1830 and 1955) uniformly, observe the tightening torques!

→ Tightening  
Torques:  
Chapter 6.3,  
page 27

## 7.9 Alignment check

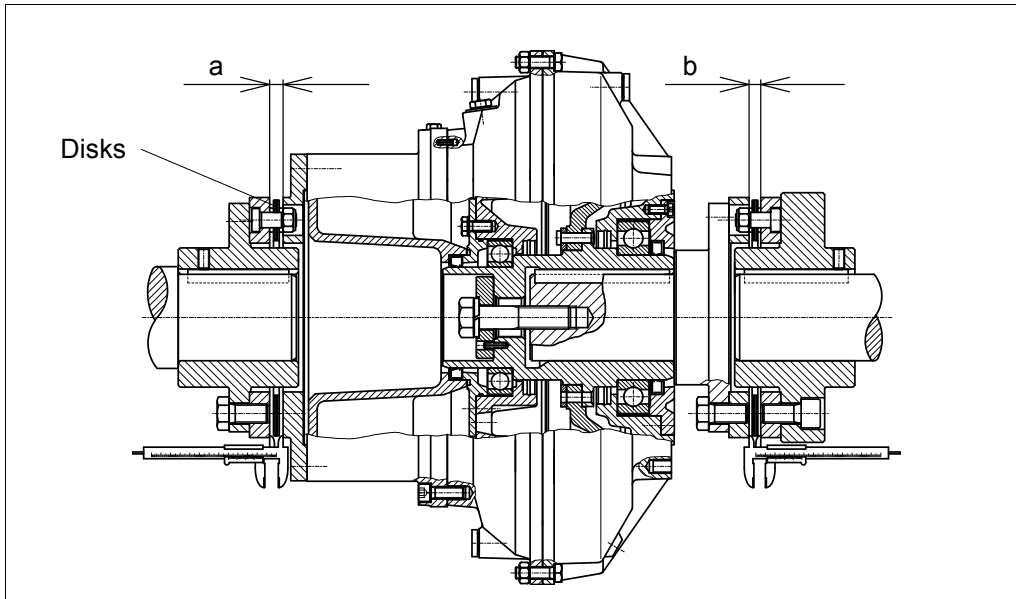


Fig. 21

- a:** Distance between flanges of input side disk pack.
- b:** Distance between flanges of output side disk packs.
- a<sub>min</sub>, b<sub>min</sub>:** minimum value of a or b.
- a<sub>max</sub>, b<sub>max</sub>:** maximum value of a or b.
- Δa:** a<sub>max</sub> - a<sub>min</sub>.
- Δb:** b<sub>max</sub> - b<sub>min</sub>.

- Measure a and b going around the total circumference of relevant disk pack in 45° steps, without rotating the shafts or the coupling. Compare the measured values with the following table:

Dimensions to check alignment in mm		
Coupling size	a = b	Δa = Δb
366 T	9,5 ... 10,3	≤ 0,55
422 T	10,4 ... 11,45	≤ 0,55
487 T	12,75 ... 14,85	≤ 1,35
562 T	13,25 ... 16,35	≤ 2,1
650 T	16,2 ... 20,2	≤ 3
750 T	17,5 ... 21,5	≤ 3
866 T	19 ... 23	≤ 3

Table 12

**ATTENTION!**  
Observe dimensions a, Δa, b and Δb under all operating conditions!

- Document alignment.



→ Reports:  
Chapter 12,  
page 54



**8.1.1 Operating fluids which may be used**

- Hydraulic oils HLP 32 to DIN 51524, Part 2 <sup>\*)</sup>
- Lube oils CLP 32 to DIN 51517, Part 3
- Steam turbine oils LTD 32 to DIN 51515, Part 1 <sup>\*)</sup>
- 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

<sup>\*)</sup> for special cases ISO VG 10 – 46 usable

**8.1.2 Proposed operating fluids**

Manu- facturer	Designation	Pour- point in °C	Flash point in °C	Fire point in °C	Class	FE8-test satisfied
Addinol	Hydraulic 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	Yes
	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	
	Mobilfluid 125	-30	225		CLP/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 Oil 32	-33	210		HLP	
	Tegula V32	-33	211		HLP	Yes
SRS - Salzbergen	Wintershall Wiolan HS 32	-24	220	240	HLP	
	Wintershall Wiolan HF 32	-27	200	240	HLP	yes
Texaco	Rando HD 32	-30	196	246	HLP	
Total	Azolla ZS 32	-27	210	220	HLP	

Table 13

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!



## 8.2 Proposed operating fluids for special requirements

### Operating fluid for the use in the food industry

Producer	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

Producer	Description	Pourpoint in °C	Flashpoint in °C	Class
Fuchs	Renosafe DU 46	-33	305	HFD-U

Note: Fuchs Renosafe DU 46 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

Producer	Description	Pourpoint in °C	Flashpoint in °C	Class
Fuchs	Plantosyn 3268	-36	230	HEES

Note: Fuchs Plantosyn 3268 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.

## 8.3 Requirements to be fulfilled by the operating fluid water



### ATTENTION!

**Water filling 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.

### 8.3.1 Usable operating fluids

Usually these requirements are satisfied by drinking water.



**8.3.2 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.

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

**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:**

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

Table 14

– **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 15

– **Proposed greases:**

<b>Supplier</b>	<b>Designation</b>
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 16

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

## 9 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-PROTECTION! / 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 26, please observe Fig. 12 on page 26.

## 9.1 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

- 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.
- Fill in the specified operating fluid quantity (→ **Chapter 8**) through a fine strainer
  - mesh size  $\leq 25 \mu\text{m}$  for turbo couplings with oil as operating medium (type T...)
  - mesh size  $\leq 50 \mu\text{m}$  for turbo couplings with water as operating medium (type TW...)
 through the filter plug opening.
- Tighten the filler plug.
- Tighten the fusible plug.

→ **Quantity:** See **Chapter 8.3.2**, page 41

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

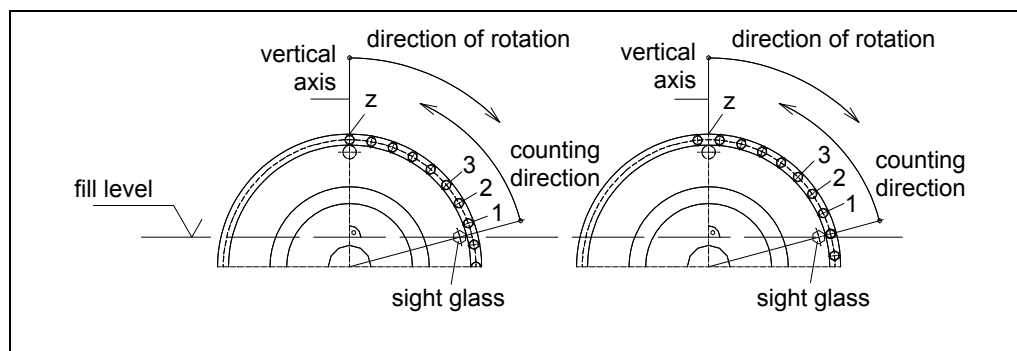


Fig. 22

- Turn the coupling until the operating fluid is just visible at the sight glass.
- Determine the **number z** of flange screws from the sight glass to the vertical axis. The first screw is the one in counting direction, **after** the intersection line through the sight glass.
- For later filling level checks, record the **number z** of screws determined and additionally mark the coupling guard.
- If not yet done, tighten the fusible plug.
- After a test run (with guard!) check the coupling for leaks.

Z = \_\_\_\_\_

→ **Assembly control report:**  
**Chapter 12.1**, page 55

→ **Tightening torques:**  
**Chapter 6.2**, page 27

## 9.2 Filling check

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

- Turn the coupling until the operating fluid is just visible at the sight glass.
- Determine the **number z** of flange screws from the sight glass up to the vertical axis. The first screw is the one in counting direction, **after** the intersection line through the sight glass.
- 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!
- After a test run (with guard!) check the coupling for leaks.

→ **Number z:**  
**Chapter 9.1,**  
**page 43**

## 9.3 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.



### 9.3.1 How to drain 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 27**

### 9.3.2 How to drain 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.
- 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.
- 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 27**

## 10 Commissioning

### DANGER!

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

Prior to beginning commissioning make sure that the clamping devices have been removed! There is the risk of property damages!



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).





**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!
- Due to the kind of bearings, standard turbo couplings require at least one standstill within three months.



→ Technical  
Data:  
Chapter 1,  
page 4

**EX-PROTECTION! / ATTENTION!**

- Check whether the disks of the connecting coupling (in German: GPK-X) touch the flanges.
- 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 12.2).



**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:  $\text{C} \text{ } \text{Ex} \text{ II 2D c 180}^\circ\text{C X}$



**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!**

# 11 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 or 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.

### **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!**



**Maintenance plan:**

→ Tightening  
Torques:  
Chapter 6.3,  
page 27

Time	Maintenance work
approx. 1 hour after commissioning	Check tightening torques of fastening screws item 1830, 1935, 1955 and 1975.
After the first 500 operating hours	Check tightening torques of fastening screws item 1830, 1935, 1955 and 1975.  Check steel disks of connecting coupling type GPK-X (→ <b>Chapter 11.2</b> ).  Check reference dimensions <b>a</b> and <b>b</b> (see <b>Chapter 7.9</b> ), compare them with commissioning report and re-align them in case of deviations.
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 <b>Chapter 1</b> (detail examination).
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, <b>Chapter 12</b> )! Consult the operating fluid supplier with regard to the permissible values (see <b>Chapter 8</b> and <b>9</b> ).
on response of a fusible plug	change all fusible plugs and the operating fluid (→ <b>Chapter 11.4</b> ).  check operating conditions (Chapter 1).  check devices provided for temperature monitoring (see <b>Chapter 16</b> : MTS, BTS(ex), BTM).
In case of impurity	Cleaning (→ <b>Chapter 11.1</b> ).

Table 17

Maintenance works and routine inspections are to be performed according to report. Document maintenance works (report sample see **Chapter 12.3**).



**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 (→ <b>Chapter 11.1</b> ).
Maintenance interval see chapter 1	Replace roller bearings (see <b>Chapter 11.3.3</b> ).

Table 18



**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.



**11.1 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.



**11.2 Connecting coupling type GPK-X**

- On inspection of the unit, check the connecting coupling for heavily deformed disks compared to the initial installation condition, for disk fractures or signs of corrosion on disks.
- The sum of all gaps (between individual disks) must not exceed 50% of the air gap between flange and disk pack (without torque application). Measure the gap between flange and disk pack around the washers and without torque application.

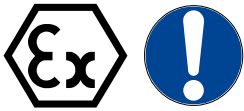
**EX-PROTECTION / ATTENTION!**

Compared to the initial installation condition, any deformed disk packs, disk fractures or signs of corrosion may be an indication for overload or faulty alignment! Exchange the entire connecting flange with disk pack (item 1940 and/or 1960)!

**Do not replace the individual disks. Only the manufacturer is able to guarantee expert repair or corrective maintenance!**



### 11.2.1 Check for wear when using an axial support



#### **EX-PROTECTION / ATTENTION!**

When using an axial support (possibly at an inclined position of the drive), a check for wear has to be performed in regular intervals. To do so, a differential measurement is performed, i.e. commissioning state vs state after operation of the respective coupling half (see assembly plan).

**As soon as the gap changes by  $\geq 1\text{mm}$ , replace the spherical calotte of the support.**



#### **Note!**

Always measure the gaps between the flanges in installed condition at an inclined position of the drive and at the same position.

## 11.3 Bearings

### 11.3.1 Bearing lubrication when using mineral oil as operating fluid

Please observe the following in order to guarantee bearing lubrication:



#### **ATTENTION!**

- Due to the kind of bearings standard turbo couplings require at least one standstill within three months.



#### **Note!**

- Turbo couplings can be provided with special bearings which allow permanent operation and contain a lifetime grease filling.

### 11.3.2 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.

### 11.3.3 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 4

### 11.4 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 19

**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!**



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

→ **Tightening torques:**  
**Chapter 6.2,**  
**page 27**

### 11.4.1 Fusible plugs in couplings not suitable for usage in potentially explosive atmospheres

Number and position of fusible plugs, blind screw and switching elements:

Coupling size and type	Outer wheel (item 0300)				Shell (item 0190)		
	Fusible plug item 0395	Blind screw item 0394	MTS-, BTS- BTM <sup>2)</sup> - switching element <sup>1)</sup>	Sightglass <sup>3)</sup> item 0396	Fusible plug item 0260	Blind screw item 0265	MTS-, BTS- switching element <sup>1)</sup>
366 T...	-	5	1	1	1	1	-
422 T...	-	7	1	1	2	-	-
487 T...	-	3	1	1	2	-	-
562 T...	-	3	1	1	2	-	-
650 T...	-	5	1	1	3	1 <sup>4)</sup>	-
750 T...	-	5	1	1	2	2	-
866 T...	-	5	1	1	3	1 <sup>4)</sup>	-

Table 20

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



#### ATTENTION!

The fusible plugs of couplings type "TW" of size 366, 422, 487, 562, 650, 750 and 866 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.

**11.4.2 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	Blind screw	MTS-/BTS-switching element <sup>2)</sup>	Sight-glass <sup>4)</sup>	Fusible plug	Blind screw	MTS-/BTS-switching element <sup>2)</sup>
	item 0395	item 0394		item 0396	item 0260	item 0265	
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 <sup>1)</sup> )	1	1	- (-)	2 (2)	-
562 T...	2 (4)	1 (1 <sup>1)</sup> )	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... <sup>3)</sup>	- (2)	5 (3)	1	1	3 (-)	- (3)	-
650 T...S... <sup>3)</sup>	- (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... <sup>3)</sup>	- (-)	5 (5)	1	1	3 (3)	- (-)	-
866 T...S... <sup>3)</sup>	- (-)	5 (5)	1	1	3 (3)	1 (1)	-

Table 21

- 1) The blind screw has to be inserted in the outer wheel opposite the sightglass (position is marked by an arrow).
- 2) The MTS or BTS switching element is inserted instead of a blind screw.
- 3) Only valid if a BTS-Ex switch unit is used.
- 4) 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 16, page 65**). Thermal monitoring systems are available at Voith Turbo as accessories.



## 12 Assembly Control-, Commissioning and Maintenance Report

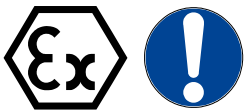


### **DANGER!**

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

Document all assembly works in the assembly control report (**Chapter 12.1**)

Document the commissioning in the commissioning report (**Chapter 12.2**).



### **EX-PROTECTION! / ATTENTION!**

Document the maintenance works performed

- on the connecting coupling GPK-X and

- on the turbo coupling

in the maintenance report for the general maintenance (**Chapter 12.3**).

Use copies of the originals, if necessary.

## 12.1 Assembly control report

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

### Voith turbo coupling

Size/ type (Chapter 15):

Serial No. (Chapter 15):

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
Measure concentricity of drive machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Measure shaft diameter of drive machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Measure concentricity of driven machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Measure shaft diameter of driven machine	Manufacturer's specification	Set: [mm] ACTUAL: [mm]
Input (drive) hub diameter	Chapter 1	Set: [mm] ACTUAL: [mm]
Output hub diameter	Chapter 1	Set: [mm] ACTUAL: [mm]
Back clearance input side key checked (drive side)	Chapter 7.3	<input type="checkbox"/>
Back clearance output side key checked (driven side)	Chapter 7.3	<input type="checkbox"/>
Key runs smoothly in keyway of input hub	Chapter 7.3	<input type="checkbox"/>
Key runs smoothly in keyway of output hub	Chapter 7.3	<input type="checkbox"/>
Input of shaft-hub connection checked. Balancing method corresponds to DIN ISO 8821 and ISO 8821	Chapter 7.3	Method used: <input type="checkbox"/> semi-inserted key <input type="checkbox"/> fully-inserted key
Output of shaft-hub connection checked. Balancing method corresponds to DIN ISO 8821 and ISO 8821	Chapter 7.3	Method used: <input type="checkbox"/> semi-inserted key <input type="checkbox"/> fully-inserted key
Input side shaft and hub cleaned and provided with parting agent	Chapter 7.3	<input type="checkbox"/>
Output side shaft and hub cleaned and provided with parting agent	Chapter 7.3	<input type="checkbox"/>
Input and output hub GPK-X Set screw (item 1931, item 1971) tightened with torque	Chapter 6.1	<input type="checkbox"/>
Mounting dimension "L" measured	Chapter 7.7.1	Set: [mm] ACTUAL: [mm]

Table 22

Assembly – control step	Explanations	Completion notice / dimensions
Input and output hub GPK-X checked for radial and axial run-out	Chapter 7.7.2	<input type="checkbox"/>
Foundation bolts tightened	Chapter 7.7.3	<input type="checkbox"/>
Disk packs mounted, bolts, items 1935 and 1975 tightened	Chapter 6.3, 7.8	<input type="checkbox"/>
Reference dimension “X” measured	Chapter 7.8	Set: [mm] ACTUAL: [mm]
Mounting of coupling Bolts item 1830 and 1955 tightened	Chapter 6.3, 7.8	<input type="checkbox"/>
Clamping device removed	Chapter 7.8	<input type="checkbox"/>
Reference dimension of distance a / b measured	Chapter 7.9	<input type="checkbox"/> a min. <input type="checkbox"/> b min. <input type="checkbox"/> a max. <input type="checkbox"/> b max. <input type="checkbox"/> Δ a <input type="checkbox"/> Δ b
MTS / BTS / BTM (if required); position checked accord. to operating manual	Chapter 1, 16	<input type="checkbox"/>
MTS / BTS / BTM (if required) tested for electrical function	Chapter 1, 16	<input type="checkbox"/>
Protective system installed accord. to recommendation	Chapter 10	<input type="checkbox"/>
Equipotential bonding between input and output effective	Chapter 10	<input type="checkbox"/>
Coupling filled with operating fluid	Chapter 9	<input type="checkbox"/>
Screw number “Z” determined for filling	Chapter 9.1	Z=                      screws
Alignment of turbo coupling checked	Enter alignment values	<input type="checkbox"/>
Concentricity of motor shaft o.k.		<input type="checkbox"/>

Enter alignment values (see **Chapter 7.7.2**):

Viewing motor towards driven machine	RADIAL (true radial running)	AXIAL (true axial running)
<p style="text-align: center;">cross-mark where applicable</p> <p>- data from gauge <input type="checkbox"/></p> <p>  data from shaft center displacement <input type="checkbox"/></p> <p>- AXIAL values measured on Ø: . . . . . mm</p>		

Alignment control (see <b>Chapter 7.9</b> )	Value within measure range	Values
a min.	<input type="checkbox"/> yes <input type="checkbox"/> no	ACTUAL: [mm]
a max.	<input type="checkbox"/> yes <input type="checkbox"/> no	ACTUAL: [mm]
b min.	<input type="checkbox"/> yes <input type="checkbox"/> no	ACTUAL: [mm]
b max.	<input type="checkbox"/> yes <input type="checkbox"/> no	ACTUAL: [mm]
Δa	<input type="checkbox"/> yes <input type="checkbox"/> no	ACTUAL: [mm]
Δb	<input type="checkbox"/> yes <input type="checkbox"/> no	ACTUAL: [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 23



## 12.2 Commissioning report

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

**Voith turbo coupling**

Size / type (Chapter 15):

Serial No. (chapter 15):

Coupling approved for hazardous areas:                      yes  / no

**Commissioning was carried out**

at  Oper. hrs

Name:

Date:

Signature

Commissioning – control step	Explanations	Completion notice
<b>Inspections prior to switching on the driving motor:</b>		
Mounting - test steps executed Completed assembly test report, Chap. 12.1	Chapter 12.1	<input type="checkbox"/>
Clamping device removed.	Chapter 7.8	<input type="checkbox"/>
Applies only to coupling used in hazardous areas: Checked whether the coupling, according to marking, is approved for hazardous areas.	Chapter 3.2	<input type="checkbox"/>
Fill level checked - Screw number "Z" determined for filling	Chapter 9.2	<input type="checkbox"/> / Z= . . . . . Screws
A protective cover (properties see Chapter 10) attached around the turbo coupling.	Chapter 10	<input type="checkbox"/>
Checked whether the installation is earthed with a grounding cable (16mm <sup>2</sup> ).		<input type="checkbox"/>
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 1	<input type="checkbox"/>
Next coupling standstill for maintenance works determined.	Chapter 10	<input type="checkbox"/>
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	<input type="checkbox"/>
Disks checked for deformation, breaks and fissures, as well as for plan surfaces, freedom of distortion, homogeneity of pack.	Chapter 7.9, Chapter 11.2	<input type="checkbox"/>
Reference dimension of distance a / b checked	Chapter 7.9	<input type="checkbox"/> a min. <input type="checkbox"/> b min. <input type="checkbox"/> a max. <input type="checkbox"/> b max. <input type="checkbox"/> Δ a <input type="checkbox"/> Δ b
Foundation bolts checked		<input type="checkbox"/>
<b>Inspections during test run:</b>		
Motor run-up is normal		<input type="checkbox"/>
Coupling is tight Floor and environment checked for oil moistening, oil did not leak		<input type="checkbox"/>
Machine running is normal		<input type="checkbox"/>
Normal noises		<input type="checkbox"/>

Table 24

Commissioning – control step	Explanations	Completion notice
<b>Inspections after switching off the driving motor:</b>		
Coupling is tight Floor and environment checked for oil moistening, oil did not leak		<input type="checkbox"/>
Disks checked for deformation, breaks and fissures, as well as for plan surfaces, freedom of distortion, homogeneity of pack.	Chapter 7.9, Chapter 11.2	<input type="checkbox"/>
<b>Switching units for temperature monitoring <sup>1)</sup> checked, if applicable</b>		
Visual test done	1)	<input type="checkbox"/>
Dust deposits removed	1)	<input type="checkbox"/>
Electric system checked	1)	<input type="checkbox"/>

Table 24

<sup>1)</sup> See separate instruction manual / Chapter 16

### 12.3 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 15):

Serial No. (chapter 15):

Coupling approved for hazardous areas:                      yes  / no

**Assembly works have been done**

at  Oper. hrs

Name:

Date:

Signature

Maintenance – control step	Explanations	Completion notice
Check for irregularities (In intervals of <b>500 h</b> , every <b>3 months</b> , at the latest)		
- Coupling is tight Floor and environment checked for oil moistening, oil did not leak		<input type="checkbox"/>
- Machine running is normal		<input type="checkbox"/>
- Normal noises		<input type="checkbox"/>
- Protective cover checked	Chapter 10	<input type="checkbox"/>
- Foundation bolts checked		<input type="checkbox"/>
Check for irregularities (after every <b>12 / 6 / 4 months</b> for 1 / 2 / 3-shift operation)		
- Disks checked for deformation, breaks and fissures, as well as for plan surfaces, freedom of distortion, homogeneity of pack.	Chapter 7.9, Chapter 11.2	<input type="checkbox"/>
- Reference dimension of distance a / b checked	Chapter 7.9	<input type="checkbox"/> a min. <input type="checkbox"/> b min. <input type="checkbox"/> a max. <input type="checkbox"/> b max. <input type="checkbox"/> Δ a <input type="checkbox"/> Δ b
Switching units for temperature monitoring <sup>1)</sup> checked, if applicable (every <b>3 months</b> )		
- visual test done	1)	<input type="checkbox"/>
- dust deposits removed	1)	<input type="checkbox"/>
- electric system checked (after <b>3 months</b> , then <b>every year</b> )	1)	<input type="checkbox"/>
Operating fluid (every <b>15000 h</b> )		
- Operating fluid checked		<input type="checkbox"/>
- Remaining operating period determined		<input type="checkbox"/> / ..... hours
- Operating fluid exchanged	Chapter 9	<input type="checkbox"/>
Roller bearings (after every interval see chapter 1)		
- roller bearings replaced	Chap. 11.3.3	<input type="checkbox"/>
Coupling cleaned (after every dirt contamination)		
- Cleaned	Chap. 11.1	<input type="checkbox"/>

Table 25

<sup>1)</sup> See separate instruction manual / Chapter 16

## 13 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!

→ Chapter 7.8,  
page 34

- For disassembly proceed according to **chapter 7, page 28 ff.**, in reverse order.
- Removal devices are not necessary because the coupling can be mounted and removed radially.

### 13.1 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.

→ Lifting  
appliances:  
Chapter 4.4

- Fix the coupling to a suitable lifting appliance.

## 13.2 Removal of input and output hub in case of press fit

- Following dismounting of the turbo coupling and disk packs, it is possible to widen the hub by means of oil pressure (for values, please refer to assembly plan) and to remove same.
- Connect flexible pressure tubes to pressure connections (3 x on input side and 3 x on output side) (for thread size, see assembly plan).
- Apply uniform oil pressure onto the connections (pressure see assembly plan) until the hub can be pulled off the shaft without difficulties.

## 14 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	
<b>Starting behavior of driven machine is not as expected.</b>	Coupling is not filled with the correct quantity of operating fluid.	Check and correct the quantity filled in.	→ Chapter 9, page 42 pp.
	The operating conditions have changed.	Consult Voith Turbo <sup>1)</sup> .	
<b>Driven machine does not reach the specified speed.</b>	Driven machine is blocked or overloaded.	Eliminate blocking or the cause of overload.	→ Chapter 9, page 42 pp.
	Coupling is not filled with the correct quantity of operating fluid.	Check and correct the quantity filled in.	
<b>Drive motor does not reach normal operation within the expected time.</b>	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.	
<b>Operating fluid leaks out of the coupling</b>	A fusible plug responded due to overload (excess temperature).	Clarify the overload cause. Replace <b>all</b> fusible plugs and change the operating fluid.	→ Chapter 11.4, page 51
	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 <sup>1)</sup> .	

<b>Malfunction</b>	<b>Possible cause(s)</b>	<b>Remedial action</b>	
<b>An existing thermal switch unit (MTS, BTS or BTM) responded.</b>	The coupling was overloaded.	Clarify the cause for coupling overload and avoid further overload.  Check and correct the fill level.	→ <b>Chapter 16, page 65</b>  → <b>Chapter 9.2, page 44</b>
	Thermal monitoring unit (MTS, BTS or BTM) is defective.	Check monitoring unit	→ <b>Chapter 16, page 65</b>
<b>Uneven running of the unit.</b>	Foundation fixing is loose.	Retighten foundation fixing.  Align the unit.	
	The unit is not aligned.	Align the unit.	→ <b>Chapter 7.7, page 32</b>
	Unit is not balanced.	Clarify the cause and eliminate unbalance.	
	The disk packs of connecting coupling are defective.	Replace disk packs, consult Voith Turbo <sup>1)</sup> .	→ <b>Chapter 11.2, page 49</b>
	Bearings are damaged.	Eliminate the bearing damage; consult Voith Turbo <sup>1)</sup> 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 <sup>1)</sup> in the event of a malfunction which is not included in this table.**

*Table 26*

<sup>1)</sup> see chapter 15, page 64.

## 15 Queries, Orders placed for Service Engineers and Spare Parts

In the event of

- queries
  - orders placed for service engineers
  - spare parts orders
- we need...

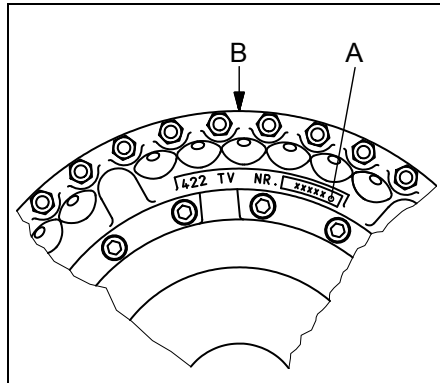


Fig. 23

...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



# 16 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!



### 16.1 MTS mechanical thermal switch unit for pre-warning

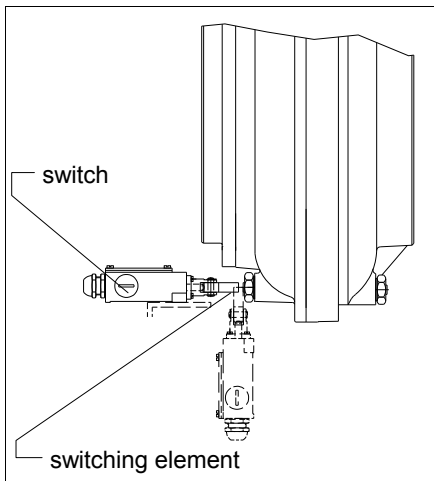


Fig. 24

#### 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 all turbo coupling sizes.

For arrangement, please refer to table in **Chapter 11.4.1**.

The switch is available in two designs:

- enclosed [degree of protection IP 65],
  - suitable for use in potentially explosive atmospheres
- type of protection:  $\text{Ex}$  II 2G EEx d IIC T6 (PTB 03 ATEX 1067 X).  
 $\text{Ex}$  II 2D IP65 T 80°C (PTB 03 ATEX 1067 X).

## 16.2 BTS non-contacting thermal switch unit

### 16.2.1 BTS non-contacting thermal switch unit for pre-warning

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

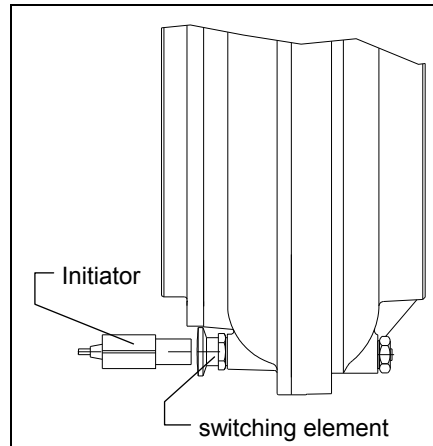


Fig. 25

#### **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 all turbo coupling sizes.  
For arrangement, please refer to table in **Chapter 11.4.1**.  
Switching element and initiator are

- cast in plastic,
  - insensitive to dirt,
  - suitable for use in potentially explosive atmospheres
- type of protection:  $\text{Ex}$  II 2G EEx ia IIC T6 (PTB 00 ATEX 2048 X).  
 $\text{Ex}$  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:  $\text{Ex}$  II (1) GD [EEx ia] IIC (PTB 00 ATEX 2035).

Isolating switch amplifier type KFA6-SOT2-Ex2 (230 V AC)

- type of protection:  $\text{Ex}$  II (1) G [EEx ia] IIC (PTB 98 ATEX 2164).

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

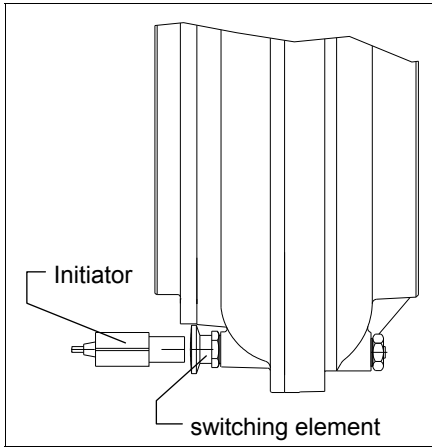


Fig. 26

**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 all turbo coupling sizes.

For arrangement, please refer to table in **Chapter 11.4.2**.

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 4

### 16.3 BTM non-contacting thermal measuring unit for pre-warning

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

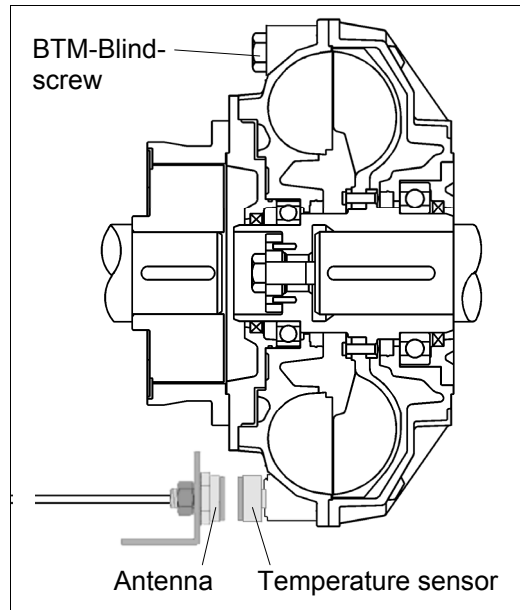


Fig. 27

**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 all turbo coupling sizes.

For arrangement, please refer to table in **Chapter 11.4.1**.



**DANGER!**

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

## 17 Spare Parts Information

Considering the great variety, please find in the following only the basic turbo coupling designs with constant fill (connecting coupling type **GPK-X**).

**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.
- Please observe **chapter 5.2** (Type designation) and **15** (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 released 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!**



### 17.1 Clamping devices

Item-No.	Description
1941	Clamping device for input
1961	Clamping device for output

Table 27

→ Clamping devices:  
Fig. 19, page 35

**17.2 Spare parts for types**  
**366/422/487/562/650/750/866 TV/TVV**  
**366/422/487/562/650/750/866 TWV/TWV**

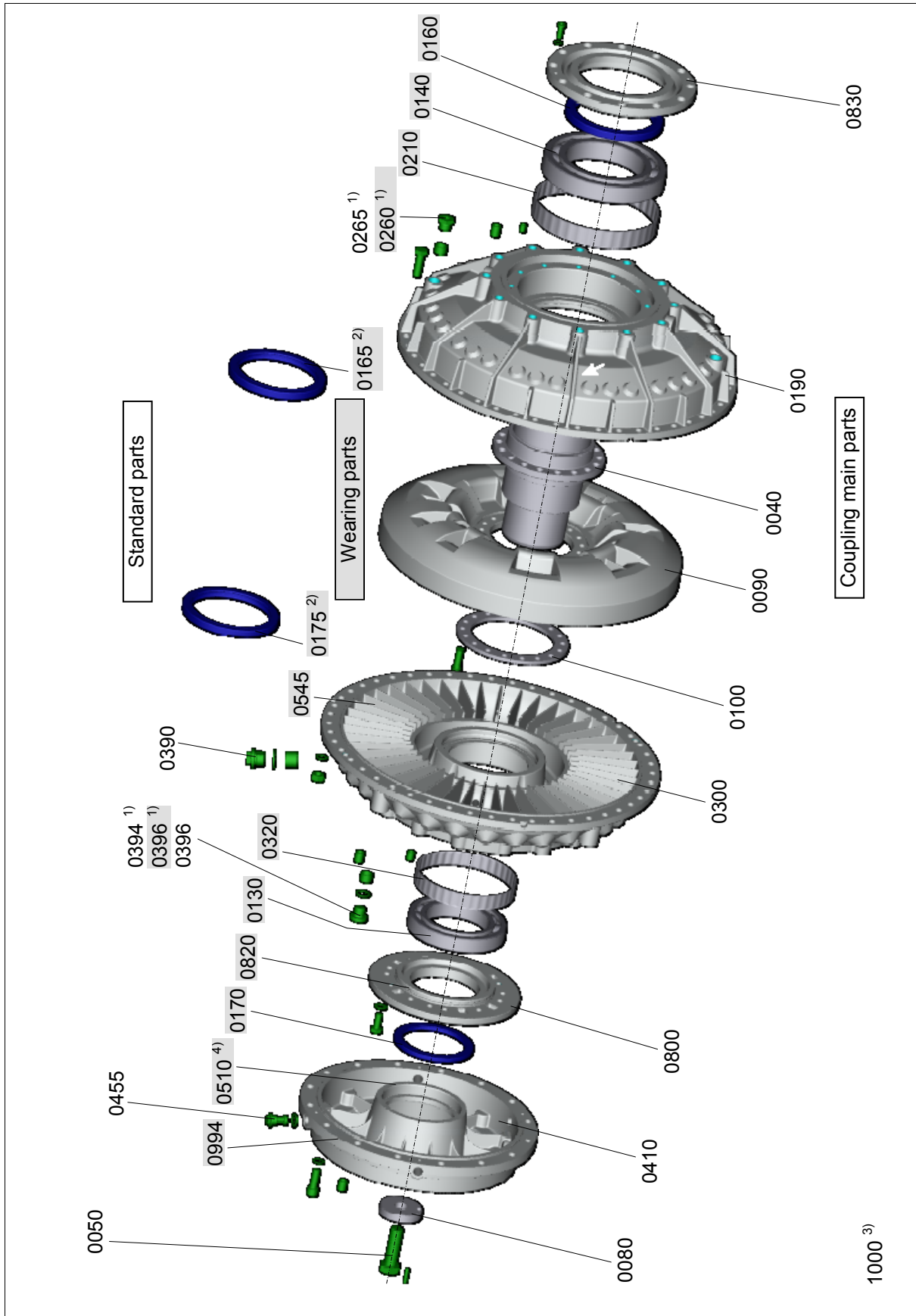


Fig. 28

Installation and Operating Manual 3626-011701 en.  
 2011-03 / Rev. 5.1. Printed in Germany.  
 Subject to modification due to technical development.

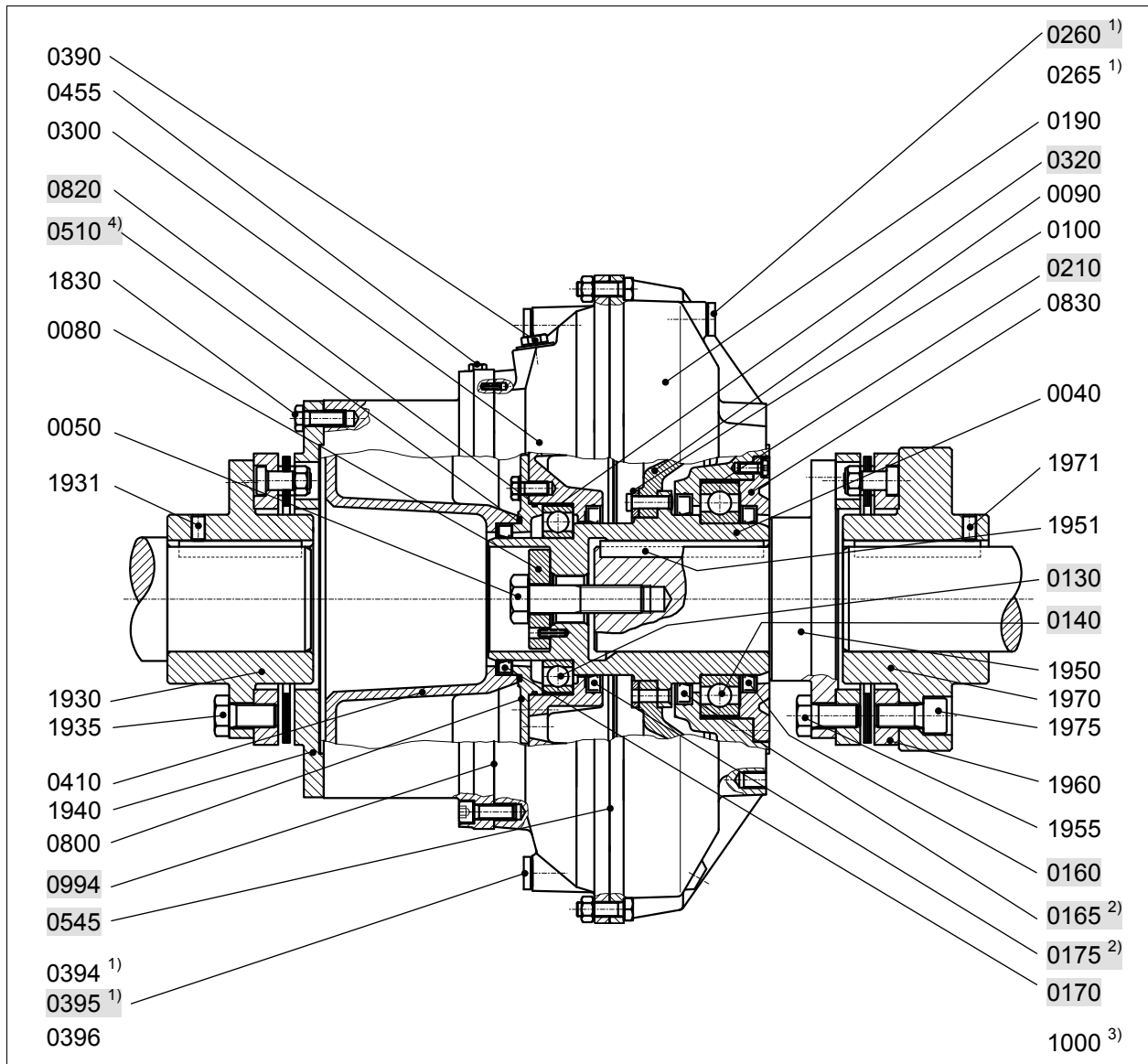


Fig. 29

- 1) For arrangement and quantity, please refer to tables in **Chapter 11.4**.
- 2) For continuous operation or operation fluid water only (TW ...).
- 3) For Type T...F... only, not shown as illustration!
- 4) At sizes 366 and 422 inserted in delay chamber groove.

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
0265	Blind screw	0140	Grooved ball bearing	0080	Holding disk
0390	Filler plug	0160	Radial shaft seal ring	0090	Inner wheel
0394	Blind screw	0165	Radial shaft seal ring	0100	Rivet/screw/clamping ring
0396	Sight glass	0170	Radial shaft seal ring	0190	Shell
0455	Nozzle screw	0175	Radial shaft seal ring	0300	Outer wheel
1830	Hex. Screw	0210	Tolerance ring	0410	Delay chamber
1931	Set screw	0260	Fusible plug	0800	Bearing support cover
1935	Set of screws	0320	Tolerance ring	0830	Sealing ring cover
1951	Key	0395	Fusible plug	1000	Valve insert (Type T... F...)
1955	Set of screws	0510	O-ring	1930	Input hub
1971	Set screw	0545	Flat seal	1940	Input flange with disk pack
1975	Set of screws	0820	O-ring	1950	Stub shaft
		0994	Flat seal	1960	Output flange with disk pack
				1970	Output hub

### 17.3 Spare parts for types 422/487/562/650/750/866 TVVS/TWVVS

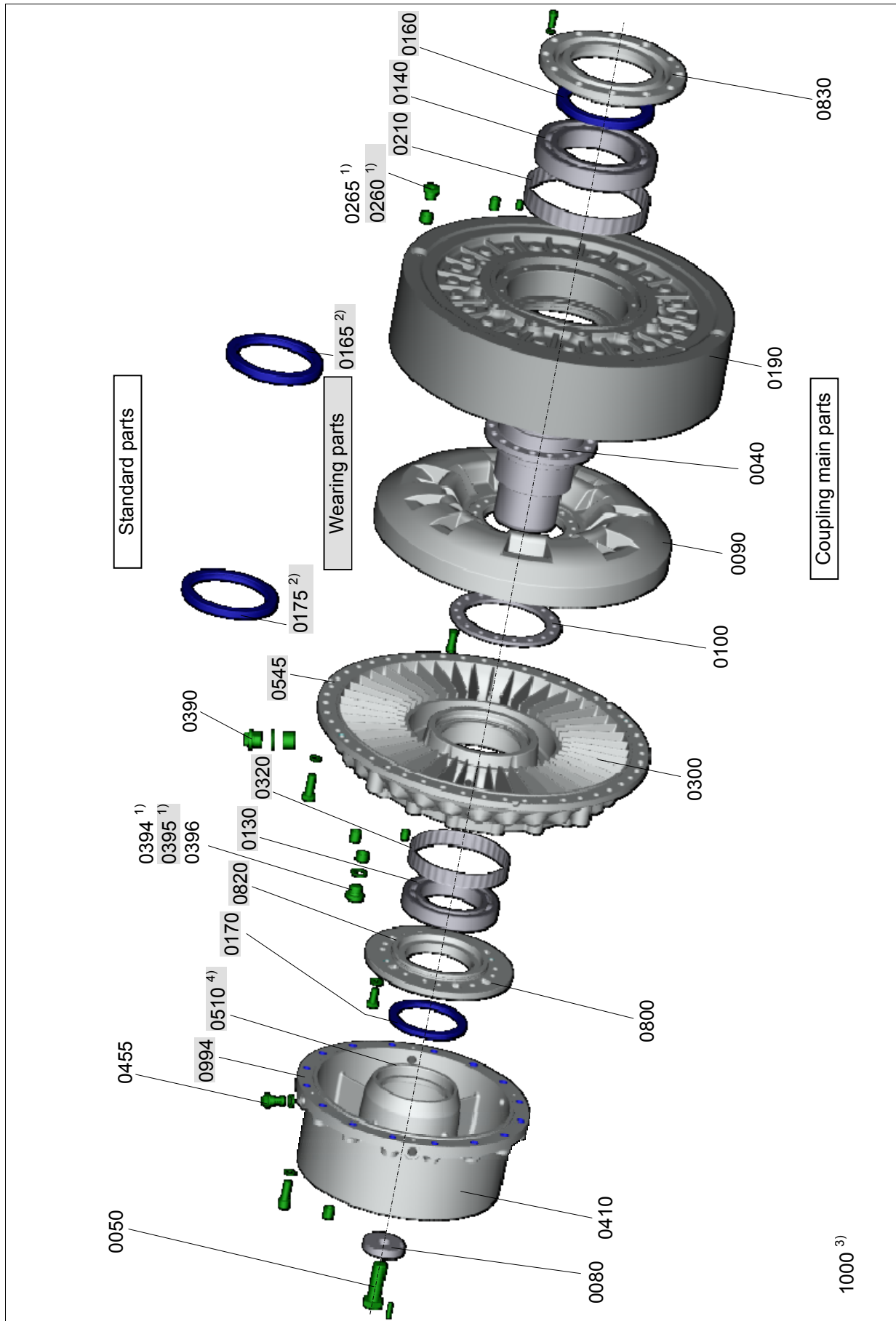


Fig. 30

Installation and Operating Manual 3626-011701 en.  
2011-03 / Rev. 5.1. Printed in Germany.  
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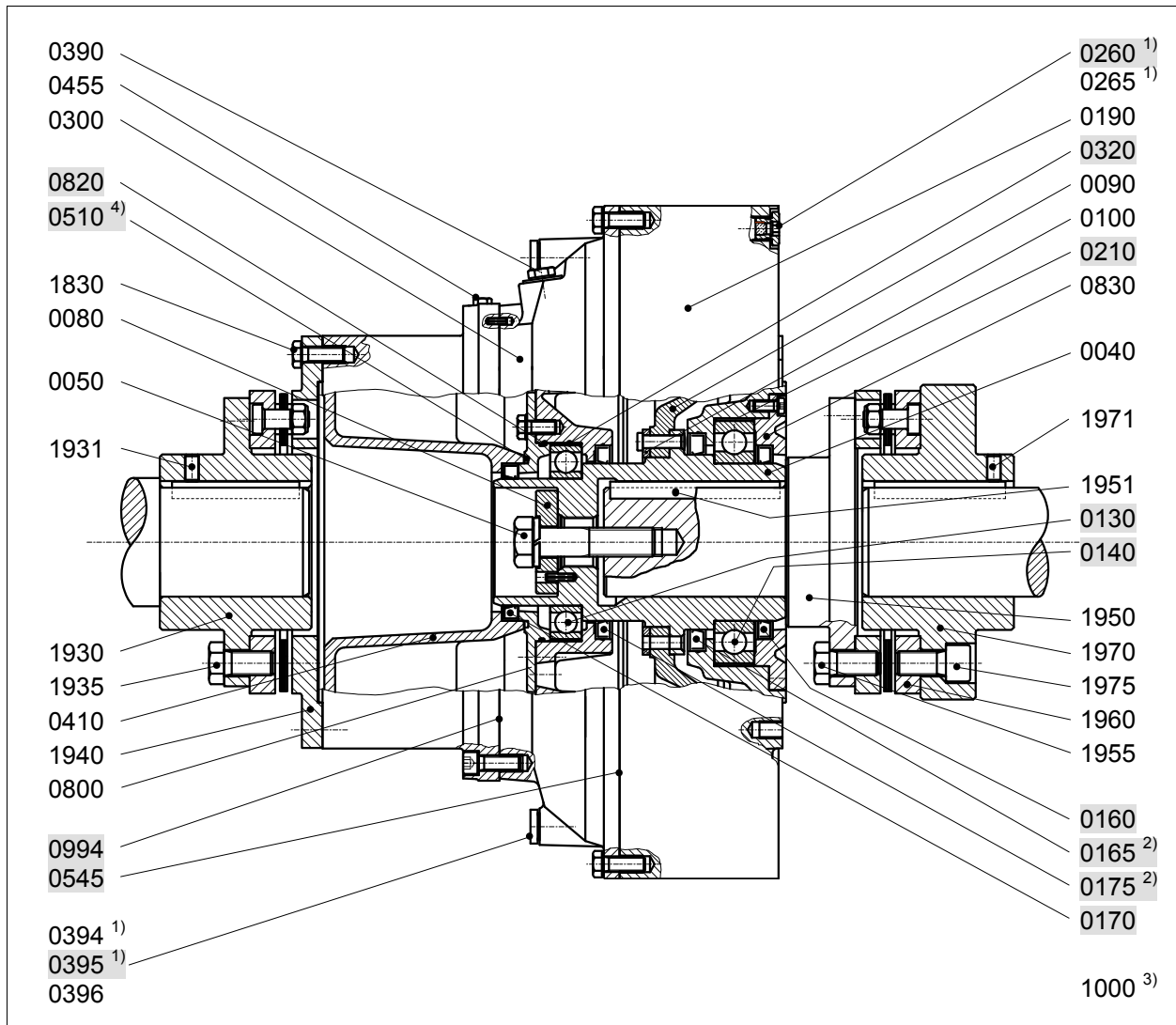


Fig. 31

- 1) For arrangement and quantity, please refer to tables in **Chapter 11.4**.
- 2) For continuous operation or operation fluid water only (TW ...).
- 3) For Type T...F... only, not shown as illustration!
- 4) At sizes 366 and 422 inserted in delay chamber groove.

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
0265	Blind screw	0140	Grooved ball bearing	0080	Holding disk
0390	Filler plug	0160	Radial shaft seal ring	0090	Inner wheel
0394	Blind screw	0165	Radial shaft seal ring	0100	Rivet/screw/clamping ring
0396	Sight glass	0170	Radial shaft seal ring	0190	Shell
0455	Nozzle screw	0175	Radial shaft seal ring	0300	Outer wheel
1830	Hex. Screw	0210	Tolerance ring	0410	Delay chamber
1931	Set screw	0260	Fusible plug	0800	Bearing support cover
1935	Set of screws	0320	Tolerance ring	0830	Sealing ring cover
1951	Key	0395	Fusible plug	1000	Valve insert (Type T... F...)
1955	Set of screws	0510	O-ring	1930	Input hub
1971	Set screw	0545	Flat seal	1940	Connecting flange with disk pack
1975	Set of screws	0820	O-ring	1950	Stub shaft
		0994	Flat seal	1960	Connecting flange with disk pack
				1970	Output hub

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# 18 Representatives

## Voith Turbo GmbH & Co. KG

### West-Europe:

#### Germany ( VTCR ):

Voith Turbo GmbH & Co. KG  
Start-up Components  
Voithstr. 1  
**74564 CRAILSHEIM**  
GERMANY  
Tel.: +49-7951 32-0  
Fax: +49-7951 32-480  
e-mail: [startup.components@voith.com](mailto:startup.components@voith.com)  
[www.voithturbo.com/startup-components](http://www.voithturbo.com/startup-components)

#### Austria:

Indukont Antriebstechnik GmbH  
Badenerstraße 40  
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AUSTRIA  
Phone: +43-2252-81118-22  
Fax: +43-2252-81118-99  
e-mail: [info@indukont.at](mailto:info@indukont.at)

#### Belgium ( VTBV ):

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Phone: +32-2-7626100  
Fax: +32-2-7626159  
e-mail: [voithturbo.be@voith.com](mailto:voithturbo.be@voith.com)

#### Denmark ( VTDK ):

Voith Turbo A/S  
Egegårdsvej 5  
**4621 GADSTRUP**  
DENMARK  
Phone: +45-46 141550  
Fax: +45-46 141551  
e-mail: [postmaster@voith.dk](mailto:postmaster@voith.dk)

#### Finland ( Masino ):

Masino Oy  
Kärkikuja 3  
**01740 VANTAA**  
FINLAND  
Phone: +358-10-8345 500  
Fax: +358-10-8345 501  
e-mail: [sales@masino.fi](mailto:sales@masino.fi)

#### France ( VTFV ):

Voith Turbo S. A. S.  
21 Boulevard du Champy-Richardets  
**93166 NOISY-LE-GRAND CEDEX**  
FRANCE  
Phone: +33-1-4815 6903  
Fax: +33-1-4815 6901  
e-mail: [voithfrance@voith.com](mailto:voithfrance@voith.com)

#### Greece ( Boznos ):

Chr. Boznos and Son S. A.  
12, K. Mavromichali Street  
**18545 PIRAEUS**  
GREECE  
Phone: +30-210-422 5134  
Fax: +30-210-422 5159  
e-mail: [info@boznos.gr](mailto:info@boznos.gr)

#### Great Britain ( VTGB ):

Voith Turbo Limited  
6, Beddington Farm Road  
**CRO 4XB CROYDON, SURREY**  
GREAT BRITAIN  
Phone: +44-20-8667 0333  
Fax: +44-20-8667 0403  
e-mail: [turbo.uk@voith.com](mailto:turbo.uk@voith.com)

#### Ireland:

see Great Britain ( VTGB )

#### Italy ( VTIV ):

Voith Turbo s.r.l.  
Via G. Lambrakis 2  
**42122 REGGIO EMILIA**  
ITALY  
Phone: +39-05-2235-6714  
Fax: +39-05-2235-6790  
e-mail: [info.voithturbo@voith.com](mailto:info.voithturbo@voith.com)

#### Liechtenstein:

see Germany ( VTCR )

#### Luxembourg:

see Belgium ( VTBV )

#### Netherlands:

see Germany ( VTCR )

#### Norway ( VTNO ):

Voith Turbo AS  
Tevlingveien 4 b  
**1081 OSLO**  
NORWAY  
Phone: +47 2408 4800  
Fax: +47 2408 4801  
e-mail: [info.turbo.norway@voith.com](mailto:info.turbo.norway@voith.com)

#### Portugal:

see Spain ( VTEV )

#### Spain ( VTEV ):

Voith Turbo S. A.  
Avenida de Suiza 3  
P.A.L. Coslada  
**28820 COSLADA (MADRID)**  
SPAIN  
Phone: +34-91-6707816  
Fax: +34-91-6707841  
e-mail: [info.voithturbo@voith.com](mailto:info.voithturbo@voith.com)

#### Sweden:

see Denmark ( VTDK )

#### Switzerland:

see Germany ( VTCR )

**East-Europe:**

**Bosnia Herzegovina:**  
see Hungary ( VTHU )

**Bulgaria:**  
see Hungary ( VTHU )

**Croatia:**  
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