

# Reliable turning of rotor shafts

## Rotor turning devices



# For optimal shaft train operation



A wear-resistant, long-lasting and low-maintenance solution! Voith rotor turning devices offer plant operators great value, safety at high turning speeds, high breakaway torques and high mass moments of inertia.

This cost-efficient solution is primarily used to break away and start shaft trains. These devices can also be used to turn rotors slowly, facilitating a safe cooling down process.

This slow cooling process is necessary for dimensional stability while, at the same time, blade channel and bearing wear damage is avoided. Additionally, rotor turning devices are used to align and position shaft trains.

## **Shaft train break away and startup systems**

Very often the starting torque of the prime mover is insufficient to initiate rotation of the shaft trains. Furthermore, the use of a rotor turning device eliminates the need for hydrostatic bearings and the peak current required for normal startup can be greatly reduced.

## **Low speed rotor turning**

Rotor deformation during the cooling down phase is avoided when rotors are programmed to run at low speeds during the shutdown (cooling off) stage of production.

## **Prevention of particulate blockages in the blade channel**

Unless continuously rotated after the shutdown, the rotors of expansion turbines and compressors may become unevenly coated with impure gas deposits. These deposits may cause an imbalance and/or jam the rotor.

## **Alignment and positioning of devices for large shaft trains**

Turning devices allow shaft trains to be slowly rotated in order to record radial and axial values for runout and to simplify the connection of shafts and couplings.

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## **Benefits**

- + **Tailor-made solutions**
  - + **Highly reliable and wear-resistant**
  - + **High drive train availability**
  - + **Outstanding degree of operational flexibility**
  - + **Equipment stability assured with protected precision-controlled rotor cooling**
  - + **Extended drivetrain service-life**
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# In shaft train configuration

For shaft trains without a free shaft end, the rotor turning device has to be integrated into the shaft train. This is done by mounting the turning device on a bearing housing or coupling guard.

Rotor turning devices, type RDV 1 through to RDV 6, operate based upon the swiveling pinion principle. During startup, the swiveling pinion drives a gear rim in the shaft train.

Once the shaft train is under its own power, the swiveling pinion is pushed out of the mesh with the external gear rim or engaged by a pneumatic system. The pinion is then secured in the disengaged position.

## Quick facts

- Rotor turning devices Type RDV 1 – 6
- Swiveling pinion
- Breakaway torque: Up to 220 000 Nm
- Turning speed: Up to 400 rpm
- Devices driven by electric or hydraulic motor

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## Swiveling type



## Features

- Installation on a horizontal mounting flange, over the gear rim
- Easy installation and removal with simple alignment
- Various turning device options are available
- Wear-free during regular operation of the train shaft
- Simple and robust construction, using standardized components
- Thermal growth of the shaft train is unlimited
- Equipped with a hand-wheel and hexagon drive
- Various explosion-proof electric protection systems are available
- In-house testing is possible

The standard turning device is manually engaged with the shaft train at standstill. A limit switch releases the drive motor, allowing the shaft train to turn. During acceleration of the shaft train, the swiveling pinion disengages automatically and is secured in a disengaged position. Additionally, a safety switch for safe locking of the hand-wheel cover is provided.

## Optional features

### Automatic I

The Automatic I is an enhanced form of the standard version that facilitates remote controlled engagement. This is done by means of an installed hoisting magnet or pneumatic cylinder, which is only possible during shaft train standstill.

### Automatic II

In addition to the features offered by the Automatic I, the Automatic II permits the turning device to synchronize with the shaft train, while the shaft train is decelerating. The supplied control module assures automatic operation.

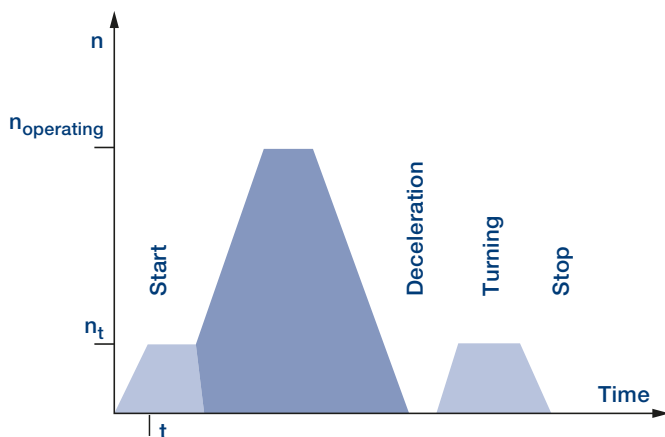
Speed sensors on the shaft train release a command for the start and stop of the turning device motor, within a specific speed range. Speed sensors on the swiveling pinion allow smooth and controlled synchronization.

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## Difference between the Automatic I and Automatic II

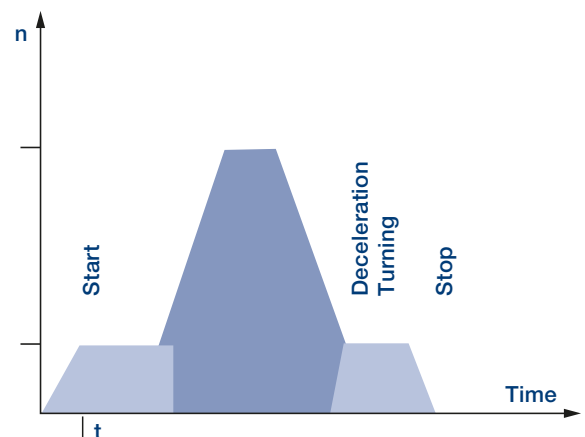
### Automatic I

Swiveling pinion turning devices



### Automatic II

Swiveling pinion & shaft end turning devices



# Shaft end mounting configuration

For shaft trains with a free shaft end, automatic rotor turning devices, type RDV 60 through to type RDV 150, are available. On Voith parallel shaft gear devices, the rotor turning device can be mounted on the free end of the pinion shaft.

The turning device drives the shaft train through an overrunning clutch, which disengages automatically once the drive train is operating faster than the turning device.

Turning devices placed on the reversing shaft train must be equipped with reverse rotation protection in order to prevent damage of the turning device, while the shaft train is operating in reverse.

## Features

- Fully automatic, self-shifting clutch eliminates the need for checking the shifting condition
- Turning devices are made from standard components, therefore spare parts are readily available
- Wear-resistant bevel gear design enables the usage of smaller drive motors compared to a worm gear design
- Low weight output range minimizes the impact on shaft line rotor dynamics, allowing high maximum speeds
- Equipped with hand-wheel and hexagon drive
- Various explosion-proof electric protection systems are available

The standard turning device is equipped with a self-synchronizing over-running clutch. Additionally, a safety switch for safe locking of the hand-wheel cover is provided.

## Optional features

- Reverse rotating protection
- Soft starter included in motor control center or supplied separately
- Position sensor for coupling engagement status
- Motor retaining brake

## Quick facts

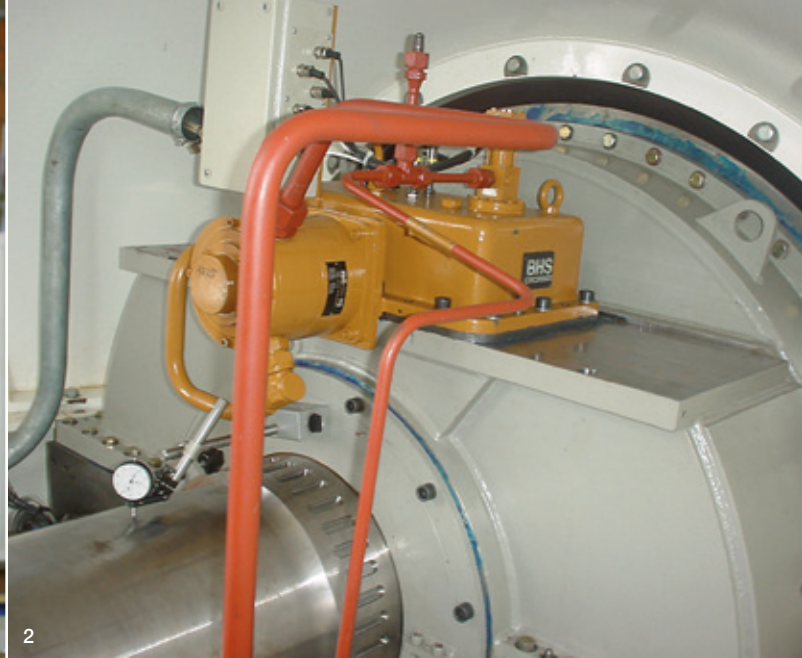
- Rotor turning devices Type RDV 60-150
- Mounting on free shaft end
- Breakaway torque: Up to 130 000 Nm
- Turning speed: Up to 600 rpm

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### Shaft end







1

2

# References

## Type RDV 120 (1)

( $n = 170$  rpm,  $BAT^* = 5679$  Nm,  $I = 2108$  kgm<sup>2</sup>) used in free shaft end assembly.

## Type RDV 3 HSO (2)

( $n = 283$  rpm,  $BAT^* = 6000$  Nm,  $MOI = 4856$  kgm<sup>2</sup>) with hydro motor, mounted on top of a gas turbine pedestal.

## Type RDV 2A1 (3)

With swiveling pinion on the bearing block of a steam turbine ( $n = 42$  rpm,  $BAT = 715$  Nm,  $2860$  kgm<sup>2</sup>) (Courtesy of MAN Turbo AG, Oberhausen).

## Turning gear device with swiveling pinion (4)

Size 5 with automatic mode I+II ( $n = 283$  rpm,  $BAT^* = 6000$  Nm,  $MOI^* = 4856$  kgm<sup>2</sup>).

\* MOI = moment of inertia

\* BAT = breakaway torque



# Expert advice from professionals that care

In order to help you make informed decisions, please supply the following information:

- Break away torque
- Turning speed
- Mass moment of inertia
- Electrical requirements
- Installation arrangement
- Jacking oil requirements

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