By professionals for professionals – transmission-retarder-system
Specially designed for buses and coaches
The integrated transmission-retarder-system was specially designed for buses and coaches and developed in conjunction with a leading transmission and retarder manufacturer.

DaimlerChrysler AG, DaimlerChrysler Power-systems, Transmissions, and Voith Turbo, Product Group Retarders, are now able to offer a technically sophisticated and economically interesting product. Transmission and retarder form a precise, synchronized system.

Two strong partners –
one common solution

The integrated transmission-retarder-system...

▪ is extremely lightweight
  That means maximum load capacity for luggage or refreshment facilities.

▪ is quiet
  That increases travelling comfort on the bus.

▪ is compact
  That means it can be installed even where space is restricted.

▪ assures easier smooth shifting
  That means easier shifting for the driver and smoother journeys for the passenger.
Mutual cooperation –
open to all users

- **stays cool**
  That allows maximum braking power and therefore maximum safety in every situation and protects the transmission from high temperature.

- **has low maintenance requirements**
  That means fewer stops for servicing and therefore it helps to protect the environment.

- **is communicative**
  That means it can be integrated into the vehicle management system. Information can be exchanged via CAN interface when required.

- **offers a variety of shifting systems**
  A wide range of shifting systems ensures easy installation and greater comfort for the driver.

- **has five braking steps**
  One step for constant driving speed on downhill slopes (v-constant) and an extra four steps for the smooth application of braking power.
Top performance through cooperation. Two partners combine their strengths to create an excellent product. The result: maximum benefit for the customer!

The basic functions are based on the reliable DaimlerChrysler AG, DaimlerChrysler Power-systems, Transmissions, 6-gear transmission with its tried and tested track record.

With its external taper synchronisation, the integrated transmission-retarder-system always ensures smooth and easy shifting. The asymmetrically shaped selector toothing enable perfect shifting especially when the transmission is cold. Due to its special toothing it has remarkable low noise running features and its progressive gear ratio ensures perfect driving performance. Voith Turbo has provided its hydrodynamic retarder, renowned for its high, continuous braking power. The retarder which is integrated into the transmission housing, quickly provides a top braking power of over 700 kW. Its operation is quiet, and, integrated in the vehicle’s cooling system, it serves as a safe, effortless, wear-free continuous brake. Cooling-down phases as they are required for other systems, are totally redundant.

Compared to its competitors, the integrated transmission-retarder-system has a special system-inherent advantage: the oil supply from the transmission and the retarder is totally separate. The transmission oil is, in addition to cooling, mainly responsible for lubrication. The retarder oil is solely used as a heavy-load operating medium for retardation. There is no problem with the temperature rising to 220°C/396°F when maximum braking power is required.
Both oil supplies are cooled in a three-chamber steel heat exchanger. This makes the need for an extra oil cooler when a noise-encapsulated transmission is required, obsolete. In this way the oil has to be changed up to 300,000 kilometres/186,000 miles only.

The vehicle manufacturer has a special advantage as well. The component integration intentionally allows a more compact design – the transmission-retarder-system requires much less installation space than non integrated systems. With its variable modular principle and the number of possible shifting systems, the integrated transmission-retarder-system offers solutions for all types of installations – regardless of transmission input torque. And there’s another advantage – the light metal housing in combination with the integrated design provides major weight savings.

The integrated transmission-retarder-system is a complete package: safety and comfort combined with economic benefits.
Precision technology –
perfect standards

The transmission-retarder system is ideal for use in buses and coaches with power up to 370 kW at an input torque of up to 2,300 Nm* (1,697 lbs ft). It can also be used in other vehicles.

The six-gear synchronised transmission changes gear with smooth precision. The gear stick is connected to the transmission by flexible cable controls. Depending on the installation situation and the level of comfort required, connection via an electronic-pneumatic gear shift (DaimlerChrysler EPS) is also possible.

Retarder operation usually occurs via a multi-stage switch with v-constant function (setting a constant driving speed on downwards routes) or optionally with a foot pedal.
*) Approx. value, depending on application.

### Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value(s)</th>
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</thead>
<tbody>
<tr>
<td><strong>Input power</strong></td>
<td>max. 370 kW</td>
</tr>
<tr>
<td><strong>Input torque</strong></td>
<td>max. 2,300 Nm*</td>
</tr>
<tr>
<td><strong>Braking torque</strong></td>
<td>max. 3,750 Nm</td>
</tr>
<tr>
<td><strong>Braking power</strong></td>
<td>max. 700 kW</td>
</tr>
<tr>
<td><strong>Unit weight without operating medium</strong></td>
<td>approx. 265 kg</td>
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<tr>
<td><strong>Oil change intervals</strong></td>
<td>up to 300,000 km/186,000 miles</td>
</tr>
<tr>
<td><strong>Oil contents transmission</strong></td>
<td>13.0 l</td>
</tr>
<tr>
<td><strong>Oil contents retarder</strong></td>
<td>7.8 l</td>
</tr>
</tbody>
</table>

### Maximum braking torque $M_{br}$ at the propshaft

![Graph showing maximum braking torque $M_{br}$ at the propshaft vs. propshaft speed rpm]