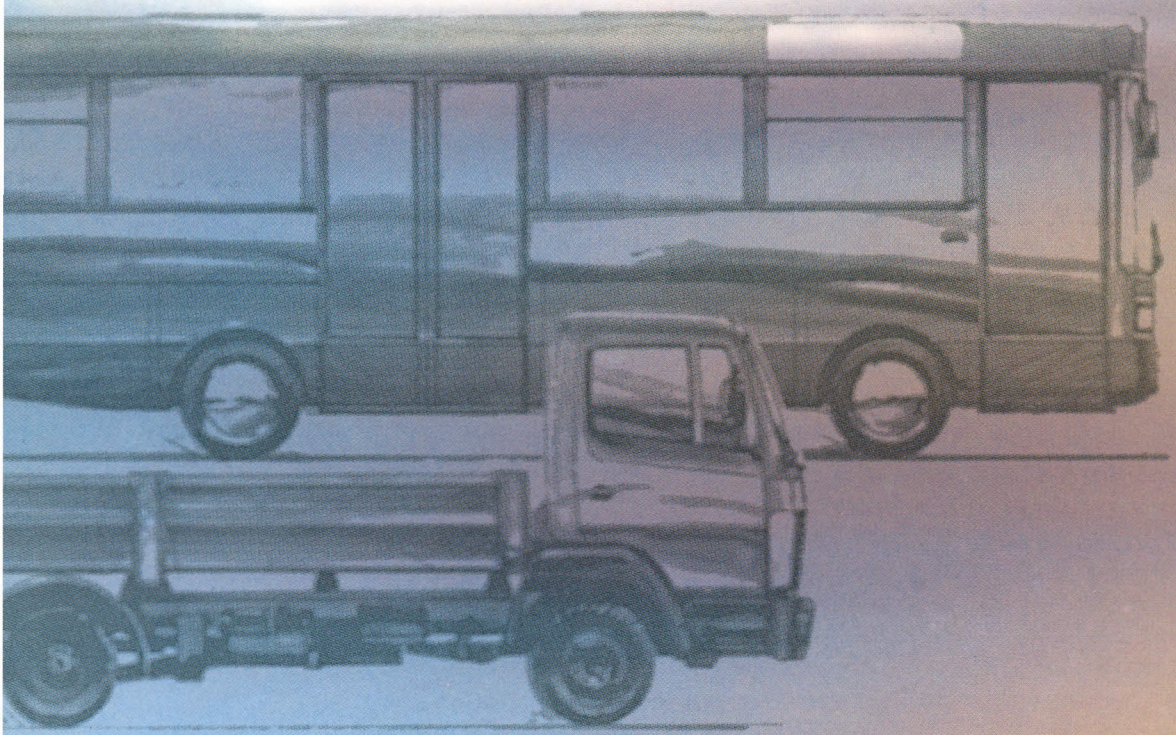
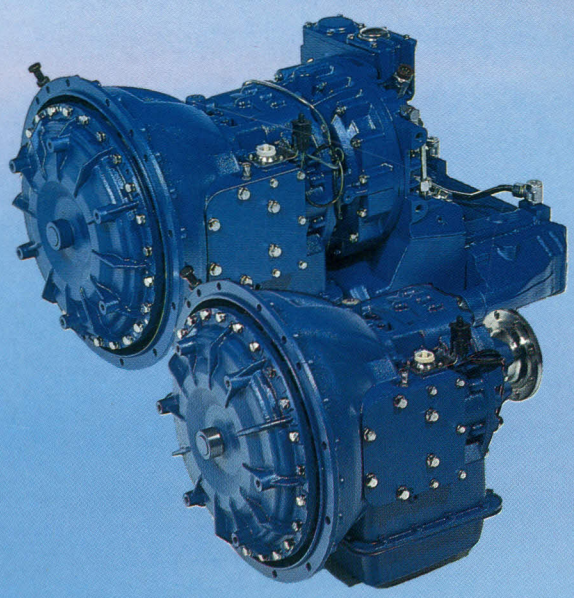
VOITH





Automatic Transmissions for Midibuses and Delivery Trucks Voith Midimat BR Voith Midimat T

VOITH
AUTOMATIC

What many have been waiting for:

Mrs. A. is moving house. She would like to do it all by herself with a rented truck. To make things easier, it should have an automatic.

Mr. B. is a mobile wholesale grocer. His business is selling and he would like to deal with his customers in a friendly and relaxed wax – not tired and irritable after an exhausting day's driving. He thinks of getting an automatic.

Mr. C. is a works manager. His overheads are getting on top of him: clutches need to be renewed, brakes need relining – wear and tear everywhere!

Mrs. D. is an art student. She has a part-time job with a parcel service company. In the evening she feels as if she has became part of the gearbox herself. Start and stop traffic has won over fine art!

Mr. E. has a truck hire company. His private saloon has an automatic. It makes driving easy and provides better availability of the car. He often thinks of his delivery trucks...

Help is now at hand for these people. There is an automatic transmission for delivery vans, small trucks and midibuses.

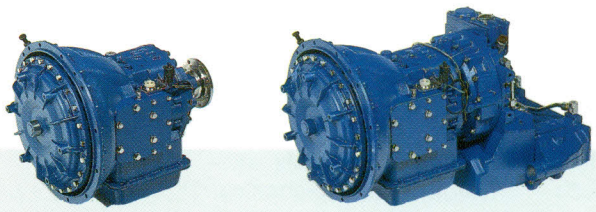
Technical Data

Midimat Transmissions have the following key features:

- Starting off smoothly with no clutch wear, powerful and quick acceleration thanks to the multi-stage, multi-phase torque converter.
- High efficiency due to lock-up of the converter.
- Extremely compact design and low weight.
- Attractive price.

Voith-Midimat transmissions have been specially designed for commercial vehicles in city traffic. They reduce the stress and strain of dense traffic and reduce operator costs. Midimat transmissions are true automatic transmissions with a torque converter for acceleration and three mechanical gears. Where the version with Retarder (Midimat BR) is chosen, all braking can be done completely wear-free, independent of the gear engaged. Up to 90% of all braking operations can be performed with the Retarder.

The transmission can be installed in delivery and distribution trucks as well as in all midibuses up to 12 t.



Type	Midimat T	Midimat BR
Input power P_1 [kW]	165	165
Input torque M_1 [NM]	550	550
Input speed n_1 [RPM]	4000	3000
Retarder torque M_{BR} [NM]	–	up to 2000
Number of gears	3	3
	Stall torque ratio / Mechanical ratios	
1st driving range	9,6/3	9,6/3
2nd driving range	3,64/1,58	3,64/1,58
3rd driving range	1,4/1	1,4/1
Reverse driving	8,36/1,42	8,36/142
Weight of dry transmission [kg]	102	160
Voltage [V]	24	24

Design and Mode of operation

Midimat transmissions are fully automatic hydrodynamic-mechanical transmissions with a multistage, multi-phase torque converter, and a three-gear planetary output gear stage. The BR version has an integrated hydrodynamic retarder.

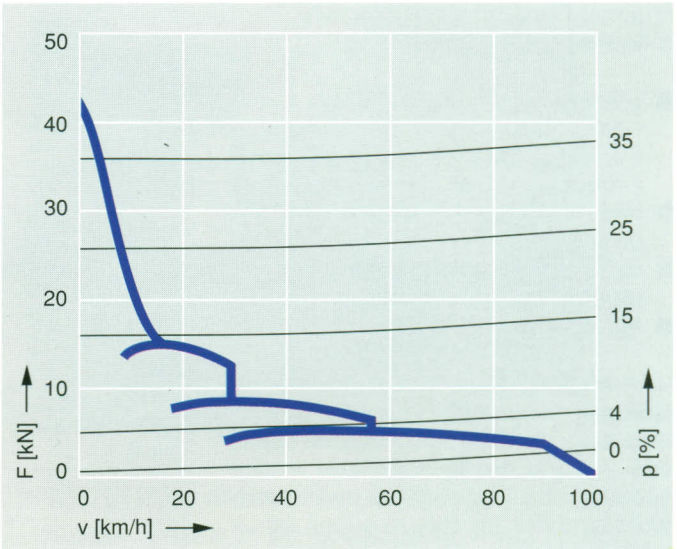
The torque converter consists of an impeller, a turbine, a reactor and a guide wheel. Reactor and guide wheel are operated automatically via free wheeling devices.

A modified Ravigneaux-type set of planet gears is employed which provides three forward gears and a reverse gear.

The wear-free hydrodynamic retarder is on the output side of the planetary gear and therefore independent of the gear engaged. Gearchanging and retarder operation are electro-hydraulic, under command of an electronic control unit. The transmission design ensures the optimum transmission of power in all driving ranges.

Options

A power take-off can be included on the primary side on request.

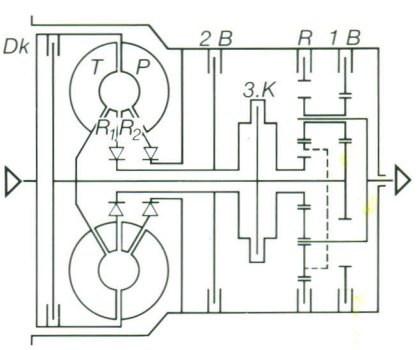


Tractive effort curves

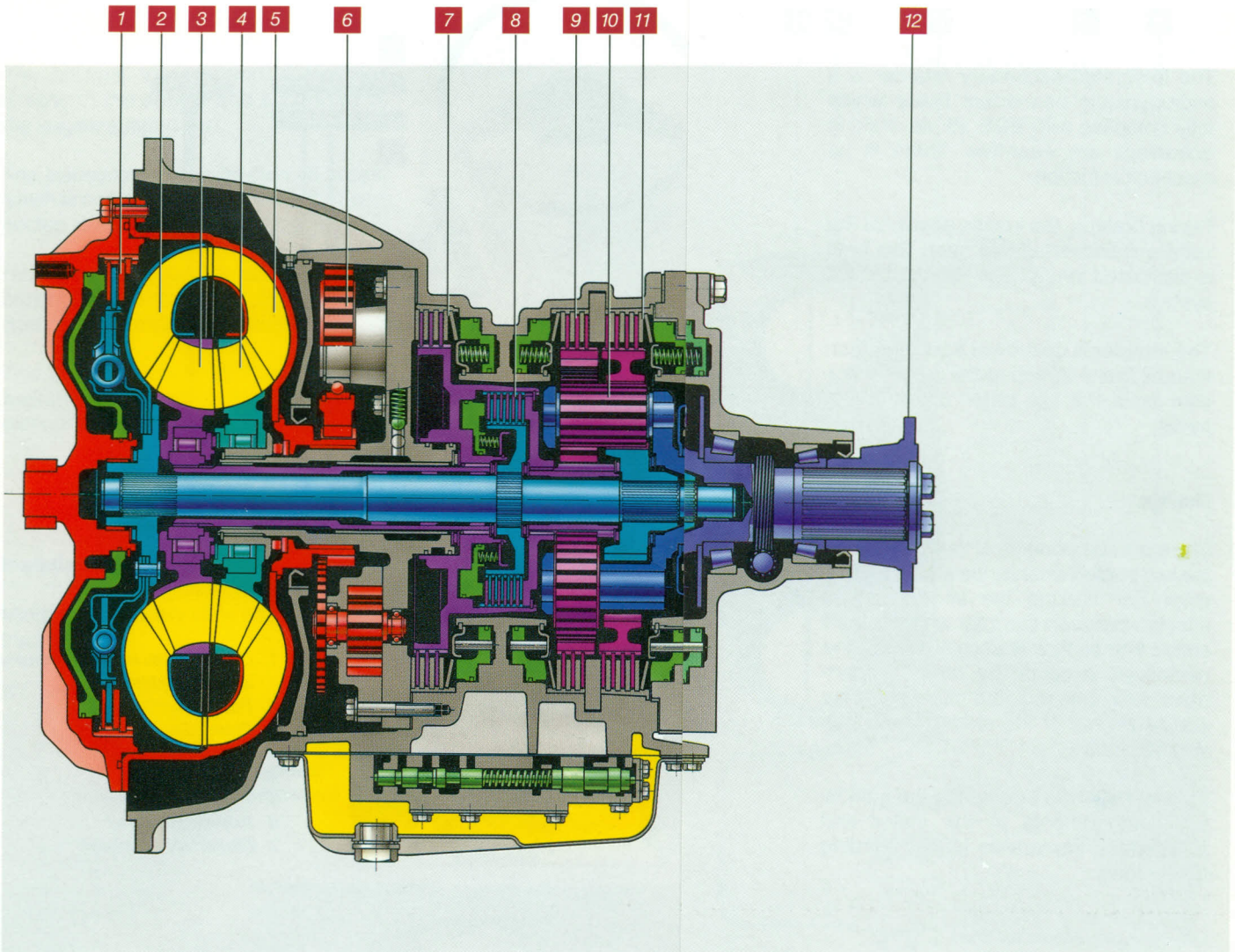
Transmission	***Midimat BR***
Vehicle	*Midibus*
Axle ratio	*4,630*
Tyre r dyn	*0,407*
C_w x A [m^2]	3,39
Weight [t]	10,5
Engine power [kW]	110

F = Tractive effort
v = Driving speed
p = Gradient in %

The hydraulic and mechanical components are switched in such a way that they ensure minimum loss of tractive effort and efficiency. A significant feature is the automatic engagement of the reactor and guide wheel in the torque converter.



Dk = Lock-up clutch
P = Impeller
T = Turbine
R_1 = Reactor
R_2 = Guide wheel
1 G = brake, 1st driving range
2 G = brake, 2nd driving range
3 G = brake, 3rd driving range
R = brake, reverse driving



Automatic transmission

1 *Lock-up clutch with torsional vibration damper*
2 *Turbine*
3 *Reactor*
4 *Guide wheel*
5 *Impeller*
6 *Power take-off*
7 *Friction-disc brake, 2nd driving range*
8 *Friction-disc clutch, 3rd driving range*
9 *Friction-disc brake, reverse driving*
10 *Friction-disc brake, 1st driving range*
11 *Planetary gear stage*
12 *Output*

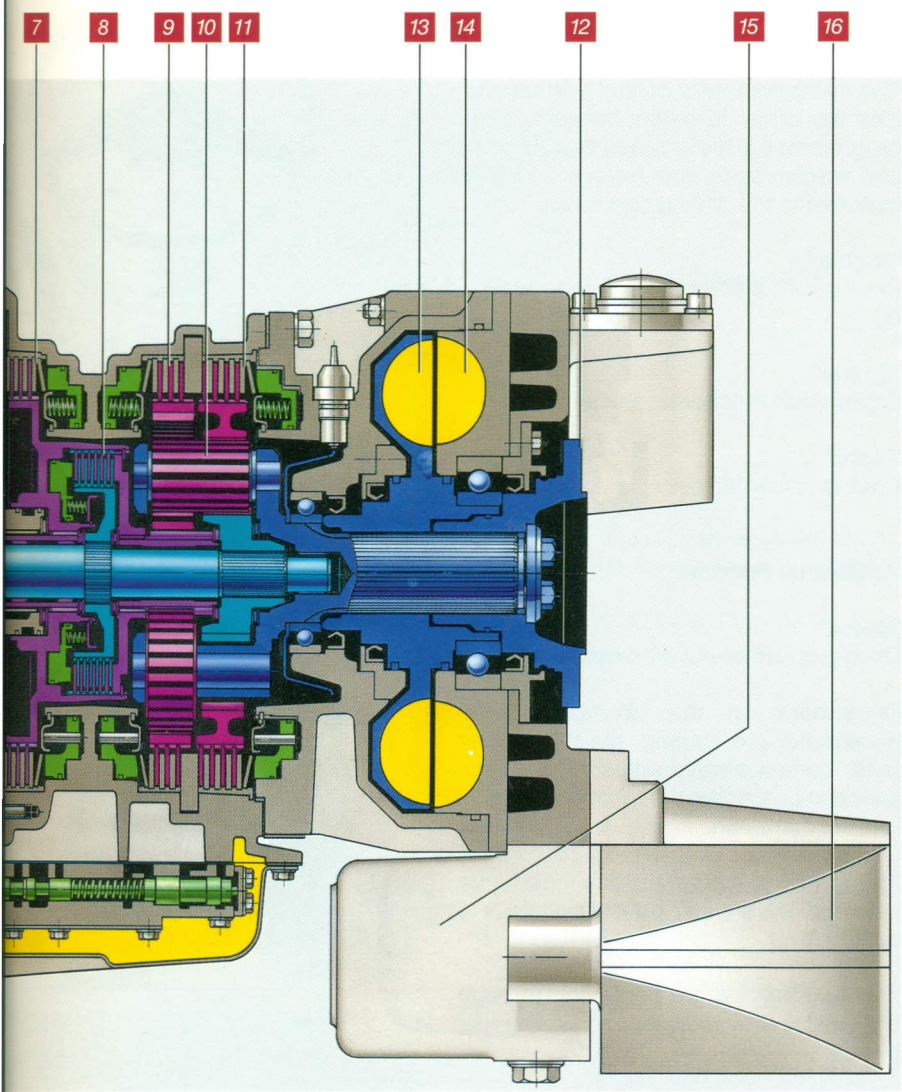
Retarder

13 *Rotor*
14 *Stator*
15 *Oil sump*
16 *Heat exchanger*

Braking effort curves

F_B = *Braking effort*
v = *Driving speed*
p = *Gradient in %*

Braking with the retarder



10 Friction-disc brake, 1st driving range
11 Planetary gear stage
12 Output

Retarder
13 Rotor
14 Stator
15 Oil sump
16 Heat exchanger

Braking effort curves
F_B = *Braking effort*
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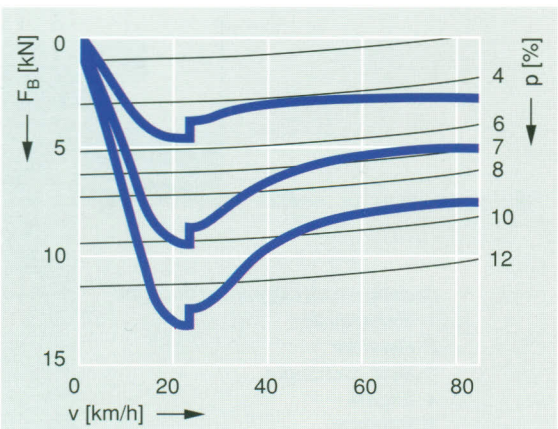


The integrated secondary retarder is a hydrodynamic permanent brake which fully complies with ECE 13. All braking operations are wear-free. There is no mechanical friction.

During braking, the kinetic energy of the vehicle is converted into heat. This heat is dissipated through the vehicle cooling system.

The retarder is controlled from a 3-notch manual brake switch at the steering column or in the idle patch of the brake pedal.

Design

The main components of the retarder are the two bladed wheels, the stator and the rotor. For braking the vehicle, oil is injected between the rotor and the fixed stator. The oil flow is accelerated by the centrifugal force in the rotor compartment and pressed into the stationary compartments of the stator, where it is decelerated.

This oil stream is arrested in the stationary compartments of the stator and decelerates the vehicle by its retarding on the rotor.

Economic Driving is Guaranteed by Electronic Control

The micro-computer control system enables the driver to select between three programmes. This ensures that engines and transmission are always optimally matched to the driving conditions:

"Normal":
Driving with loaded or partly loaded vehicle

"Empty":
Driving with unloaded vehicle

"Uphill":
Driving in hilly terrain

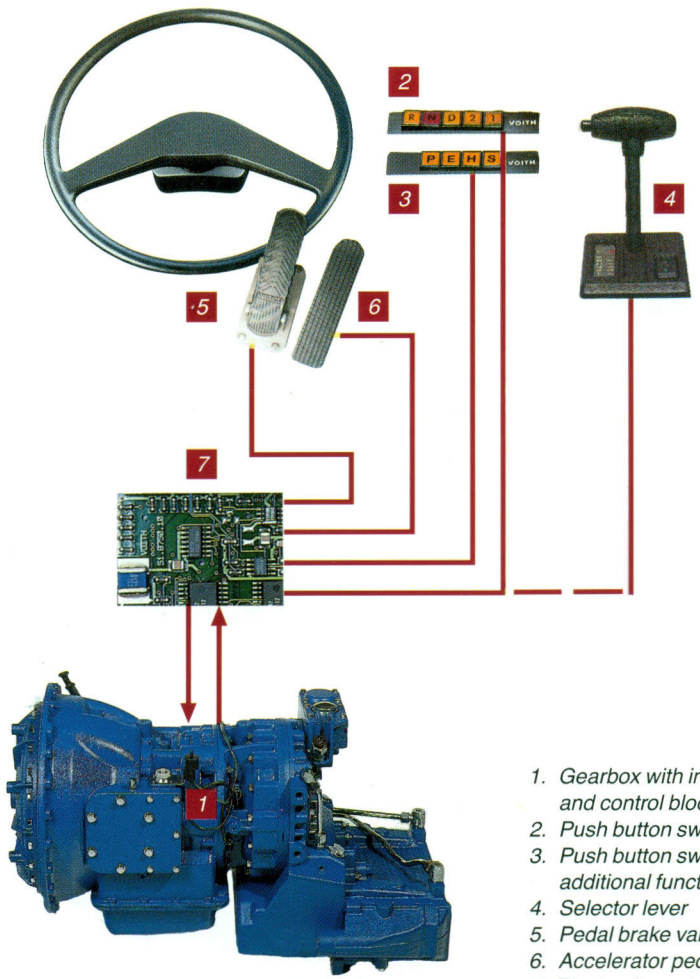
Additional Function:

"Snow":
Driving on snow-covered roads.

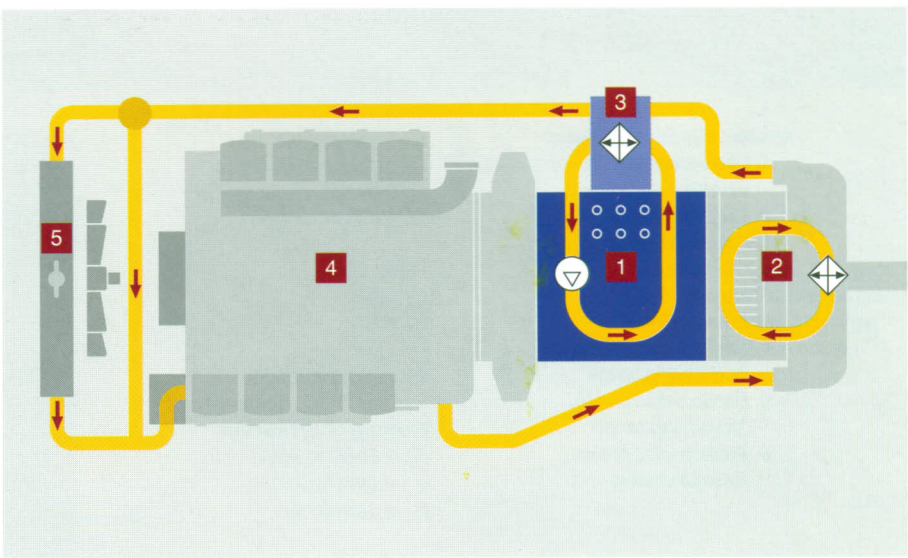
Dependent on the position of the accelerator (16 stages), the micro-computer control always adjusts the switch points to guarantee the most economical fuel consumption.

The driving programmes can be selected via a push button switch or a control lever.

The retarder can be controlled through the pedal brake valve or a manual switch.



1. *Gearbox with induction transmitter and control block*
2. *Push button switch*
3. *Push button switch, additional function*
4. *Selector lever*
5. *Pedal brake valve*
6. *Accelerator pedal*
7. *Electronic control unit*



Cooling circuit diagram at the right:
1 Transmission
2 Retarder
3 Heat exchanger
4 Engine
5 Radiator

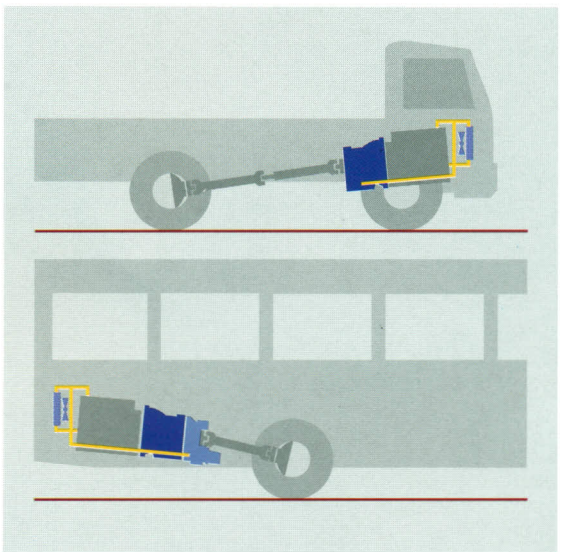
Installation in the Vehicle

The Midimat transmission is mounted directly to the engine and supported by the engine suspension.

The transmission has its own oil supply which is cooled by a heat exchanger connected to the vehicle cooling system.

Heat generated by the retarder during braking is also dissipated to the vehicle cooling system via a heat exchanger.

The transmission is controlled electro-hydraulically receiving signals from an electronic control unit.

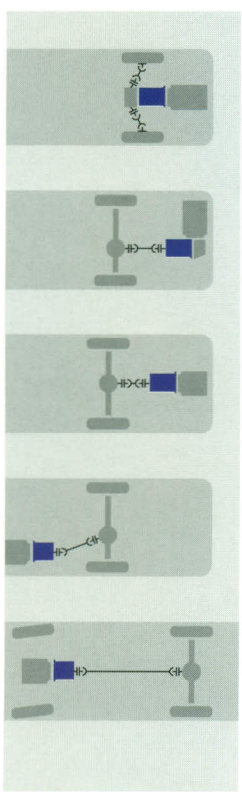


Standard arrangement lorry

Standard arrangement In-line rear Bus

Installation Examples:

Midibuses, delivery vans and distribution trucks.



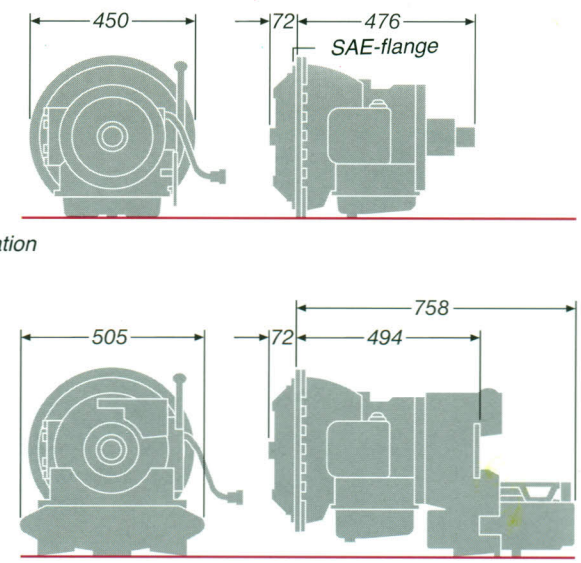
Transaxle (Neonplan)

Transverse installation (Menarini)

In-line central (MAN)

In-line sideways (Van Hool)

In-line Truck



Dimensions:
Top: Transmission type T

Bottom: Transmission type BR

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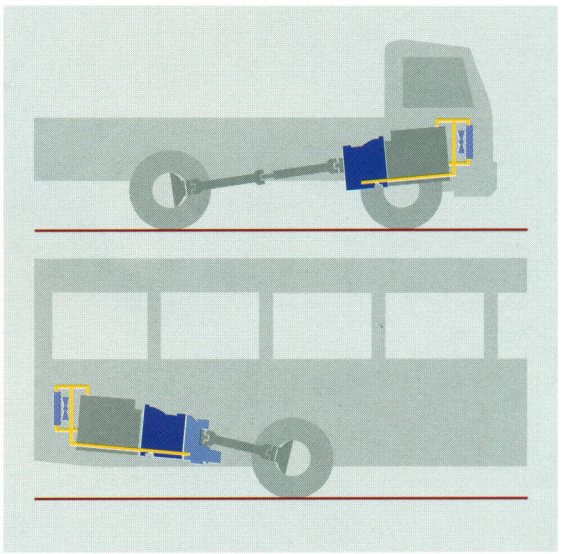

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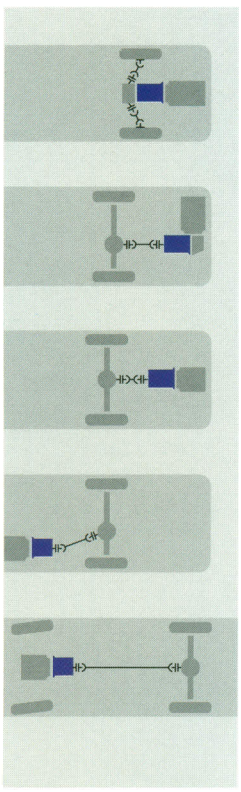

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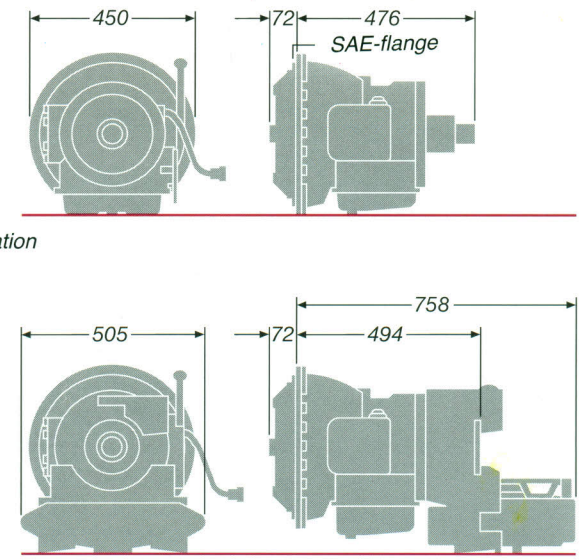

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Bottom: Transmission type BR

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