



## Driveline Technology in Modern Trucks



On the Move



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“None of the details which promises cost reductions may be left aside. For years, ZF is living up to such requirements with its product portfolio. Already during the development phase, we ensure that cost advantages are enabled for operation.”

Rolf Lutz, Senior Vice President of the  
Truck Driveline Technology business unit



On the move. What sounds like adventure is usually hard daily business in the transport sector – for both, the driver and the fleet owner or forwarder. Raw material and fuel prices on the rise force operators to calculate jobs more cautiously. None of the details which promise cost reductions may be left aside. For years, ZF is living up to such requirements with its product portfolio. Already during the development phase, we ensure that cost advantages are enabled for operation. In the meantime, the CV transmission has become one of the most important microeconomic factors for end customers. Whether it is heavy transport, inner city distributor traffic, or transporter applications, whether it is construction site or military vehicles: In all cases/ applications and vehicle categories, ZF commercial vehicle transmissions ensure economically viable operation. Everybody is profiting from the long service lifetime of ZF products, big fleets as well as companies with just one single vehicle. In addition, benefits stem from the fact that our new CV transmissions are operating in a highly reliable manner with almost no maintenance and servicing at all. Automatic transmissions, such as the ones from the AS Tronic family, attain considerable fuel consumption reductions during operation. This factor is also highly important for environmental protection. Therefore, ZF is already today developing the next generation of environmentally-friendly hybrid drive concepts for commercial vehicles.

Also considered highly important: Safety, comfort, and the environment. Subjects which, at ZF, are closely intertwined or even mutually dependent. Also in the case of goods transport, the human being is still at the center of attention. ZF products are destined to relieve the driver by making work easier. After all, goods are to be transported safely to their final destination. And also for truckers, the job should be fun! After all, it is crucial for all of us that they do a good job.

A handwritten signature in black ink, appearing to read 'R. Lutz', written in a cursive style.

Rolf Lutz

# Automatic Transmissions

Traffic is getting heavier. More powerful engines. The aspiration for greater efficiency in freight transport. Contemporary traffic conditions place ever-increasing demands on people and materials. ZF automatic transmissions are today's answer to changing conditions.

Whether it's long-haul freight transport, distribution work, or a special vehicle, whether it's a small delivery van or a super-heavy truck, ZF has the right automatic transmission for every imaginable truck configuration. And you win three times over with every transmission you purchase: You gain efficiency, safety, and comfort. And you'll spend less on fuel and service, too. Truck drivers' jobs are made easier so they can devote their attention to what's happening on the road.

ZF automatic transmissions give you the gift of effortless driving.

"Riding along almost identical routes all over Europe, my new AS Tronic-equipped tractor saves up to an average of 4.11 percent of fuel when compared to its predecessor. Thus for us, price increases for Diesel fuel were offset by approximately one fifth in total."

Castrese Catone, Director of Catone Trasporti International

"Now all I can report are clearly positive experiences. The transmissions are extremely reliable; technical problems are practically non-existent. The service intervals are really long, and we only have to change the transmission fluid every three years. The engine is always running at optimum speed, which extends its service life."

György Wáberer, President of Waberers Optimum Solution®



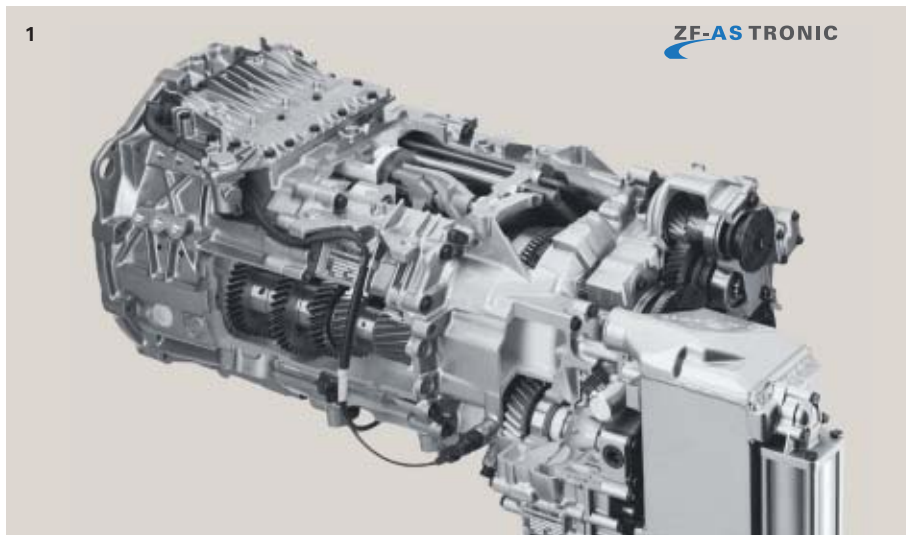
# AS Tronic: Driveline Technology for Heavy Trucks

The AS Tronic is the first automatic transmission for trucks. The N° 1 works in the HGVs on our roads. For long-distance heavy goods transport, distribution traffic, or special vehicles – trucks drive to the head of the pack with the N° 1 automatic transmission. The AS Tronic is the first choice for thousands of drivers. And the N° 1 gets best marks in comparisons and individual tests. All the benefits of this drive concept will push you to the top!



**1 AS Tronic with Intarder**  
Shifting automatically,  
Driving economically

**2 Power take-off (PTO)**



- Automatically efficient thanks to: Optimum protection from external influences, Increased service intervals, Fast gearshifts save fuel, Extended service life of the clutch, Perfect communication between the engine, clutch, and transmission protects the entire driveline, Drive program always selects the most economical engine speed.

- Automatically safe thanks to: No shifting – better concentration, For undivided attention in city traffic, Particularly sensitive maneuvering, With ZF-Intarder upon request – a wear-free brake for even more safety.
- Automatically relaxed thanks to: No clutch engagement jolting and release shocks, No clutch pedal, Manual gear selection possible via tip switch, Reliable in

all situations: On long distances, as well as in demanding terrain, Perfectly harmonized clutch and shift activities.

- The AS Tronic can be equipped with clutch-dependent and speed-dependent power take-offs.

- No “attached” control elements
- Only a few central connections for compressed air and electrics
- Electronic control unit (ECU) is integrated in the shift module
- Space and weight-saving design: 2 countershafts and 2-speed planetary gear sets
- Constant-mesh basic transmission (not synchronized), both the splitter and the range change group are synchronized
- Easier, shorter, simpler, and more universal than everything else presently available on the market



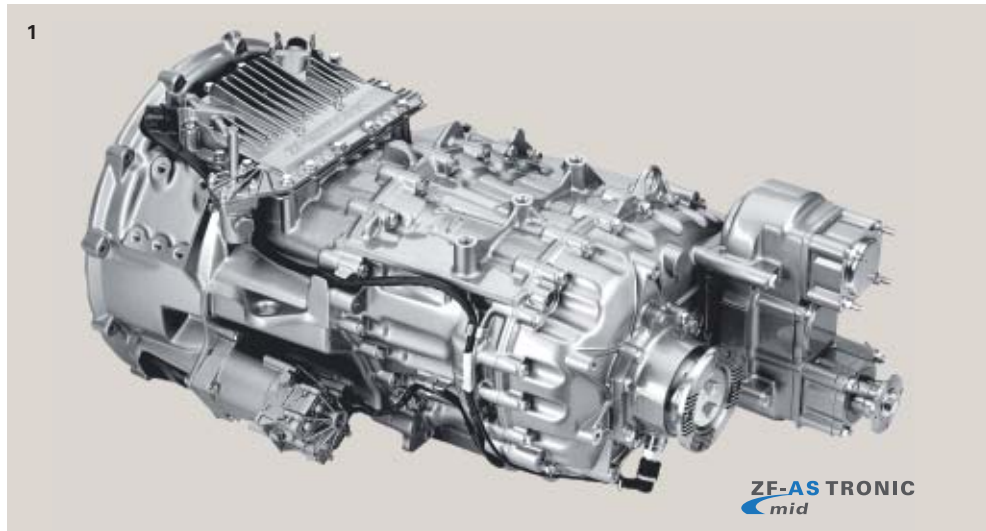
# AS Tronic mid: Driveline Technology for Medium Trucks

We developed the AS Tronic mid automatic transmission so that medium truck operators could also enjoy increased safety, efficiency, and comfort. The benefits this transmission has to offer are particularly valuable to drivers in city traffic and interurban distribution work. Cities require the most shifting, and the trucks are driven by many different drivers. These requirements are all strong arguments for the AS Tronic mid transmission line. Twelve gears ensure that any vehicle and load between 12 to 36 tons can drive properly.





1 AS Tronic mid  
Swift shifting processes  
save fuel



- Gentle gear changes protect both the clutch and the downstream driveline. If the driver wants to get involved and change gears manually, he or she can use the push-button switch. It applies for both the automatic and the manual mode: Incorrect shifting excluded thanks to the electronic control unit.

This control system is also responsible for extending the service life of the clutch and reducing fuel consumption. The electropneumatically shifting transmissions in the AS Tronic mid line are available as modular systems with a total installation length of 840 or 900 millimeters.

- The AS Tronic mid can be equipped with clutch-dependent and speed-dependent power take-offs.



- Optional: Manual or automatic shifting
- Modular design makes the unit reliable and easy-to-service
- Reduced operating costs:  
Fuel consumption, clutch wear

# AS Tronic lite: Driveline Technology for Light Trucks

The city is the natural territory for light trucks. The city is a demanding place. It requires the driver to get to his destination safely and on time, despite heavy traffic. And it is tough on the vehicle: Stop-and-go traffic and constant acceleration and deceleration demand every ounce of performance from the driveline.



**1 AS Tronic lite**  
For undivided attention  
in city traffic



- The AS Tronic lite automatic transmission fights both driver and material fatigue. Integrated electronics control clutch and shift activity perfectly – shifting errors are impossible, even when novice drivers are at the wheel. Rapid shifting times ensure the necessary dynamic performance. Being able to accelerate quickly is especially valuable in the city.
- The AS Tronic lite is also easy on your budget. The increased clutch life and reduced fuel consumption also help to reduce costs. With its low, space-saving

installation height, the electrohydraulically shifting transmission was made to be at home in trucks with a total weight of up to 12 tons. And it weighs no more than an adequate manual transmission.

- The AS Tronic lite can be equipped with clutch-dependent power take-offs.



- Optional: Manual or automatic shifting
- Reliable and service-friendly thanks to modular design
- Reduced operating costs: Fuel consumption, clutch wear



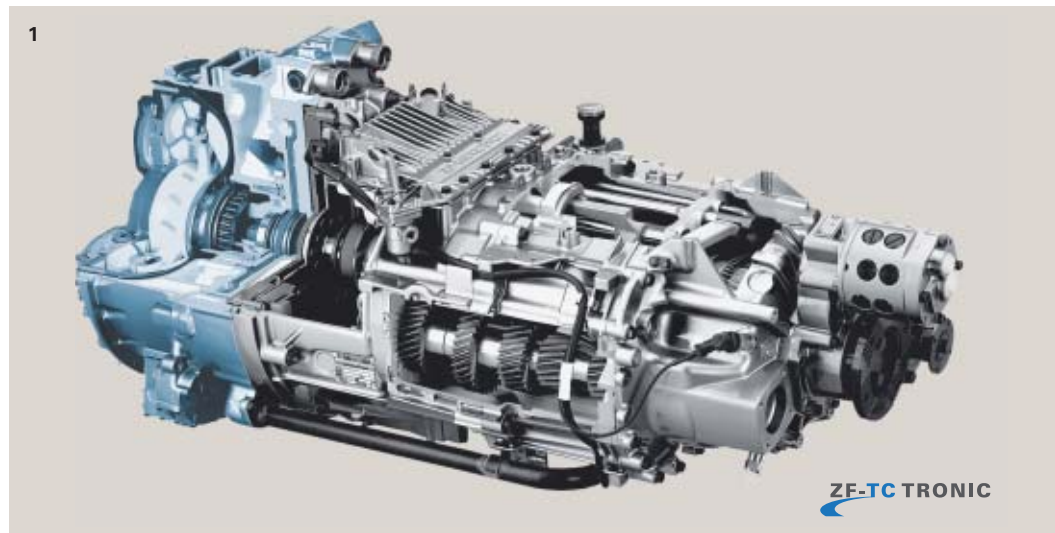
# TC Tronic: Driveline Technology for Heavy Tractors

Heavy tractors in action. Just looking at them and listening to the roar of their engines is enough to give you an idea of their power. Large, ultra-heavy loads make their way from place to place using high-torque drives. The TC Tronic, the automatic transmission with a torque converter clutch, ensures that the tremendous power of the electronically controlled diesel engine is transmitted with exacting precision. This allows heavy tractors to start gently from a stop.



### 1 TC Tronic

Torque converter and clutch system for gentle starting



- There's greater comfort for drivers of special vehicles, too: Wherever long and frequent maneuvering is required, and wherever the working environment consists of difficult terrain, the TC Tronic ensures precise and measured movements. The TC Tronic combines the advantages of an automatic transmission with a hydrodynamic torque converter clutch. Starts and maneuvers are wear-free, thanks to the torque converter.
- With the TC Tronic, the driver has the choice between automatic or manual shifting right at his or her fingertips. The electronic controls prevent incorrect shifting in the manual mode as well. The clutch is under automatic control. The 12 forward and two reverse gears are finely tuned to allow drivers to handle even the toughest driving situations with ease. A primary retarder provides perfect deceleration.



Suitable for:

- Heavy tractors
- Cranes
- Off-road commercial vehicles



# Ecomat: Safe, Economical, and Comfort-Enhancing

No matter whether it is a fire engine or a municipal vehicle, the automatic 6-speed Ecomat 4 transmission is the ideal supplement at the driveline-end. In comparison to the 5-speed transmission, the Ecomat features the following two essential advantages: Improved tractive power as well as maximum speed when combined with less powerful engines plus use of the torque converter.





- 1 Ecomat**  
Driving automatically, without interruption of the tractive force
- 2 Integrated primary retarder**
- 3 Version with power take-off (PTO)**

- The current transmission generation does not only contribute to the optimization of driving/riding characteristics and efficiency but also generates considerable fuel savings and a reduction in pollutant emissions.
- The Ecomat 4 transmission, developed for Euro 4 engines, with its 6 speeds is perfectly adapted to frequent setting-off processes in inner city traffic. A true relief for the driver. Moreover, the torsion

damper contributes to the minimization of vibrations. Furthermore, the use of Ecofluid A plus which has been specially harmonized with ZF transmission fluid temperature requirements reduces the number of maintenance intervals.



- Gentle shifting protects the driveline.
- Programmable for the topography of the route.
- High level of safety in traffic via integrated retarder.

# Manual Transmissions



We keep making a good thing better! ZF manual transmissions offer your truck a custom fit: With 5, 6, 9, or 12 gears, they are perfectly designed for the performance spectrum of today's commercial vehicles. Hills and valleys, stop-and-go traffic, acceleration – they deliver the right torque for every situation in all kinds of trucks. These robust transmissions are characterized by their quiet operation and optimal gear ratios. They have long since proven their efficiency. Low fuel consumption and minimal required maintenance guarantee efficient operation.

The constant refinement of all manual transmission ranges and the use of improved materials and processing technologies ensure that ZF manual transmissions always incorporate the latest developments. They are up to the challenges presented by powerful engines and heavy vehicles. Furthermore, efficiency and ecology are equally important criteria to ZF product development staff. Weight reduction and compact dimensions are of just as much interest to automotive manufacturers as the simple installation of the transmission.

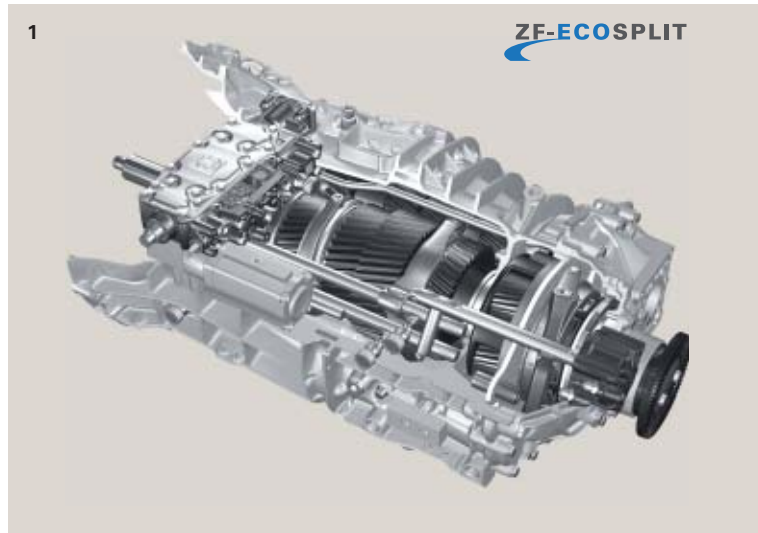




# Ecosplit: Driveline Technology for Heavy Trucks

How do you get a heavy load to its destination quickly, safely, and economically? Your commercial vehicle needs a powerful engine, a transmission that transfers power with precision, and a driver who can transfer that power to the road shifting from gear to gear. The New Ecosplit offers 12 gear ratios in its large transmission range. The lower gears provide power for starting from a stop and precise maneuvering, the middle gears are good for acceleration and passing maneuvers, and the higher gears help drivers make good time on long stretches of open road. Trips will pass quickly, even with lower-torque engines.





- 1 Ecosplit**  
Fewer gear stages, optimal power transmission
- 2 Intarder**
- 3 Power take-off (PTO)**

- Thanks to its wide torque range, the Ecosplit synchromesh transmission is well off with its 12 gear steps. An aluminum housing keeps the Ecosplit from gaining unnecessary pounds, and the helical gears keep the unit quiet during operation. Short-travel and dual cone synchronization as well as the Servoshift unit reduce shift forces and paths. The Ecosplit transmission line, which is equipped with an integrated bell housing, is available with a wide range of features for all truck applications up to 44 tons total weight.

- The electronic control unit prevents accidental switching from the upper gear set to the lower gear set. Furthermore, a gate lock in the lower range group set prevents accidental downshifting.
- Ecosplit can be equipped with clutch-dependent and speed-dependent power take-offs.

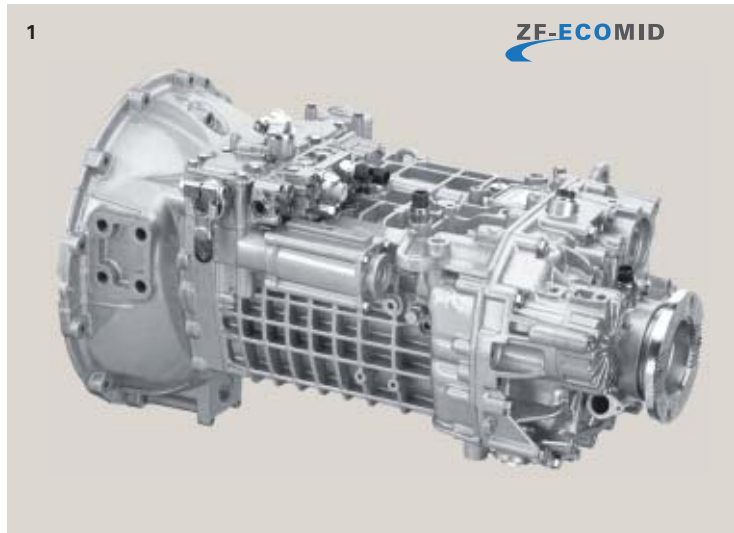


- 12 gear steps
- Compact light design
- Low total installation weight
- Minimum noise emission

# Ecomid: Driveline Technology for Medium Trucks

Quickly taking goods to another city, maneuvering in a pedestrian zone with a heavy load. Collecting garbage from residential areas. Doing hard work on a construction site, or reliably cleaning up snow in the winter. With the Ecomid manual transmission system, distribution vehicles and city vehicles can be put to a wide variety of uses – and work especially efficiently while doing so. The Ecomid lets medium-weight trucks show off their strength and versatility.





ZF-ECOMID

**1 Ecomid**  
Shifting made simple and economical

**2 Power take-off (PTO)**

- The Ecomid makes it child's play for truck drivers to shift gears while navigating busy city streets. Nine gears effectively transfer the power of the engine to the road in all conditions, whether you're pulling away from a traffic light, just keeping up with the flow of traffic, or going up hills. The correct gear is selected, quietly, quickly, and effortlessly. The easy-to-shift manual transmissions were developed for vehicles carrying medium loads.
- The 9-speed Ecomid manual transmission for distributor vehicles is equipped with the Servoshift unit, a

pneumatic shift aid, a clutch bell which is integrated into the housing, and a new gear set for the overdrive. Thus, this manual transmission is the optimal choice for CVs up to 36 tons gross combination weight.

- The Ecomid can be equipped with clutch-dependent and speed-dependent power take-offs.



- 9 gear steps
- Dashboard-compatible shift system
- Compact light design
- Low total installation weight
- Minimum noise emission

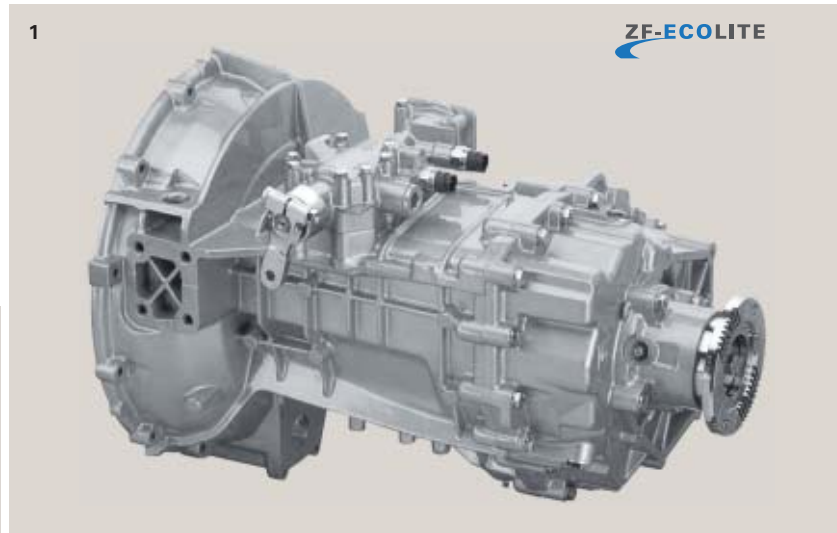
# Ecolite: Driveline Technology for Light Trucks

It is impossible to imagine our daily lives without them. Vans and light trucks guarantee that we are supplied with the necessities of life – everything from our breakfast rolls to the newspaper. Their services are irreplaceable particularly in metropolitan areas where the volume of traffic is enormous. These environments call for flexible vehicles that are simple to operate, require little maintenance, and have low operating costs.



**1 Ecolite**  
Agile driving, dynamic shifting

**2 Power take-off (PTO)**



- The Ecolite series makes a wide range of manual 5-speed and 6-speed transmissions available. Their low weight, high performance, suitable gear ratios, and quiet operation guarantee efficient operation with optimum driving comfort. And thanks to their robust design, the manual ZF transmissions have very long service lives.
- The Ecolite transmission range can be equipped with up to two clutch-dependent power take-offs.



- 6 gear steps
- Dashboard-compatible shift system
- Compact light design
- Low total installation weight
- Minimum noise emission



# Intarder and PTOs: Safe Braking, Versatile Use

ZF transmissions transfer the engine's power optimally onto the road. Moreover, different applications equip the transmissions with an additional set of capacities. The Intarder is a decisive win-win factor for safety; ZF PTOs turn your vehicles into multi-talents.



“None of our vehicles gets on the road without the ZF-Intarder. We don't want our trucks or drivers to do without this safety feature. There are gadgets you can do without in a truck, but a retarder should be mandatory.”

Rudolf Rapf, Fleet Manager Ullrich / Forwarder

“When it comes to safety, we do not engage in any kind of compromise for our vehicles. Our trucks exclusively run with the ZF-Intarder. My drivers, my goods/cargo, and other traffic participants deserve it!”

Enrique Pérez Iglesias, Director of Vigón, Spain





# Intarder: Safe Braking

Efficiency counts when you are transporting goods. You need the right engine and transmission for the job. And safety is just as important. The brakes have to work just as well as the engine! To protect the brakes from fading due to long-term stress, secondary retarders handle much of the work (80 to 90 percent). The service brakes, therefore, remain cool and are ready for use when the occasion arises. In contrast to retarders made by other manufacturers, the Intarder is integrated in the transmission. Gentle brake modulation is made possible by five brake levels. Its compact design causes almost no change to the transmission dimensions.



**1 Intarder**  
Wear-free braking and increasing safety

**2 PTOs**  
are also possible for transmissions equipped with an Intarder



- The latest version of the ZF transmission brake generates 25 percent more braking efficiency, weighs less, and operates much quieter than its predecessor.
- The new Intarder can be connected to manual as well as automatic transmission systems in a much easier way and is optimally integrated in the vehicle's brake management system including the cruise control function. Thus, the Intarder is in charge of both, transmission cooling and heating functions. Thanks to its active support, the required transmission fluid temperature is reached much faster and thereby, also the optimum efficiency ratio for fuel consumption.

- The Intarder is available for manual ZF synchromesh transmissions and automatic AS Tronic transmissions.



- Hydrodynamic, wear-free retarder (brake)
- Braking is independent of engine speed
- No interruption in braking force while shifting or operating the clutch



# ZF Power Take-Offs: More Than Just Driving

Commercial vehicles with one or more ZF power take-offs (PTOs) have special capabilities. This makes them true specialists for very specific tasks they can perform while driving or parked. They could collect garbage, clean sewer lines, clean streets, plow snow, mow hills, mix and pump concrete, or lift and dump heavy loads. Those are just a few of the many possibilities.



**1 PTOs**  
Multifunctional



- Engine-dependent ZF PTOs are arranged between the engine and transmission and are driven directly by the engine via a special coupling. Applications: High-pressure pumps for fire trucks, sewer cleaning and suction vehicles, drilling devices, concrete mixers and pumps.
- Clutch-dependent ZF PTOs are installed on the output side or laterally at the transmission housing. They will only operate when the engine is running and the vehicle clutch is closed. Applications: Water, sludge, and hydraulic pumps, compressors, winches, fire department aerial ladders, scaffolding, etc.
- Drive-dependent ZF PTOs are connected with the transmission's output shaft. They are active once the drive wheels of the vehicle begin to move. They supply the hydraulic system of two-circuit steering systems with working pressure. This means that drivers can still steer the vehicle if the engine dies.



- Drive for additional units
- Wide range of applications
- Also retrofit assembly enabled

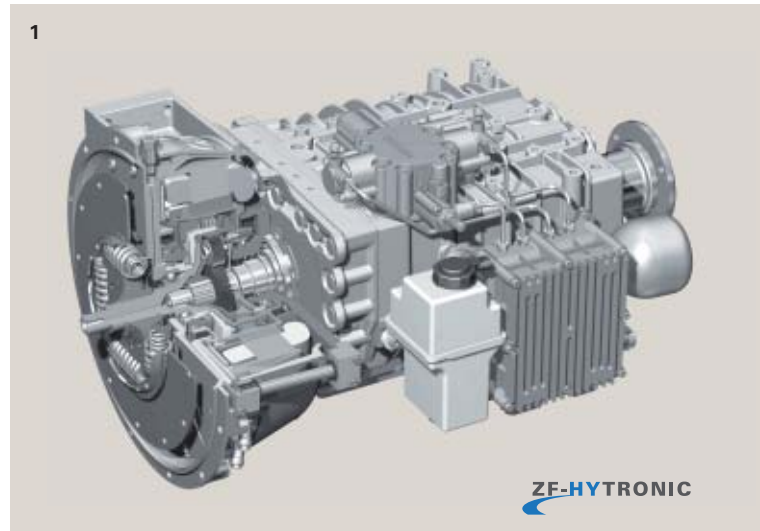
# Innovative Driving: With ZF Hybrid Technology

The properties of commercial vehicles are assessed according to increasingly stricter standards. Hybrid technology is blazing decisive trails in the areas of fuel savings, environmental compatibility, and noise. ZF owns extensive expertise in development and manufacturing for all hybrid designs. This applies to components such as the E-machine, modules ready for installation, i.e. the inertia starter module with controls, hybrid transmissions, and entire hybrid systems.

Major advantages for commercial vehicle transport: Fuel savings and preservation of components prone to wear. This is where in inner city traffic, the hybrid concept plays off its prime qualities: This commercial vehicle category is characterized by numerous setting off and stopping processes, and here, the start&stop operation together with recuperation – recovery of braking energy – help to save fuel. During start&stop operation, the combustion engine is switched off at standstill and upon request, a quick start of the E-machine re-activates it. Moreover, in comparison to today's vehicles, the driver is not suffering any curtailments with regard to driving performance (mileage) and riding comfort. In the future, hybrid drives will become even more important because legal regulations are, for example, requiring the establishment of so-called "green zones" in inner city areas which will further restrict the use of combustion engines.

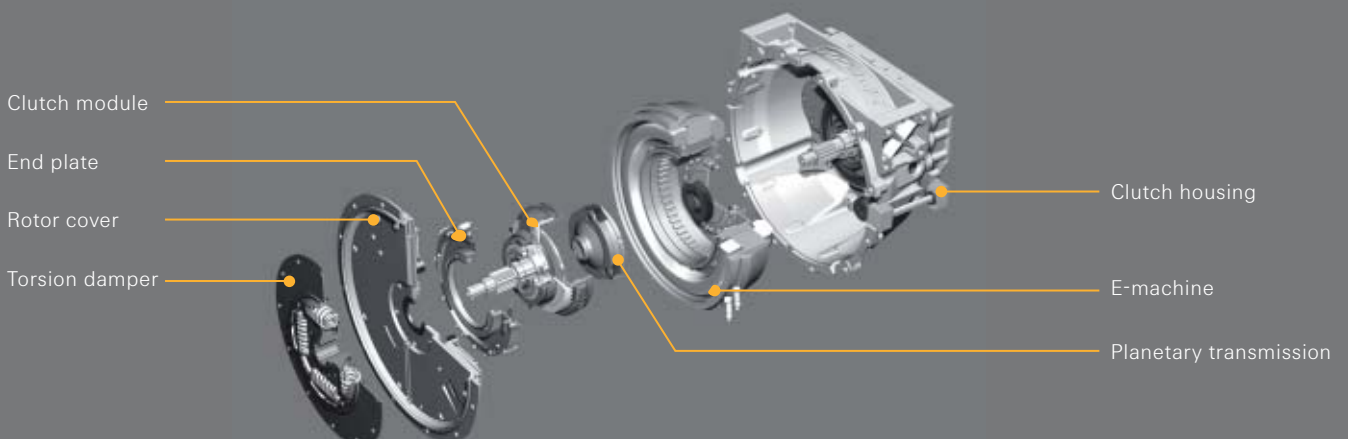
## HyTronic: One Single Transmission – Three Drive Variants.

- With the system based on the EDA (electrodynamic starting element), ZF is developing a parallel hybrid concept which in addition to the electric drive offers further, attractive add-on functions for both, the driver and the manufacturer. Moreover, the EDA replaces the starting or master clutch.
- Technically, the EDA hybrid concept is characterized by the fact that the electric motor is not located directly between the combustion engine and the transmission but rather coupled to it by means of a single-stage planetary gear. However, the unit does require little space only and can be completely integrated in the existing clutch bell of the automatic AS Tronic transmission instead of the starting clutch. These opportune installation conditions provide vehicle manufacturers with more flexibility: The identical installation space of a specific vehicle model can thus accommodate three different drive solutions – a traditional driveline featuring a manual Ecolite transmission, the automated AS Tronic transmission including the starting clutch, or a hybrid system equipped with EDA.



- The EDA is made up by an electro machine, a wet multidisk clutch, and a planetary transmission. Setting off with a hybrid system – this special configuration allows for the implementation of its major function: Here, electric energy is transformed into tractive power while simultaneously, the combustion engine is started. A hybrid system equipped with EDA unfolds its advantages (relating to fuel consumption and drivers' benefits) primarily in inner city or suburban distributor traffic where numerous starting, stopping, and maneuvering activities are called for.

### Hybrid module



# Partners of Fleet Operators: On-Site Service

Transmissions achieve the maximum in hard everyday operation. High mileage with almost no wear is normal. But even the best technology requires professional maintenance and repair now and again. And we at ZF are there for you. After all, no one knows our products as well as we do. With over 650 subsidiaries and authorized partner companies worldwide, we are available to help you quickly, no matter where you are.

Our broad range of services is intended to support your competitiveness in the long run. This is accomplished through comprehensive consulting and service on the one hand, parts replacement with original spare parts and swing units on the other hand, as well as technical vehicle enhancements. Transmissions are replaced worldwide within the shortest period of time. Our customer service employees analyze the shipping tasks of your vehicles, recommend the optimally suited transmission, and program it specifically for the topography of the route used.

A further strength of the Service is the adaptation of your vehicles to changing conditions. Based on a thorough analysis of requirements and performance parameters, we will figure out the best options for optimizing your vehicle. For more efficiency, more power, more safety, and more comfort.



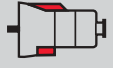



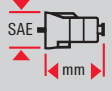



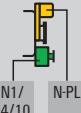


**Short routes and  
fast service**

There are more than 650  
ZF After Sales Service  
Points with the complete  
service spectrum worldwide.



# Automatic Transmissions

| Transmission designation  | Input torque   | No. of gears  | Ratio spread  | Installation dimensions  | Retarder  | Mass / weight *  | Oil capacity  | PTO   |
|---|--|---|---|--|---|--|---|---|
|  | <br>Lb/ft |  |  | <br>SAE<br>mm | <br>ZF-Intarder | <br>+ ZF-Intarder<br>kg | <br>+ ZF-Intarder<br>Litre | <br>N1/4/10 N-PL |

## ZF-AS TRONIC *lite*

|              |     |   |                   |       |   |       |        |     |
|--------------|-----|---|-------------------|-------|---|-------|--------|-----|
| 6 AS 700 TO  | 516 | 6 | 6.02-0.79; R 5.58 | 2 650 | - | 115 - | 7.0 -  | ○ - |
| 6 AS 800 TO  | 627 | 6 | 6.58-0.78; R 6.06 | 2 709 | - | 138 - | 10.7 - | ○ - |
| 6 AS 1000 TO | 774 | 6 | 6.75-0.78; R 6.06 | 2 709 | - | 150 - | 10.5 - | ○ - |

## ZF-AS TRONIC *mid*





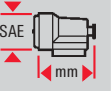







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|---------------|------|----|---------------------|---------|---|-------|-------|-----|
| 12 AS 1010 TD | 738  | 12 | 12.84-1.00; R 13.07 | 1/2 840 | - | 188 - | 7.8 - | ○ ○ |
| 12 AS 1010 TO | 738  | 12 | 10.37-0.81; R 10.56 | 1/2 840 | - | 188 - | 7.8 - | ○ ○ |
| 12 AS 1210 TO | 886  | 12 | 10.37-0.81; R 10.56 | 1/2 840 | - | 188 - | 7.8 - | ○ ○ |
| 12 AS 1220 TD | 886  | 12 | 12.84-1.00; R 13.07 | 1/2 900 | - | 205 - | 9.3 - | ○ ○ |
| 12 AS 1420 TD | 1033 | 12 | 12.84-1.00; R 13.07 | 1/2 900 | - | 205 - | 9.3 - | ○ ○ |
| 12 AS 1420 TO | 1033 | 12 | 10.37-0.81; R 10.56 | 1/2 900 | - | 205 - | 9.3 - | ○ ○ |
| 12 AS 1620 TO | 1181 | 12 | 10.37-0.81; R 10.56 | 1/2 900 | - | 205 - | 9.3 - | ○ ○ |

## ZF-AS TRONIC

|               |      |    |                     |       |   |         |         |     |
|---------------|------|----|---------------------|-------|---|---------|---------|-----|
| 12 AS 1630 TD | 1181 | 12 | 15.86-1.00; R 14.68 | 1 910 | ○ | 252 323 | 11.0 21 | ○ ○ |
| 12 AS 1930 TD | 1402 | 12 | 15.86-1.00; R 14.68 | 1 910 | ○ | 252 323 | 11.0 21 | ○ ○ |
| 12 AS 1930 TO | 1402 | 12 | 12.33-0.78; R 11.41 | 1 910 | ○ | 249 320 | 11.0 21 | ○ ○ |
| 12 AS 2130 TD | 1550 | 12 | 15.86-1.00; R 14.68 | 1 910 | ○ | 252 323 | 11.0 21 | ○ ○ |
| 12 AS 2130 TO | 1550 | 12 | 12.33-0.78; R 11.41 | 1 910 | ○ | 249 320 | 11.0 21 | ○ ○ |
| 12 AS 2140 TD | 1550 | 12 | 15.86-1.00; R 14.68 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 12 AS 2330 TD | 1697 | 12 | 15.86-1.00; R 14.68 | 1 910 | ○ | 252 323 | 11.0 21 | ○ ○ |
| 12 AS 2330 TO | 1697 | 12 | 12.33-0.78; R 11.41 | 1 910 | ○ | 249 320 | 11.0 21 | ○ ○ |
| 12 AS 2340 TD | 1697 | 12 | 15.86-1.00; R 14.68 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 12 AS 2530 TO | 1845 | 12 | 12.33-0.78; R 11.41 | 1 910 | ○ | 249 320 | 11.0 21 | ○ ○ |
| 12 AS 2540 TD | 1845 | 12 | 15.86-1.00; R 14.68 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 12 AS 2540 TO | 1845 | 12 | 12.29-0.78; R 11.38 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 12 AS 2740 TO | 1993 | 12 | 12.29-0.78; R 11.38 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 12 AS 2940 TO | 2139 | 12 | 12.29-0.78; R 11.38 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 12 AS 3140 TO | 2286 | 12 | 12.29-0.78; R 11.38 | 1 953 | ○ | 255 326 | 12.5 23 | ○ ○ |
| 16 AS 2230 TD | 1624 | 16 | 17.03-1.00; R 15.77 | 1 953 | ○ | 266 337 | 12.0 23 | ○ ○ |
| 16 AS 2630 TO | 1919 | 16 | 14.12-0.83; R 13.07 | 1 953 | ○ | 268 339 | 12.0 23 | ○ ○ |

## ZF-TC TRONIC

|               |      |    |                     |        |   |       |        |     |
|---------------|------|----|---------------------|--------|---|-------|--------|-----|
| 12 TC 2740 TO | 1993 | 12 | 12.29-0.78; R 11.38 | 1 1315 | - | 545 - | 29.0 - | ○ ○ |
|---------------|------|----|---------------------|--------|---|-------|--------|-----|

| Transmission designation  | Input torque   | No. of gears  | Ratio spread  | Installation dimensions  | Mass / weight *   | Oil capacity  | Add. gear set   | EST 146/147   | CAN comm.   | W/o CAN comm.   | Emerg. gearshift  |
|---|--|---|---|--|---|---|---|---|---|---|---|
|  | <br>Lb/ft |  |  | <br>SAE<br>mm | <br>kg | <br>Liter |  |  |  |  |  |

## ZF-ECOMAT

|            |      |   |             |         |     |     |   |   |   |   |   |
|------------|------|---|-------------|---------|-----|-----|---|---|---|---|---|
| 5 HP 502 C | 770  | 5 | 3.43-0.83   | 1/2 693 | 270 | ~30 | - | ● | ● | ○ | - |
|            | 770  | 5 | 5.60-1.00   | 1/2 795 | 326 | ~30 | ● | ● | ● | ○ | - |
| 6 HP 502 C | 770  | 6 | 3.43-0.59** | 1/2 693 | 280 | ~30 | - | ● | ● | ○ | - |
|            | 770  | 6 | 5.60-0.83   | 1/2 795 | 326 | ~30 | ● | ● | ● | ○ | - |
| 5 HP 592 C | 880  | 5 | 3.43-0.83   | 1/2 693 | 285 | ~30 | - | ● | ● | ○ | - |
|            | 880  | 5 | 5.60-1.00   | 1/2 795 | 336 | ~30 | ● | ● | ● | ○ | - |
| 6 HP 592 C | 880  | 6 | 3.43-0.59** | 1/2 693 | 285 | ~30 | - | ● | ● | ○ | - |
|            | 880  | 6 | 5.60-0.83   | 1/2 795 | 336 | ~30 | ● | ● | ● | ○ | - |
| 5 HP 602 C | 1180 | 5 | 3.43-0.83   | 1/2 693 | 300 | ~30 | - | ● | ● | ○ | - |
|            | 1180 | 5 | 5.60-1.00   | 1/2 795 | 334 | ~30 | ● | ● | ● | ○ | - |
| 6 HP 602 C | 1180 | 6 | 3.43-0.59** | 1/2 693 | 300 | ~30 | - | ● | ● | ○ | - |
|            | 1180 | 6 | 5.60-0.83   | 1/2 795 | 346 | ~30 | ● | ● | ● | ○ | - |
| 5 HP 902 C | 1470 | 5 | 3.43-0.83   | 1/2 693 | 310 | ~30 | - | ● | ● | ○ | ○ |
|            | 1470 | 5 | 5.60-1.00   | 1/2 795 | 344 | ~30 | ● | ● | ● | ○ | ○ |
| 6 HP 902 C | 1470 | 6 | 3.43-0.59** | 1/2 693 | 310 | ~30 | - | ● | ● | ○ | ○ |
|            | 1470 | 6 | 5.60-0.83   | 1/2 795 | 356 | ~30 | ● | ● | ● | ○ | ○ |
| 7 HP 902 C | 1470 | 7 | 5.60-0.59** | 1/2 795 | 356 | ~30 | ● | ● | ● | ○ | ○ |

All Ecomat transmissions also available with engine-dependent PTO.

# Manual Transmissions

| Transmission designation | Input torque | No. of gears | Ratio spread | Installation dimensions | Retarder | Mass/weight* | Oil capacity | Servo-shift | PTO                     |
|--------------------------|--------------|--------------|--------------|-------------------------|----------|--------------|--------------|-------------|-------------------------|
|                          | <br>Lb/ft    |              |              | <br>mm                  |          | <br>kg       | <br>Liter    |             | <br>NMV NS N1/4/10 N-PL |

## ZF-ECOLITE

|             |     |   |                   |   |         |   |       |   |      |   |   |   |   |   |   |
|-------------|-----|---|-------------------|---|---------|---|-------|---|------|---|---|---|---|---|---|
| S 5-42      | 428 | 5 | 5.72-0.76; R 5.24 | 3 | 485/619 | - | 73/78 | - | 3.2  | - | - | - | ○ | - | - |
| S 5-42      | 443 | 5 | 4.65-0.77; R 4.35 | 3 | 485/619 | - | 73/78 | - | 3.2  | - | - | - | ○ | - | - |
| 6 S 700 TO  | 516 | 6 | 6.02-0.79; R 5.58 | 2 | 650     | - | 100   | - | 7.0  | - | ○ | - | - | ○ | - |
| 6 S 800 TO  | 627 | 6 | 6.58-0.78; R 6.06 | 2 | 709     | - | 124   | - | 10.7 | - | ○ | - | - | ○ | - |
| 6 S 1000 TO | 774 | 6 | 6.75-0.78; R 6.06 | 2 | 709     | - | 136   | - | 10.5 | - | ○ | - | - | ○ | - |
| 6 S 1200 TD | 923 | 6 | 7.72-1.00; R 7.10 | 1 | 588     | - | 170   | - | 11.5 | - | - | - | - | ○ | - |

## ZF-ECOMID

|             |     |   |                     |     |     |   |         |   |          |   |   |   |   |   |   |
|-------------|-----|---|---------------------|-----|-----|---|---------|---|----------|---|---|---|---|---|---|
| 9 S 75      | 568 | 9 | 13.16-1.00; R 11.74 | 2/1 | 630 | - | 125     | - | 10.5/9.5 | - | - | - | - | ○ | - |
| 9 S 75      | 664 | 9 | 9.56-0.73; R 8.53   | 2/1 | 630 | - | 125     | - | 10.5/9.5 | - | - | - | - | ○ | - |
| 9 S 1110 TD | 812 | 9 | 12.73-1.00; R 12.04 | 2/1 | 840 | ○ | 190 245 |   | 8.8 21   |   | ○ | - | - | ○ | ○ |
| 9 S 1110 TO | 812 | 9 | 9.48-0.75; R 8.97   | 2/1 | 840 | ○ | 190 245 |   | 8.8 21   |   | ○ | - | - | ○ | ○ |
| 9 S 1310 TO | 959 | 9 | 9.48-0.75; R 8.97   | 2/1 | 840 | ○ | 190 245 |   | 8.8 21   |   | ○ | - | - | ○ | ○ |

## ZF-ECOSPLIT

|              |      |    |                     |   |      |   |         |  |           |  |   |   |   |   |   |
|--------------|------|----|---------------------|---|------|---|---------|--|-----------|--|---|---|---|---|---|
| 12 S 2130 TD | 1550 | 12 | 15.57-1.00; R 14.57 | 1 | 930  | ○ | 280 350 |  | 13.2 21   |  | ● | - | - | ○ | ○ |
| 12 S 2330 TD | 1697 | 12 | 15.57-1.00; R 14.57 | 1 | 1015 | ○ | 310 380 |  | 15.1 23   |  | ● | - | - | ○ | ○ |
| 12 S 2830 TD | 2066 | 12 | 15.57-1.00; R 14.57 | 1 | 1015 | ○ | 310 380 |  | 15.1 23   |  | ● | - | - | ○ | ○ |
| 16 S 1630 TD | 1181 | 16 | 16.41-1.00; R 15.36 | 1 | 930  | ○ | 289 362 |  | 11.0 18.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 1830 TO | 1365 | 16 | 13.80-0.84; R 12.92 | 1 | 930  | ○ | 289 362 |  | 11.0 18.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 1930 TD | 1402 | 16 | 16.41-1.00; R 15.36 | 1 | 1015 | ○ | 315 388 |  | 13.0 21.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 2230 TO | 1624 | 16 | 13.80-0.84; R 12.92 | 1 | 1015 | ○ | 315 388 |  | 13.0 21.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 2230 TD | 1624 | 16 | 16.41-1.00; R 15.36 | 1 | 1015 | ○ | 319 392 |  | 13.0 21.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 2330 TD | 1734 | 16 | 16.41-1.00; R 15.36 | 1 | 1015 | ○ | 319 392 |  | 13.0 21.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 2530 TO | 1845 | 16 | 13.80-0.84; R 12.92 | 1 | 1015 | ○ | 319 392 |  | 13.0 21.5 |  | ○ | ○ | - | ○ | ○ |
| 16 S 2730 TO | 1993 | 16 | 13.80-0.84; R 12.92 | 1 | 1031 | ○ | 334 407 |  | 13.5 22   |  | ○ | - | - | ○ | ○ |

- Standard
- Optional
- Not available
- \* Without oil fill, heat exchanger
- \*\* At  $i = 0.59$ ,  $n_{max} = 2000$  rpm, only with EEC

# Transmission Designations

| Automatic transmissions  | Number of gears          | Technological family       | Torque limit   | Product family   | Variant*                        | Mode                                   |
|--|--------------------------|----------------------------|--|--|---------------------------------|--|
|  | 12                       | AS                         | 21   | 4  | 0                               | TD                                     |
| AS = automatic transmission system;<br>TC = TC-Tronic (AS + WSK) | Number = number of gears | Torque [Nm] = factor x 100 | 0 = AS Tronic lite; 1 = AS Tronic mid short;<br>2 = AS Tronic mid long; 3 = AS Tronic short;<br>4 = AS Tronic long; 5 = clutch-dependent PTO | 0 = standard; 1 = Intarder;;<br>2 = clutch-dependent PTO | D = direct drive; O = Overdrive | Application-specific upgrades possible |

\* In case of combinations, the lowest number is used.

| Manual transmissions         | Number of gears          | Technological family       | Torque limit                             | Product family   | Variant*                        | Mode                                   |
|------------------------------|--------------------------|----------------------------|--|--|---------------------------------|--|
|                              | 16                       | S                          | 22                                       | 3  | 0                               | TD                                     |
| S = synchronesh transmission | Number = number of gears | Torque [Nm] = Factor x 100 | 0 = Ecolite; 1 = Ecomid;<br>3 = Ecosplit | 0 = Standard; 1 = Intarder; 2 = NMV;<br>3 = 100% thrust; 4 = Servoshift;<br>5 = clutch-dependent PTO | D = Direct drive; O = Overdrive | Application-specific upgrades possible |

\* When features of a single transmission are combined with features from a combination of products (e.g., transmission with Intarder), the number for the combination of products takes precedence. If several equivalent features are combined, the lower number will be used.

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