Ecomid – The Manual Transmission for Modern Medium-Duty Trucks

ZF Friedrichshafen AG

Highlights (Technology)

Ecomid for modern, medium-duty trucks

- 9 gear steps
- Particularly powerful starting gear (crawler)
- Easy to shift
- Universally applicable
- Compact, light design
- Minimum noise emissions

Highlights (Customer Value)

Ecomid stands for:

- Payload advantages
- Cost-effectiveness
- Reliability
- Comprehensive ZF transmission system

Advantages for the Vehicle Manufacturer

Ecomid means:

- 9 gears – DD or OD
- Opportune power-to-weight ratio
- Variable in terms of application
- Cost advantages

Advantages for the Vehicle Owner

Ecomid stands for:

- Reduced operating costs
- Universal application
- High level of safety
- Reliable service

Medium-Duty Trucks, More Powerful Engines Require More Powerful Transmissions

1970

S 6-90 (+ GV)

6 gears + splitter group

900 Nm

1985

ZF-ECOMID

9 S 109
4 gears + range change group + crawler

16 S 109
4 gears + range change group + splitter group

1,150 Nm

2007

ZF-ECOMID

9 S 1110 TO/TD
9 S 1310 TO
4 Gänge + Bereichsgruppe + Crawler

ZF-ECOMID

1,300 Nm / 1,420 Nm*

* Application-dependent release

2016/17

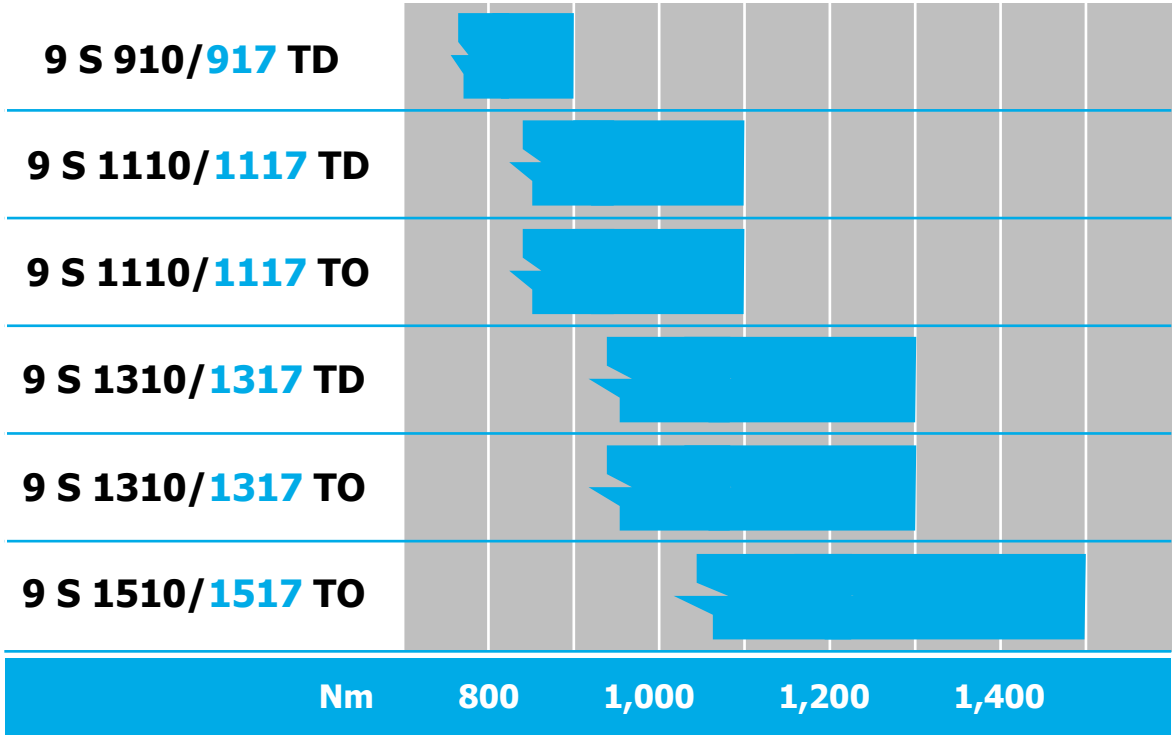
ZF-ECOMID

9 S 1510 TO
4 gears + range change group + crawler

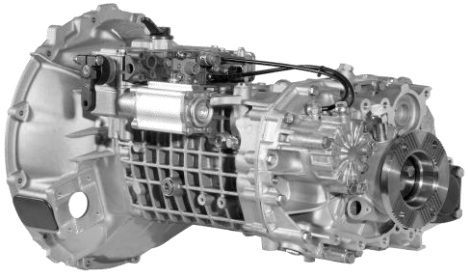
9 S (x)x17 TO/TD
higher Crawler ratio for better climbing capacity

1,500 Nm

The Ecomid Product Portfolio



All transmission versions 9 S (x)x17 Tx with higher Crawler ratio (wide ratio).



ZF-ECOMID

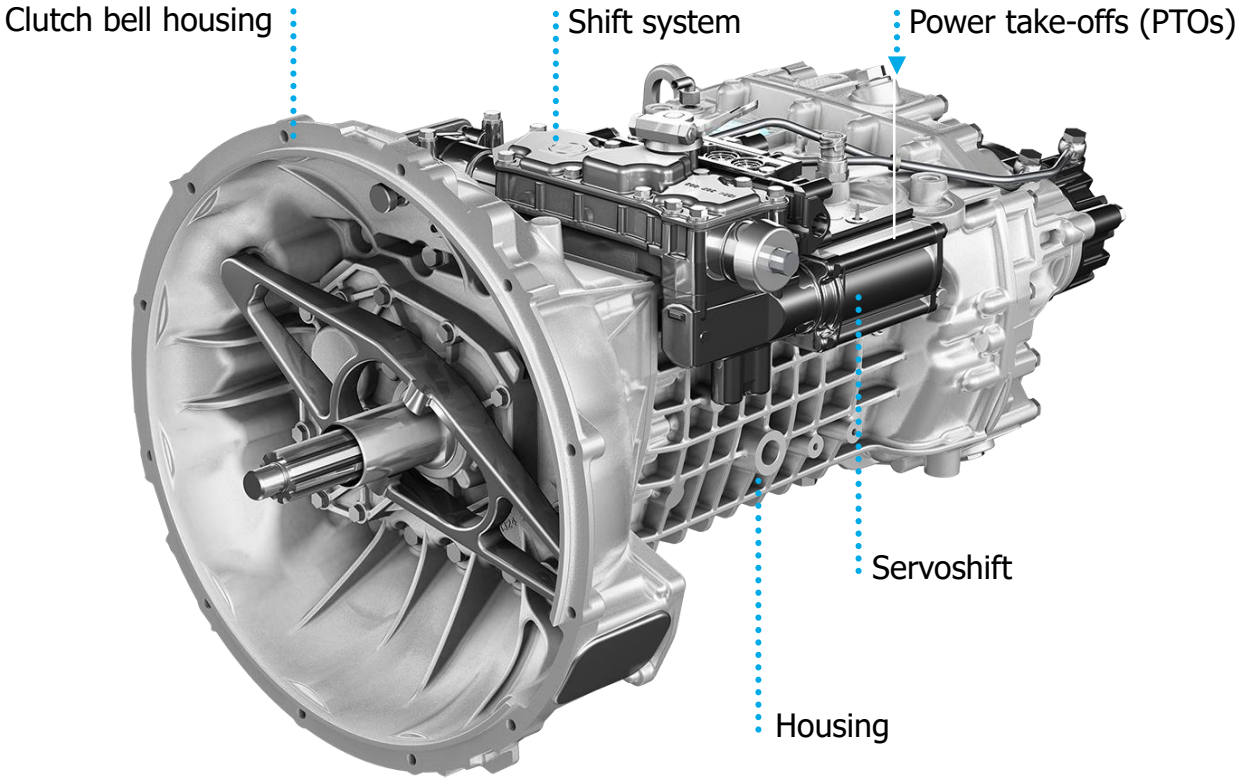
Technical Data

9-speed Transmission

	9 S 910/917	9 S 1110/1117		9 S 1310/1317		9 S 1510/1517
	TD	TD	TO	TD	TO	TO
i=	12.73/14.1 (C) • 8.83 • 6.28 • 4.64 • 3.48 • 2.54 • 1.81 • 1.34 • 1.00 • 12.04 (R)		9.48/10.51 (C) • 6.58 • 4.68 • 3.48 • 2.62 • 1.89 • 1.35 • 1.00 • 0.75 • 8.97 (R)	12.73/14.1 (C) • 8.83 • 6.28 • 4.64 • 3.48 • 2.54 • 1.81 • 1.34 • 1.00 • 12.04 (R)		9.48/10.51 (C) • 6.58 • 4.68 • 3.48 • 2.62 • 1.89 • 1.35 • 1.00 • 0.75 • 8.97 (R)
Nm	900	1,100		1,300		1,500
kg	202					
	8.9					
mm	840					
SAE	1 or 2					

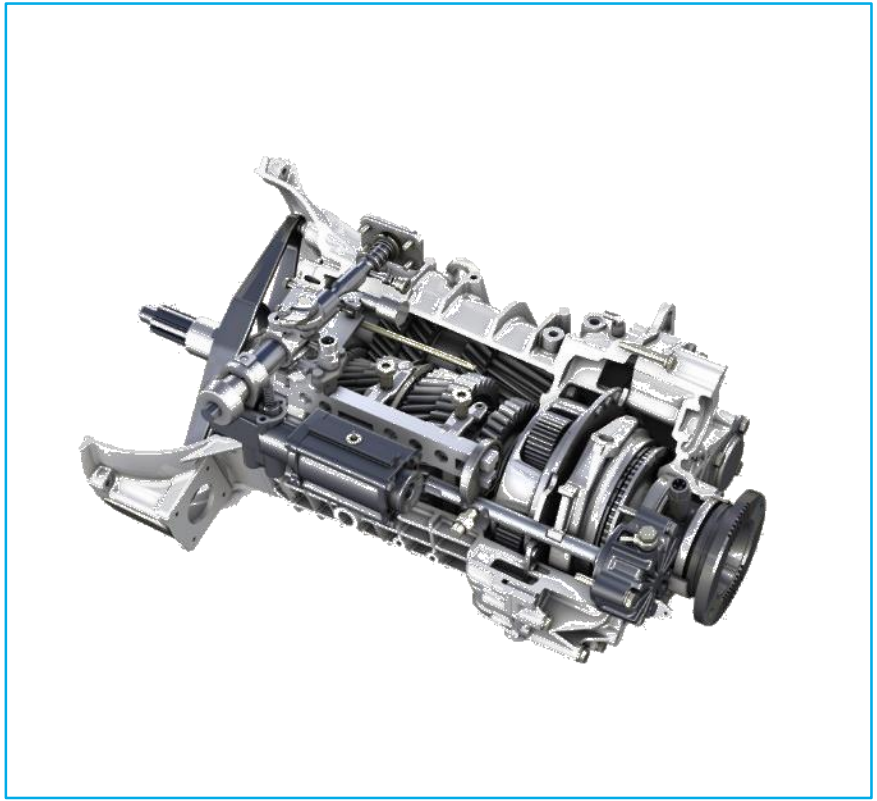
All transmission versions 9 S (x)x17 Tx with higher Crawler ratio (wide ratio).

The Transmission System

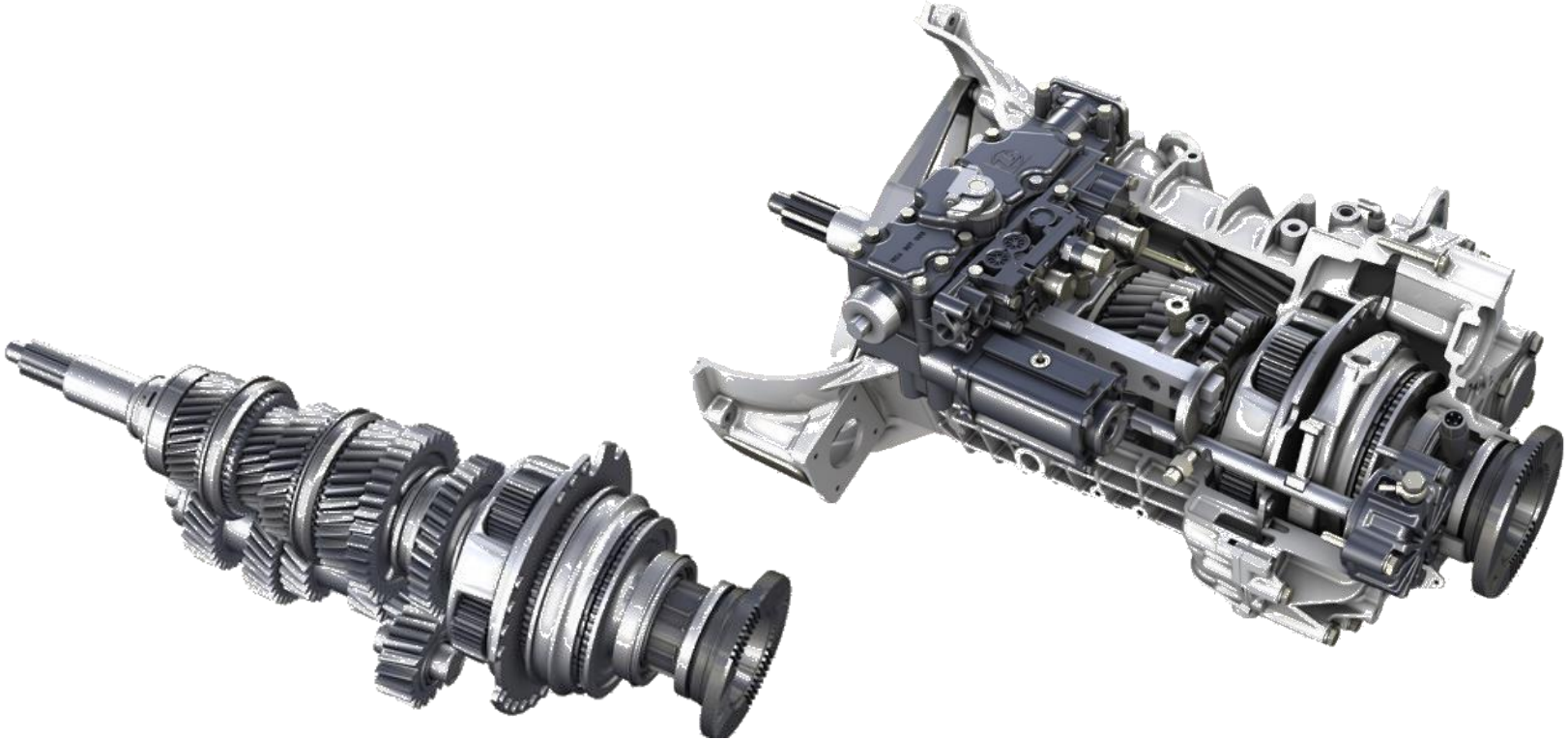


Technical Characteristics

- Modern transmission technology
- Variable adaptation to vehicle application
- Optional auxiliary units and parts

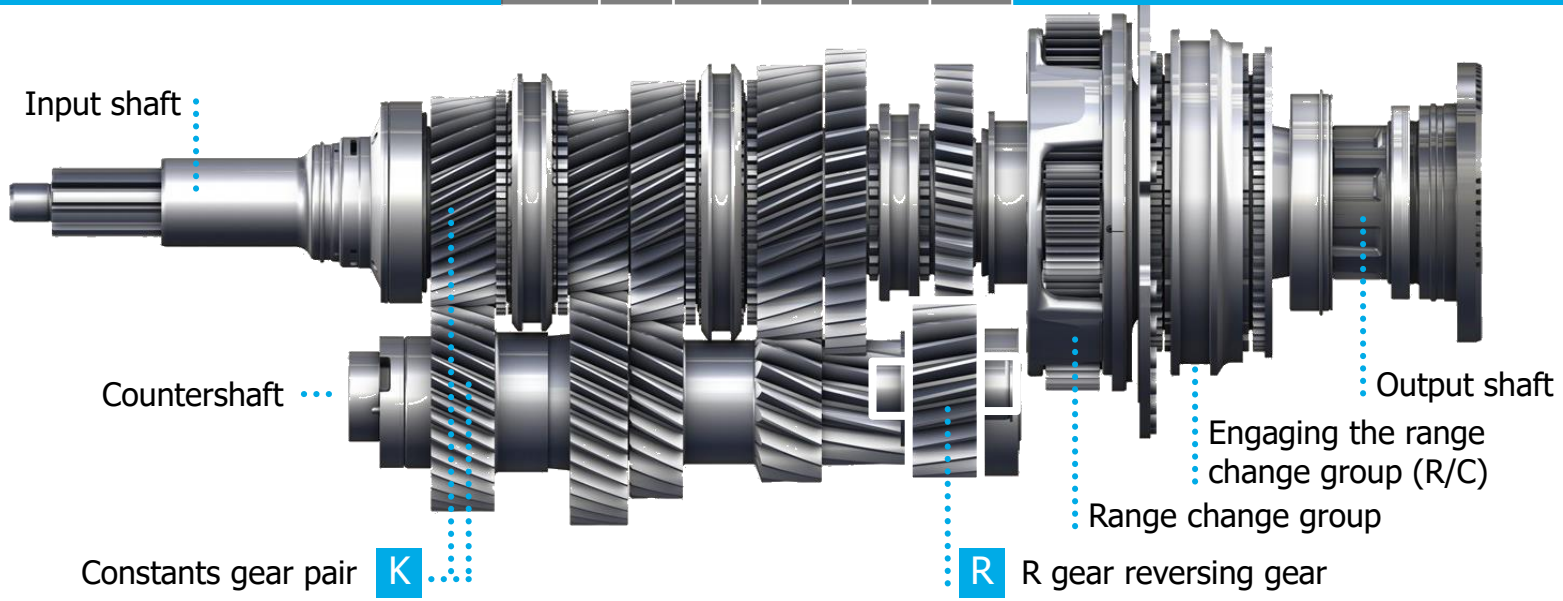


Transmission Design

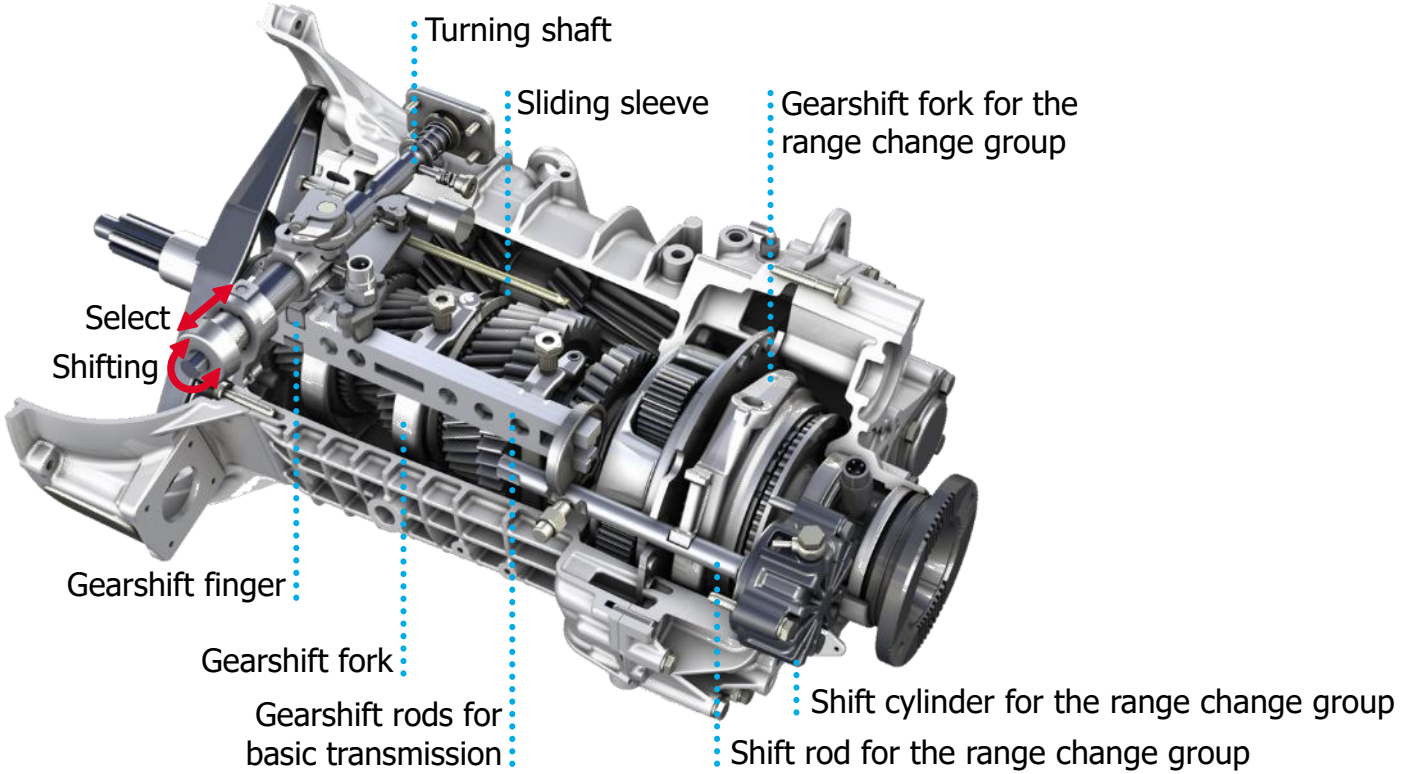


Shift System

Direct drive (TD)	8	7	6	5	**C**	**R**
	4	3	2	1		
Overdrive (TO)	7	8	6	5	**C**	**R**
	3	4	2	1		

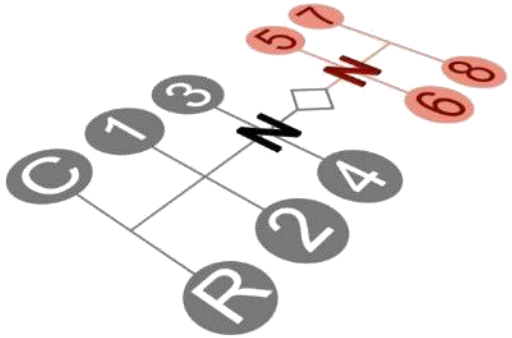


Gear-Change Mechanism (Basic Transmission)

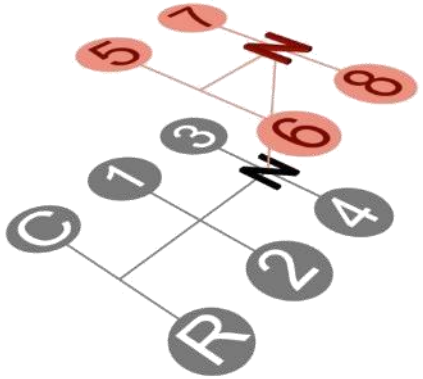


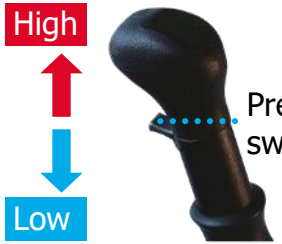
Controls

Double H shift pattern



Superimposed H shift pattern





Pre-selection switch

Accelerator pedal

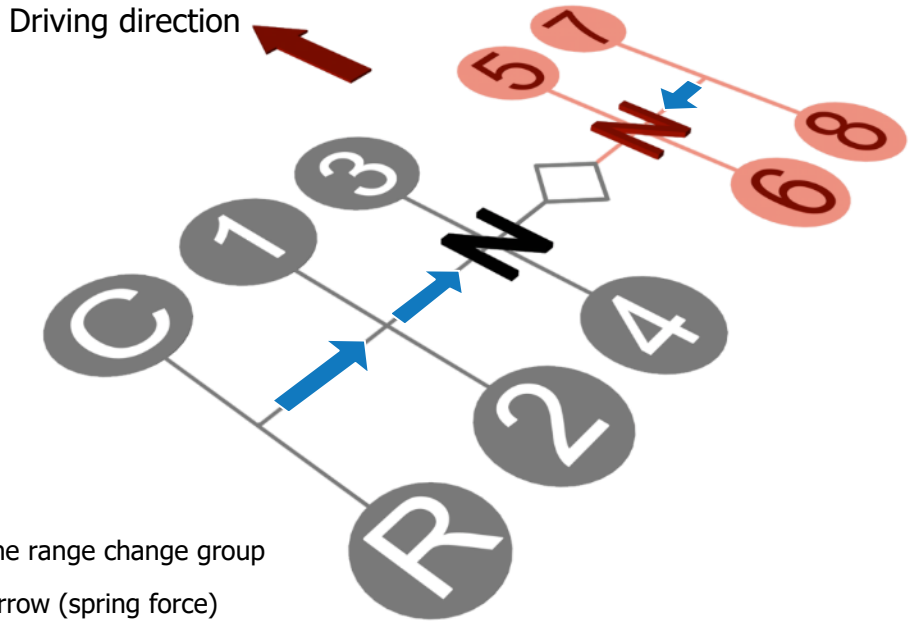
Clutch pedal

Brake pedal

Tachometer

Shifting
Double H Shift Pattern

The different levels of spring force provide good orientation within the shift pattern



Range change group:

- High
- Low
- **N** = Neutral position
- ◇ = Automatic changeover of the range change group
- → = Resistance in direction of arrow (spring force)

PTOs and Their Application




	NH/1	NH/4	N.../10	N.../PL
Performance	high	medium	high	
Short-term operation		●		
Continuous duty	●		●	●
Speed	low	medium	low / high	
Drive	Clutch-dependent			Drive-dependent
Bulk and tank trucks			●	
Dump trucks	●	●		
Loading crane	●	●		
Concrete mixers / concrete pumps			●	
Fire services			●	
Articulated mast	●	●		
Waste collection vehicles			●	
Street and drain-cleaning vehicles			●	
Truck crane			●	●
Emergency pump of dual circuit steering system				●

PTOs for Ecomid

N…/1

N…/4

N…/10

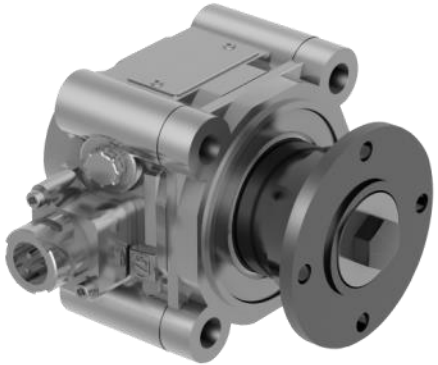
N…/PL

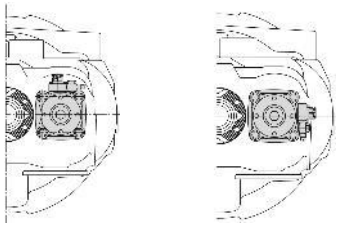
Power take-off			Permissible torque	9 S 910 TD 9 S 1110 TD 9 S 1310 TD	9 S 1110 TO 9 S 1310 TO 9 S 1510 TO
				12.73 – 1.0	9.48 – 0.75
Typ			Nm	Factor f[1)]	
NH/1			800	0.72	0.97
NH/4			430	0.92	1.24
N109/10	„C"		410 – 630	0.88 – 1.42	1.19 – 1.90
	„D"	NL/1	600	0.72	0.97
		NL/4	430	0.92	1.24
N 109 PL			-	Factor g = 1.85[2)]	

PTO Program for Ecomid

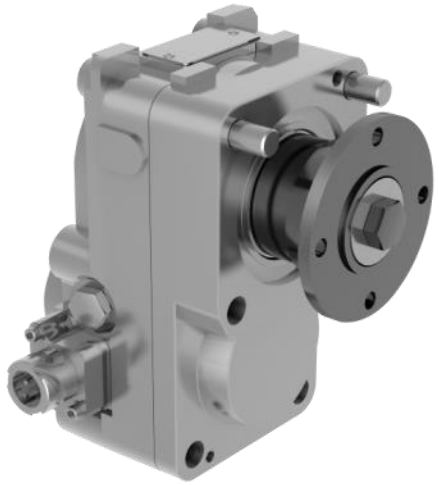
	Transmission designation	PTO type	Output point	Output torque Nm	Speed factor		Direction of rotation		Driven by			Operating mode	
					"f"[1)]	"g"	counter-engine-wise	engine-wise	clutch dependent	engine dependent	drive dependent	Continuous operation	Short-term operation
Ecomid	9 S 1110 TO 9 S 1310 TO 9 S 1510 TO	NH/1		800	0.97	-	o	-	o	-	-	o	-
		NH/4		430	1.24	-	-	o	o	-	-	-	o
		N 109/10	C	410 – 630	1.19 – 1.90	-	-	o	o	-	-	o	-
			D: NL/1	600	0.97	-	o	-	o	-	-	o	-
			D: NL/4	430	1.24	-	-	o	o	-	-	-	o
		N 109 PL		-	-	1.85	-	o	-	-	o	o	-
	9 S 910 TD 9 S 1110 TD 9 S 1310 TD	NH/1		800	0.72	-	o	-	o	-	-	o	-
		NH/4		430	0.92	-	-	o	o	-	-	-	o
		N 109/10	C	410 – 630	0.88 – 1.42	-	-	o	o	-	-	o	-
			D: NL/1	600	0.72	-	o	-	o	-	-	o	-
			D: NL/4	430	0.92	-	-	o	o	-	-	-	o
		N 109 PL		-	-	1.85	-	o	-	-	o	o	-

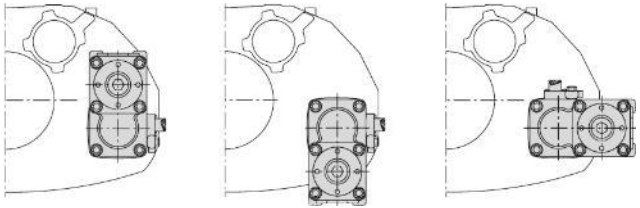
Ecomid
Clutch-Dependent PTO



ZF NL/1 and NH/1 PTOs with integrated shift cylinder	
For driving:	Hydraulic pumps for example
Design:	**b** = with output flange
	c = for direct pump attachment
Operating mode:	Continuous operation
Axle offset:	Without (center of countershaft)
Possible installation positions:	
Output torque:	NL/1 max. 600 Nm
	NH/1 max. 800 Nm

Ecomid
Clutch-Dependent PTO



ZF NL/4 and NH/4 PTOs with integrated shift cylinder	
For driving:	Hydraulic pumps for example
Design:	**b** = with output flange
	c = for direct pump attachment
Operating mode:	Short-term operation
Axle offset:	80 mm
Possible installation positions:	
Output torque:	NL/4 and NH/4 = 430 Nm