VARIABLE
DRIVE
SYSTEMS

Infinitely Variable Transmissions

Power Split Systems

Electric Drives

Your Partner for
Innovative Drive Technology

www.vds-getriebe.at

TERMINOLOGY / TRANSMISSION CONFIGURATION

ABBREVIATIONS

IVT: infinitely variable transmission

CVT: continuously variable transmission

VTP: variable twin planet

VPD: variable power divider

eGB: Reduction Gearbox for electric drive

eDU: Electric drive unit (Gearbox + electric motor)

eAD: Axle drive (Gearbox from E-motor to wheel drive shaft flanges including differential)

eADU: Electric axle drive unit (axle drive including E-motor)

POWERSPLIT SYSTEM - HYDROSTATIC VARIATOR

H1F: hydrostatic range + one powersplit range forward

H2F: hydrostatic range + two powersplit ranges forward

1RH1F: one powersplit range reverse + hydrostatic range + one powersplit range forward

1RH2F: one powersplit range reverse + hydrostatic range + two powersplit ranges forward

HL: high/low ranges available

POWERSPLIT SYSTEM - ELECTRIC VARIATOR

E1F: electric range + one powersplit range forward

E2F: electric range + two powersplit ranges forward

1RE1F: one powersplit range reverse + electric range + one powersplit range forward

1RE2F: one powersplit range reverse + electric range + two powersplit ranges forward

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VPD - VARIABLE POWER DIVIDER

ELECTRIC DRIVES AND AXLE DRIVE UNITS

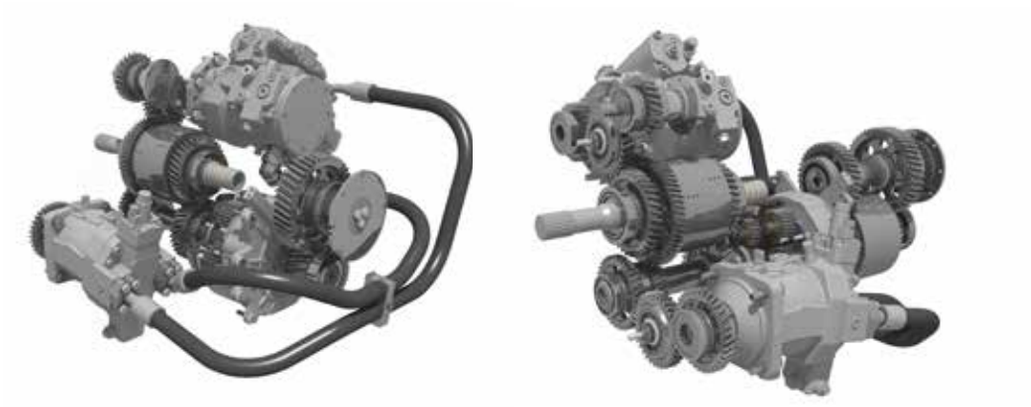
1. Comparison of Transmission Functions
MT/AMT – AT – IVT/CVT

Manual or automated manual transmission (MT/AMT)	Automatic transmission (AT)	Infinitely/Continuously variable transmission (IVT/CVT)
Vehicle start by slipping clutch - clutch wear - danger of clutch burning under heavy conditions - danger of engine stalling	**Vehicle start and operation at low speed in „torque converter mode“** - significant losses at low speed - large radiators required	**Smooth vehicle start up even at very low engine speed** ✓
Torque and drive interruptions during shifting - hard to shift gears at eava conditions (full load, uphill) - danger of exceeding backshifts limits when driving downhill	**Drawbar pull is achieved by speed difference in TC pump and turbine wheel** - high engine speed required to start the vehicle - output speed is hard to control at varying load conditions	**Continuous control of output torque and output speed** ✓
Creeper gears required to operate at low speed	**Difficult to operate the vehicle at very low speed or when the vehicle creeps forward**	**Very accurate control of vehicle speed due to direct relation among engine speed and vehicle speed** ✓
Skilled and experienced drivers required to operate vehicles under difficult conditions or in stressful situations	**Overheating when operated in torque converter mode**	**Permanent connection from engine to drive wheels when driving uphill as well as downhill** ✓
Dynamic loads in drivetrain due to shiftings and clutch engagement	**Poor engine brake capability in „pushing operation“ (downhill, deceleration)**	**No torque inconsistancies or interruptions during acceleration and deceleration** ✓
		Combustion engine can be used to slow down the vehicle until standstill even without activation the brake ✓
		No overheating, no clutch burning ✓
		Full engine power available at all driving conditions (kick-down function) ✓
		ECO-mode available by lugging down the engine to most fuel efficient conditions ✓

2. VTP - Variable Twin Planet
TRANSMISSION

A breakthrough in infinitely variable transmission technology

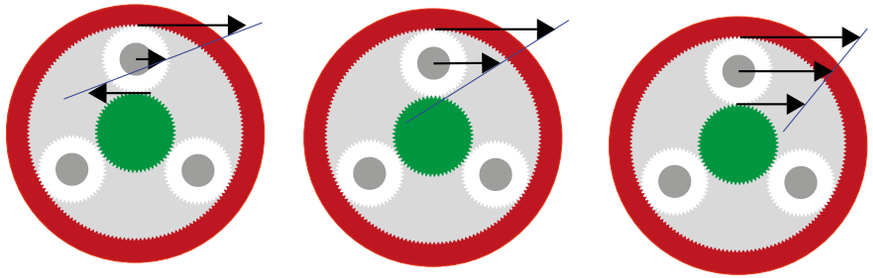
Hydro-mechanical or electric-mechanical powersplit solution maximizing the advantages of both hydrostatic/electric and mechanical power transfer patented planetary system combined with a closed-loop variator system. Always in the „perfect gear“ for peak operating performance and efficiency. Vehicle speed decoupled from engine speed. Reduced environmental impact. Reduced operating cost.



VTP System – Variable Twin Planet

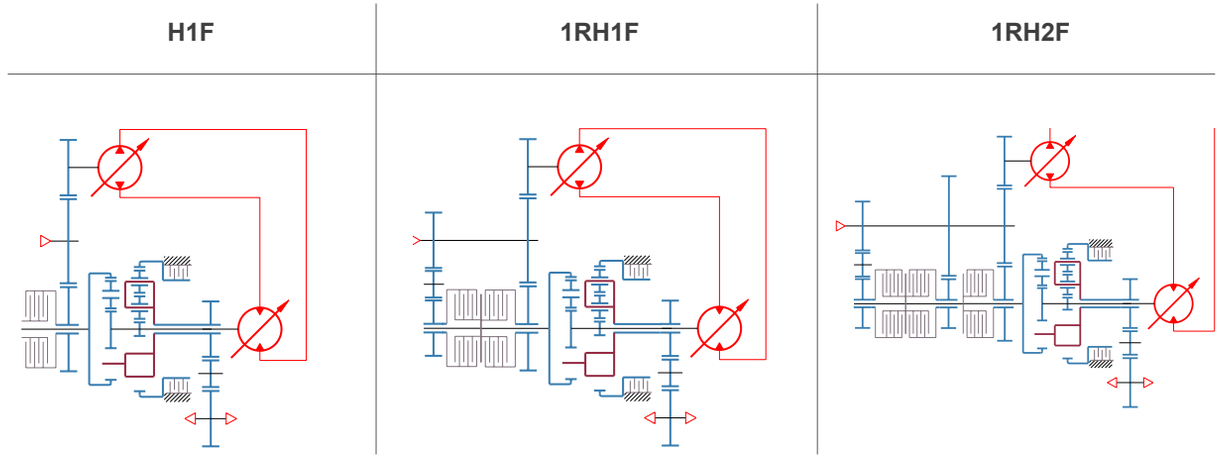
How it works

The variable twin planet (VTP) system defines a new series of infinitely variable transmissions (IVT) operating on the principle of hydrostatic-mechanical or electric-mechanical power split.
To achieve high gradeability and drawbar pull with reasonable variator sizes, the transmission can be configured with one, two or three mechanical gear ranges shifted by powershift clutches.



Ring gear: Input mechanical power
Sun gear: Driven by variator or hydrostatic or electric power
Carrier: Variable output speed

2.1. VTP System - Variable Twin Planet
WORKING PRINCIPLE AND FUNCTIONAL DESCRIPTION



System and functional description

The core element of the novel VTP stepless transmission is a twin planetary gear set at transmission output. One of the two planetary gear sets is a reverse planetary gear set and is active only at low speed in pure variator operation (gear set 2), while the superposition of mechanical and variator-power occurs in the planetary gear set 1.

The selected arrangement and the gear ratios in the two planetary gear sets provide excellent gradeability with small variator dimensions as well as large gear spread with low mechanical effort.

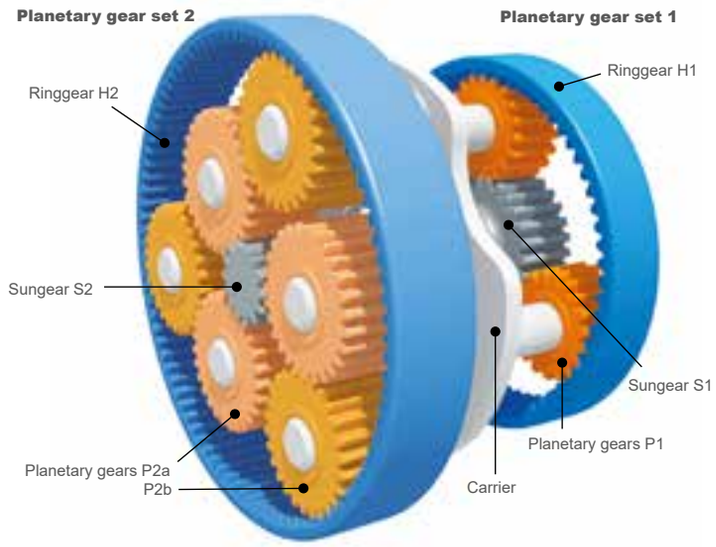
Variators like compact hydro units in back-to-back arrangement, separate hydropumps and hydromotors in a closed cycle or electric variators can be used.

At low speeds, the vehicle is powered only by the hydrostatic power branch. Connection of ring gear H2 with the housing in planetary gear set 2 transfers power from the hydromotor via sun gear S2 and the planet carrier to the drive wheels (see figure page 6). The transmission components in the mechanical power transmission path do not transfer any load in this operation range. Their rotational speeds at the drive end are defined by their coupling in planet gear set 1 and at the input side through coupling to the transmission input shaft. Planet gear set 2 has got a high gear ratio to achieve high pull forces with small hydrostatic units.

The rotational motion of sun gears S1 and S2 or of the planet carrier forces a speed at ring gear H1 that leads to synchronous rotational speeds on adequately high rotational speed of the sun gears at couplings K1 on forward travel or at coupling KR on backward travel.

On reaching synchronous speed, the system shifts from hydrostatic drive to the continuous power branch without interruption of the output torque and corresponding pulling force. Switching occurs via overlapping of the closing of the respective coupling and subsequent opening of the ring gear brake. The couplings and brakes are multiple disk models.

WORKING PRINCIPLE AND FUNCTIONAL DESCRIPTION



After shifting, the mechanical drive is transferred via ring gear H1, which is coupled to the transmission input shaft and rotates at a constant speed. Continuous change of the speed of the hydrostatic branch steplessly adapts the overall gear ratio.

Immediately after shifting to the powersplit range, the sun gear in the planetary gear set 1 rotates opposite to the ring gear and thereby reduces the speed of the planet carrier. In this operation range, the transmission functions at reverse power, which means that the hydromotor works as a pump and returns to the mechanical branch via the hydrostatic circuit. On a change of the pivot angle hydropump swash plate, the speed of the hydromotor is adapted from maximum speed against the direction of the ring gear via swash plate angle zero to the maximum speed in the same direction as ring gear H1.
On swash plate angle zero, the transmission operates at maximum efficiency because the complete drive power is transferred purely mechanically. The hydromotor must deliver only the power loss to support the torque of sun gear S1 at zero speed.

On further adjustment of the swash plate, the speed of sun gear S1 is increased in the same direction as ring gear H1 until maximum travel speed in the first powersplit range is reached. Switching from the first to the second powersplit range occurs via a power shift with the variator unit compensating the step. On this special shifting function, the overlapping shifting of couplings K1 and K2 forces a continuous increase of speed on ring gear H1; during acceleration of the ring gear, the adaptation of the speed of the sun gear enables maintaining a constant overall gear ratio or adapting it to the respective operating conditions. On completion of the shift, the gear ratio in the second powersplit range is nearly the same as before shifting out of the first. This process enables stepless adjustment of the gear ratio in two powersplit ranges with high overall gear spread.

The gear ratio in planetary gear set 1 is significantly lower than in planetary gear set 2 in order to achieve high gear spread in the powersplit areas and also to keep the pressure level in the hydrostatic circuit within a range where the hydropump and the hydromotor can work with good efficiency.

2.1. VTP System - Variable Twin Planet
WORKING PRINCIPLE AND FUNCTIONAL DESCRIPTION

Figure A

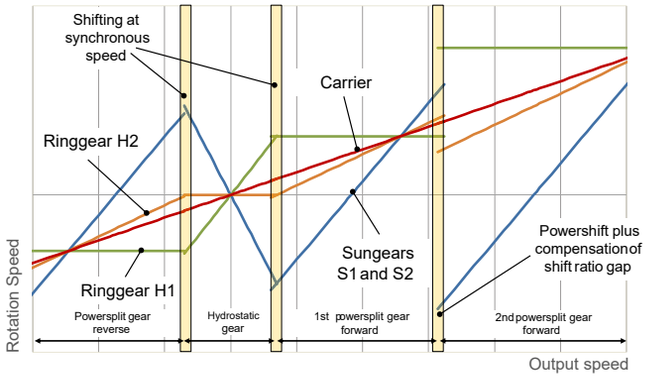


Figure B

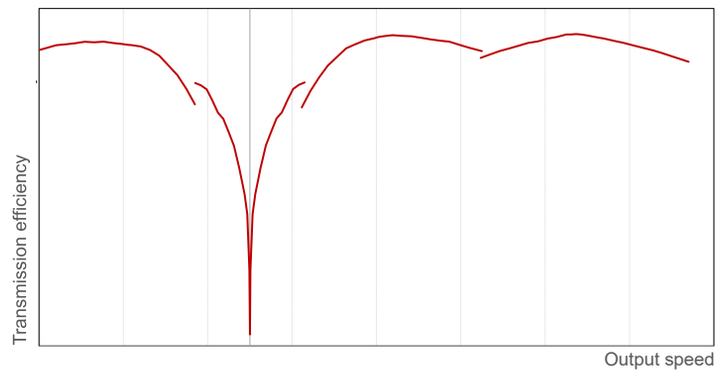


Figure A - depicts the rotational speed relationship in a VTP transmission with a pure hydrostatic travel area at low speed and two powersplit ranges for forward travel and one powersplit range for reverse travel.

Figure B - shows the efficiency characteristic versus the travel speed at constant input rotational speed. Notable are the characteristic camel backs at the center of the powersplit ranges, where the complete drive power is transferred purely mechanically and the transmission provides the best efficiency.

Benefits

Fully automated drivetrain

Hydro-mechanical solution maximizing the advantages of both hydrostatic and mechanical elements. Patented planetary system combined with a closed loop hydrostatic variator. Always in the „perfect gear“ for peak operating efficiency. Vehicle speed decoupled from engine and implement speed.

Significant improvement in safety and mobility

Permanent torque flow between engine and wheels when driving uphill as well as downhill due to continuous control of output torque and output speed. Combustion engine can be used to slow down the vehicle until standstill even without activating the brake - no brake overheating. Smooth vehicle start up at very low engine speed possible.

Drivetrain protection and optimized performance

-> No engine overspeeding
-> No overheating
-> No clutch burning
-> No engine stalling
-> Engine operated in optimum conditions
-> Kick-down function to achieve maximum vehicle acceleration

Best driving comfort

No torque inconsistencies or interruptions during acceleration and deceleration. Fully-automated drivetrain. High vehicle speed at low engine speed.
Cruise control integrated.

Applications

Agric tractors - Municipal Vehicles - High Mobility Vehicles - Forestry machines - Telehandler - Sweepers - RoRo trucks - Garbage collectors - City buses

2.2. OVERVIEW AGRIC TRACTORS / FORESTRY

Engine Power	kW	80	100	120	140	160	180	200	220	240
	hp	109	136	163	190	218	245	272	299	326

VTP500
7,5 t / 500 Nm

VTP800
10,5 t / 800 Nm

VTP1050
12 t / 1050 Nm

VTP1100
14 t / 1100 Nm

VTP1400
18 t / 1400 Nm

VTP1400
18 t / 1400 Nm

VTP Rigid Body Vehicles
2.2.1 AGRIC TRACTOR TRANSMISSIONS

Transmission configuration	VTP500 1RH2F	VTP800 1RH2F - HL	VTP1100 1RH2F - HL	VTP1400 1RH2F - HL
	1 powersplit gear rev - hydrostatic rev/fwd - 2 powersplit gears fwd	1 powersplit gear rev - hydrostatic rev/fwd - 2 powersplit gears fwd high-low range gear		
Rated input power	100 kW (135 hp)	120 kW (170 hp)	180 kW (240 hp)	250 kW (340 hp)
Rated input speed	2300 rpm	2200 rpm	2100 rpm	2100 rpm
Max input torque	500 Nm	800 Nm	1100 Nm	1400 Nm
Max output torque	1550 Nm	3200 Nm	4450 Nm	3800 Nm
Transmission ratios	rev -0,82 to ∞ / fwd ∞ to 0,43	rev -0,84 to -∞ / fwd ∞ to 0,48	rev -0,75 to ∞ / fwd ∞ to 0,42	rev -0,55 to ∞ / fwd ∞ to 0,31
Control unit	Bosch RC30 / RC40			
Electronic interface	CAN-J1939			
GVW	7 t	10,5 t	14 t	18 t

2.3.1 AGRIC TRACTOR TRANSAXELS

Transaxels configuration	VTP1050 1RH2F - HL	VTP1400 1RH2F - HL
	1 powersplit gear rev - hydrostatic rev/fwd - 2 powersplit gears fwd, high-low range gear	
Rated input power	160 kW (220 hp)	250 kW (340 hp)
Rated input speed	2200 rpm	2100 Nm
Max input torque	1050 Nm	1400 Nm
Max axle torque	97 kNm	150 kNm
Wheel speed -/+	-116 rpm / +151 rpm	-90 rpm / +170 rpm
Static tire radius (SRI)	887 mm	1025 mm
Control unit	Bosch RC30 / RC40	
Electronic interface	CAN-J1939	
Differential lock	friction disks	
PTO speeds	540E / 1000 / 1000E 540 / 540E / 1000	
Lift capacity	11 t	12,5 t
GVW	12 t	18 t

VTP Frame Vehicles

2.3 OVERVIEW HIGH MOBILITY / MUNICIPAL / SWEEPER / CONSTRUCTION

Engine Power	kW	100	130	160	190	220	250	280	310	340	370	400
	hp	136	177	218	258	299	340	381	422	462	503	544

VTP550
550 Nm

VTP450
450 Nm

eVTP450
450 Nm

High Mobility
Municipal

VTP800
800 Nm

High Mobility
Municipal
Light Sweeper
Fire & Rescue
Light Truck

VTP1250
1250 Nm

High Mobility
Municipal
Sweeper
Fire & Rescue

VTP1750
1750 Nm

Municipal
High Mobility
Fire & Rescue

VTP2050
2050 Nm

High Mobility
Fire & Rescue
Oil field Mining

VRP2650
2650 Nm

Agriculture
Wheel Loader
Construction
Forestry

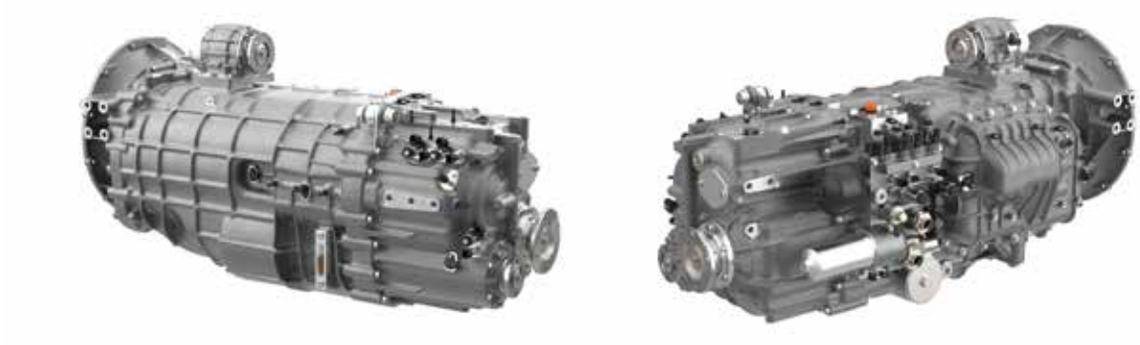
2.3.1 VTP450/550 HIGH MOBILITY / MUNICIPAL

Transmission configuration	VTP450 H2F - 4WD	VTP450 H2F - 4WD	VTP550 H2F - 2WD	VTP550 H2F - 4WD
	hydrostatic rev/fwd - 2 powersplit gears fwd / 4 wheel drive - bottom	hydrostatic rev/fwd - 2 powersplit gears fwd / 4 wheel drive - side	hydrostatic rev/fwd - 2 powersplit gears fwd / 4 wheel drive	1 powersplit gear rev - hydrostatic rev/fwd - 2 powersplit gears fwd / 4 wheel drive

Rated input power	170 kW (215 hp)		110 - 125 kW (150 - 170 hp)	
Rated input speed	up to 3800 rpm		up to 3600 rpm	
Rated input torque	500 Nm		500 Nm	
Max output torque	2000 Nm		2600 Nm	
Transmission ratios	rev -6,0 to ∞ / fwd ∞ to 0,77		rev -4,28 to ∞ / fwd ∞ to 0,64	
Control Unit	Bosch RC30 / RC40			
Electronic interface	CAN-J1939			
Engine flange	SAE4		SAE4 / SAE3	
Differential	4WD - 50/50			4WD - 50/50
Differential lock	mechanical diff lock			mechanical diff lock
PTO speed (Option)	PTO as drive through		PTO as drive through and/or at 2 o'clock position	
Dry weight	195 kg		190 kg	201 kg

VTP Frame Vehicles

2.3.2 VTP1250 SWEEPER / MUNICIPAL / HIGH MOBILITY



Transmission configuration	VTP1250 H2F - HL
	hydrostatic rev/fwd - 2 powersplit gears fwd - high/low range gear
Rated input power	215 kW (290 hp)
Rated input speed	2100 rpm
Max input torque	1250 Nm
Max output torque	6500 Nm
Transmission ratios	rev -4,0 to ∞ / fwd ∞ to 0,756
Control Unit	Bosch RC30 / RC40
Electronic interface	CAN-J1939
Engine flange	SAE1
PTO 1 (Option)	12 o‘clock / i = 0,97 max 800 Nm - to propshaft or pump drive
PTO 2 (Option)	i = 1,0 drive through max 800 Nm
PTO 3 (Option)	7 o‘clock / i = 0,92 / max 600 Nm

2.3.3 VTP1750 VARIOUS APPLICATIONS

Transmission configuration	VTP1750 H2F	VTP1750 1RH1F
	hydrostatic rev/fwd - 2 powersplit gears fwd	1 powersplit gear rev - hydrostatic rev/fwd - 1 powersplit gear fwd
Rated input power	300 kW (408 hp)	
Rated input speed	2000 rpm to 2300 rpm	
Max input torque	1750 Nm	
Max output torque	8800 Nm	
Transmission ratios	rev -3,95 to ∞ / fwd ∞ to 0,787	rev -1,42 to ∞ / fwd ∞ to 1,42
Control Unit	Bosch RC30	
Electronic interface	CAN-J1939	
Engine flange	SAE2	
PTO 1 (Option)	PTO 1 output at 12 o'clock / i = 0,694 / 950 Nm	
PTO 2 (Option)	PTO 2 output at 1 o'clock as pump drive through / i = 0,694 / 950 Nm	
Dry weight	490 kg	497 kg

VTP Frame Vehicles

2.3.4 VTP2450 HIGH MOBILITY / CONSTRUCTION

Transmission configuration	VTP2050 H2F - HL	VRP2650 3R3F
	hydrostatic rev/fwd - 2 powersplit gears fwd / high-low range gears	3 powersplit gears rev and 3 powersplit gears fwd
Rated input power	340 kW (460 hp)	400 kW (540 hp)
Rated input speed	2200 rpm	1700 rpm
Max input torque	2050 Nm	2650 Nm
Max output torque	12000 Nm	6650 Nm
Transmission ratios	rev -3,78 to ∞ / fwd ∞ to 0,49	rev -0,412 to ∞ / fwd ∞ to 0,4
Control unit	Bosch RC30 / RC40	Bosch Bodas Series RC40
Electronic interface	CAN-J1939	
Engine flange	SAE 2	SAE 1
Further options	PTO / Pump drives	

2.3.5 eVTP500 ELECTRIC VARIATOR MUNICIPAL

Version E2F
Electric variator integrated into transmission housing

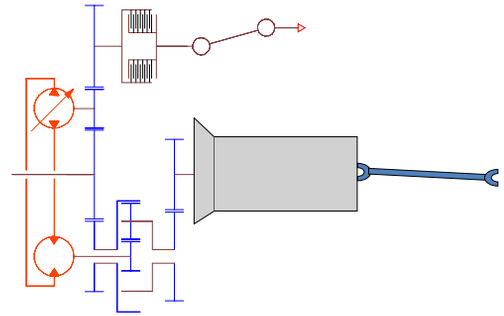
Additional functions

- Energy recuperation at breaking
- Provide electric power for implements, also at standstill
- Emission free operation in pure electric drive mode (depending on installed battery capacity)
- Electric power boost

Transmission configuration	eVTP500 E2F - 4WD
	electric rev/fwd - 2 powersplit gears fwd / 4 wheel drive
Rated input power	110 - 125 kW (150 - 170 hp)
Rated input speed	up to 3600 rpm
Rated input torque	500 Nm
Max output torque	2600 Nm
Transmission ratios	rev -5,47 to ∞ / fwd ∞ to 0,89
Generator/E-motor	Nominal power 40 kW / 400 V
Control Unit	Bosch RC30
Electronic interface	CAN-J1939
Engine flange	SAE4
Differential	50/50
Differential lock	mechanical diff lock
PTO speeds (Option)	PTO as drive through

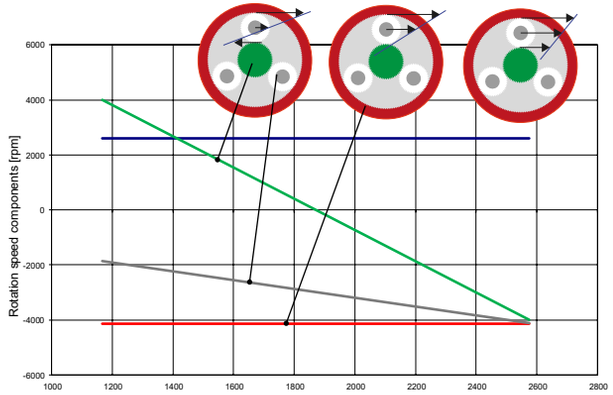
VARIABLE POWER DIVIDER
3. VPD FUNCTIONAL DESCRIPTION

The Variable Power Divider VPD
is a transmission module installed between the combustion engine and the standard transmission of a vehicle powertrain. The purpose of the design is to enable driving at various speeds, while the PTO is being driven with a constant speed to power auxiliaries. By using the functional principle of hydrostatic– mechanical powersplit it provides variable output speed to the standard transmisson while keeping the PTO at optimum operating conditions. So VDP eliminates the need for a second, „pony“, engine to drive implements. VPD expands your standard driveline to a infinitely variable driveline.

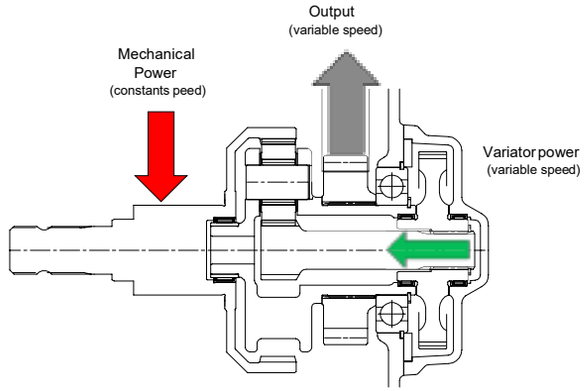


Functionalities

Drive mode: The engine to transmission drive ratio remains at a defined ratio at all times in this mode. The accelerator pedal functions normally and its position can be used for shift modulation as usual. Speed increase from engine to transmission input may help to reduce torque in the main transmission if requested.



Work Mode: The engine speed is being controlled via a turn knob in the dashboard. The VPD control unit controls the engine speed. The accelerator pedal controls the engine to transmission drive ratio, and thus influences the vehicle speed proportionally. VPD expands your standard driveline to a infinitely variable driveline.



Benefits

- Wear-free variator system
- All functions controlled electronically
- Very easy to operate
- Less driver training needed - cost advantage
- Higher work output by optimal driving speed adaptation to implement work condition
- Fully automatic transition from drive-mode to work- mode and back
- Best efficiency due to small hydros
- „Overdrive-function“ available to reduce input torque to standard transmission
- Stepless control of vehicle speed while keeping the engine and PTO speed constant

3.1 VARIABLE POWER DIVIDER VPD2500

Transmission configuration	VPD2500
Rated input power	200 kW (270 hp)
Rated input speed	2600 rpm
Rated input torque	800 Nm
Transmission ratios	2,23 to 1,01
Control unit	Bosch RC30
Electronic interface	CAN-J1939
Flange to engine	SAE3
Flange to transmission	SAE3
PTO ratio	i = 0,71
PTO power	100 kW (136 hp)

4. ELECTRIC AXLE DRIVES AND AXLE DRIVE UNITS

electric Axle Drive Unit - Bosch

electric Axle Drive Units - Aradex

Gearbox / drive unit	eAD160	eADUB160	eADUA-VM600	eADUA-VM616
Maximum input power	90 kW	90 kW	120 kW / 200 kW	100 kW / 160 kW
Maximum input speed	12800 rpm	12800 rpm	7200 rpm	5800 rpm
Maximum input torque	160 Nm	160 Nm	320 Nm	320 Nm
Continuous input power	60 kW	60 kW	65 kW / 69 kW	48 kW / 70 kW
Continuous input torque	95 Nm	95 Nm	220 Nm	180 Nm
Transmission ratios	23,9			
	18,2		15	
	15			
Maximum axle torque	3800 / 2900 / 2400 Nm	3800 / 2900 / 2400 Nm	4800 Nm	4800 Nm
Maximum wheel speed	530 / 700 / 850 rpm	530 / 700 / 850 rpm	480 rpm	387 rpm
Dry weight	70 kg	102 kg	149 kg	179 kg
Electric drive unit		Bosch SMG180	Aradex VM600-18W0040	Aradex VM616-18W0044
Voltage		400 V	400 V / 670 V	400 V / 670 V
Brake	Friction brake included / spring engaged - pressure released			

5. REDUCTION GEARBOXES AND ELECTRIC DRIVE UNITS

eGB650

eGB1100

e2GB800

eDUL100

Gearbox / drive unit	eGB650	eDUA650	eGB1100	eDUA1100	e2GB800	eDUL100
Maximum input power	160 kW	110 kW / 205 kW	240 kW	162 kW / 280 kW	2 x 60 kW	2 x 51 kW
Maximum input speed	7500 rpm	6500 rpm	7500 rpm	4500 rpm	6000 rpm	5000 rpm
Maximum input torque	650 Nm	650 Nm	1100 Nm	1100 Nm	2 x 400 Nm	2 x 350 Nm
Rated input power	140 kW	92 kW / 116 kW	160 kW	98 kW / 135 kW	2 x 35 kW	2 x 29 kW
Rated input torque	450 Nm	390 Nm	650 Nm	580 Nm	2 x 250 Nm	2 x 200 Nm
Transmission ratio	2,1	2,1	3,1	3,1	2,3	2,3
Maximum output speed	3570 rpm	3090 rpm	2420 rpm	1450 rpm	2600 rpm	2160 rpm
Maximum output torque	1360 Nm	1360 Nm	3400 Nm	3400 Nm	1800 Nm	1600 rpm
Dry weight	42 kg	151 kg	57 kg	208 kg	127 kg	320 kg
Electric drive unit		Aradex		Aradex		2 x Linde/eMotion
		VM600-18W0073		VM616-18W0120		2 x EDM-160LL200
Voltage		400 V / 670 V		400 V / 670 V		90 V
Options	disk brake	disk brake				

VDS GETRIEBE GMBH + VDS DRIVELINE GMBH

VDS is a high-tech company based in Wolfern in Upper Austria. The company specialises in the development and production of innovative drive systems for working machines, municipal applications, construction machinery and high-terrain vehicles.

The engineering services range from concept development to series transfer and series production. At the customer's request, complete drive systems for special applications and requirements are planned and implemented.

A team of specialists, well experienced in developing IVTs from conceptual studies to mass production, works out innovative solutions in latest driveline technology. In addition to engineering services, VDS supplies powersplit components up to complete IVT systems for niche markets.

Don't hesitate to get in touch with VDS to find a solution for your specific driveline request:

VDS Getriebe GmbH + VDS Driveline GmbH

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Impressum

VDS STANDS FOR

CREATIVE SPIRIT AND PLANNING

Our continuous drive systems are a combination of mechanics, hydraulics, hydrostatics, electronics and the **know-how** to produce our final product. Skillfully we combine our energy-efficient drive systems. Our key factors are enthusiasm and success.

DETAILING

Our ideas bring us alsways further. We will modify and verify to achieve optimal results. Our employees in the control systems are all trained in electrical engineering, mechatronics and software development. They are also professionals in creativity and process a spirit of enthusiasm and motivation. You will be captured by their team spirit.

PROTOTYPING

The construction of prototypes is divided into several phases such as casting, machining tools, weight, strength and resistance and other properties. We not only create reproducible, resilient results, we improve them also and document the process. This is what high-tech transmission construction looks like at **VDS.**

TECHNICAL VALIDATION

Each gearbox designed by VDS is subjected to experimental validation. The parts in the design are purchased by VDS or the customer and assembled by VDS. All tests, whether endurance, vehicle or functional will be documented in every phase.

MASS PRODUCTION

Series production: From concept to production we discovered how important series production is, so in the year 2018 we decided to found VDS Driveline GmbH. This way we can respond to our customers - using our own company structure in Wolfern. We specialize in small and medium production volumes of transmissions and transmission components, pumps and other assemblies around the **VDS drive system**.

CUSTOMER SUPPORT & AFTER SALES

We know how important it is - good communication and cooperation during the development and production process. Long-term development of partnerships with common goals is our number **one priority.** Our gearboxes stand for quality and so do we. We look for safety and a smooth ride into the futue.
Where challenges begin VDS takes you further.

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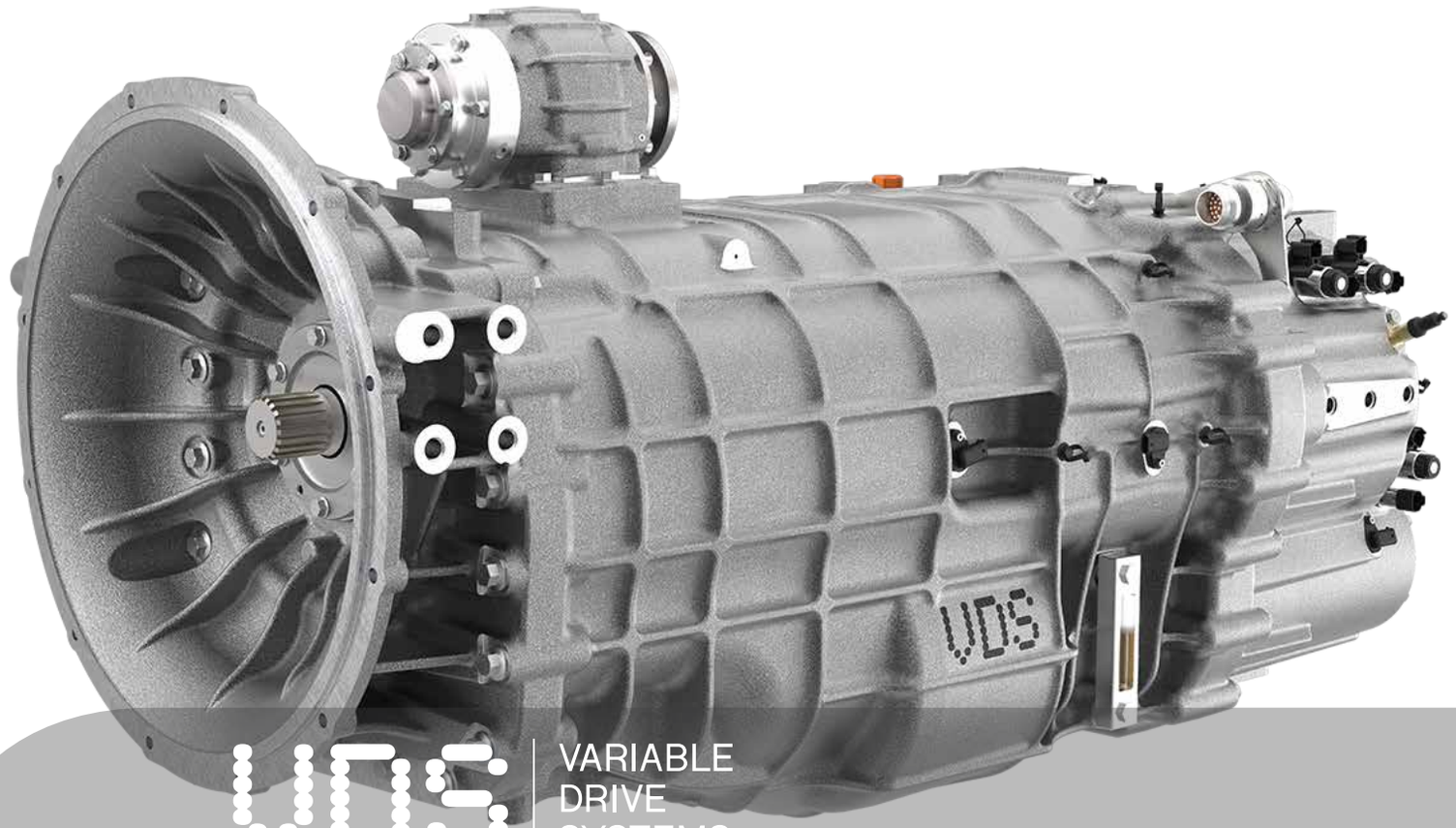

VDS VARIABLE DRIVE SYSTEMS

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