

Tractor test: Fendt 312 Vario

Give it up for Fendt...

... which has so wholeheartedly embraced continuously variable transmission technology that all bar its little 200-series tractors are now sold as stepless models. At the bottom end of the hp scale, the 300 tractor range is the latest Fendt product to adopt CVT-style operation, and here we test the line's tidily packaged flagship – the 81kW/110hp rated (ECE R24) 312 Vario unit

Even though the Fendt 300 series has traditionally sold by the bucketful in the company's native Germany, this degree of popularity has never quite transferred itself across the Channel to the UK.

There's an extremely simple reason for this trend. And – surprise, surprise – that reason is 'price'. For although the Fendt brand has long enjoyed a reputation for residing at the upper end of the price tag spectrum, it's reasonable to suggest that these premium green products become more competitive the higher up the hp scale the potential purchaser scans. Over the past five or so years, the 180hp 818 and 300hp 930 have been the marque's top UK sellers, and today it remains a similar story with the current 190hp 820 and 330hp 936 models again heading up the Fendt sales charts.

So, where does that leave the little 300? The reality is that in the semi-powershift format there is so much competition in the 100hp sector that the conventional Fendt offering, the 300 Ci, tends to get lost within the collective crowd. Yet with the addition of the Vario gearbox, the brand once again sets itself apart in this tractor class – hence our test here on the 81kW/110hp rated (ECE R24) 312 model, which is reckoned to top out at a 92kW/125hp maximum. Transmission in question is the Vario ML75 unit.

On to the detail, then. Starting with the engine, all Vario 300 models are powered by a 4-litre, four-cylinder Deutz TCD 2012 L-4V engine, complete with four valves per cylinder, common-rail fuel injection, electronic engine control and external exhaust recirculation. The compact Deutz

motor complies with Tier IIIa standards, too, so we were understandably keen to discover how it would fare at the DLG test station in terms of both its output and its overall fuel consumption.

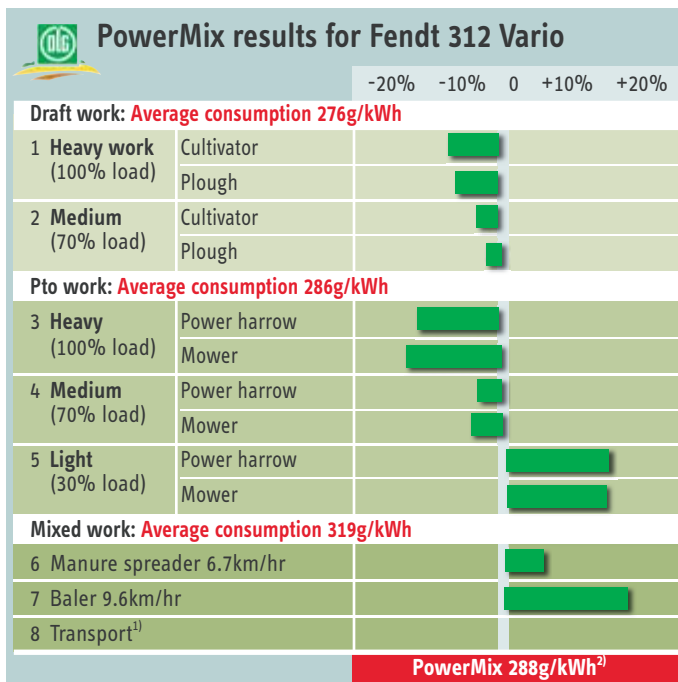
On the former, a pto output of 78.4kW at rated speed and a maximum of 84.8kW at 1,800rpm are impressive results and reasonably close to the manufacturer's ECE R24 statistics at the flywheel; 'rated' is only fractionally below, while the max output figure is under by about 8%.

And much the same applies to the 312's fuel guzzle. Returns of 245g/kWh at rated speed, 227g/kWh at maximum output and a PowerMix result of 288g/kWh confer benchmark status on the little Fendt in this particular horsepower category, and that even includes when assessed alongside models still running at the old Tier II emissions standard.

As it turns out we have hit upon the 312's top trumps right at the start of this test, because the transmission comes out as a major strong point, too. Unlike other Vario incarnations, the 312 version is blissfully simple to operate, comprising just the one stubby lever that enables the driver to increase travel progress from 30m/hr all the way up to a relaxed 40km/hr at a reduced engine speed of 1,750rpm. There are no travel ranges to confuse, making this arguably the first Fendt CVT that can justifiably be termed a 'jump on and go' tractor. Granted, there is neither a 50km/hr option nor any hint of the TMS control sophistication that are so heavily pushed on the 312's larger sibs, but then these omissions may well be seen as a positive by buyers in this sector of the market.







The PowerMix figure is shown at the bottom and is arrived at by averaging out the seven individual tests, recorded on 36 different test runs. The average data (in red) within the table indicate in which application the fuel consumption is more or less economical. Length and direction of the green bars show the degree to which the tractor deviates from its average result as it works through the PowerMix tasks.

¹⁾ The transport cycle part of the test is not measured yet. ²⁾ The rate is expressed in g/kWh and indicates average fuel consumption in grams per kilowatt hour.



The new Deutz engine complies with Tier IIIa emissions and, at the DLG test centre, delivered lower fuel consumption rates than the Tier II motors we've tested in the past. Engine and transmission are two of the 312 model's performance highlights. Photos: ST.

Assuming the lack of spec isn't an issue, our only criticism of the 312 set-up is that some of the control arrangement could be improved upon; here we're thinking particularly of the 'N' neutral button, which would be more sensibly located a little closer to the operator.

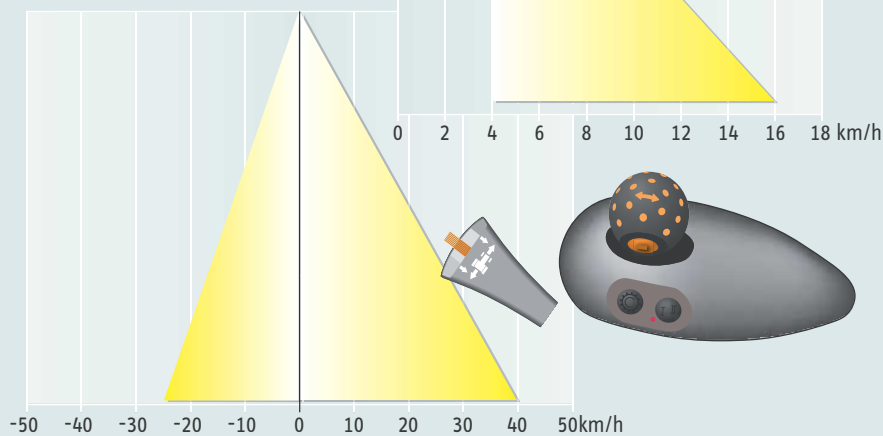
Right back at the rear, the 312 Vario is reckoned to be the first CVT tractor that can be fitted with a ground speed pto, leaving just a 1,000E setting as the only option omission. The pto speed changes arrive at the touch of a button, while the external controls on both the mudguards

receive test plus points, too. Other options in this department extend to a front pto (£2,034), and we also like the auto slurry spreading function that enables the operator to set a higher engine speed in the cab and then activate it from the ground after the pto has been engaged.

Fendt 312 Vario: The stepless ML75 gearbox has only one travel range and offers a 40km/hr forward speed and 25km/hr reverse speed. Maximum travel of 40km/hr comes in at a usefully low and economical 1,700rpm.

Infinitely variable in the main band

Stepless in forwards and reverse



Further profi tester praise goes to what's regarded by many users as the 'good old Fendt ELC system', which some of those same operators would have undoubtedly preferred to have seen retained on the 700 and 800 Varios. Why? Because it is simple to fathom and intuitive to use.

Now, however, we begin to encounter the not so impressive side of the 312. Whereas there are no complaints with the rear linkage control, there's certainly scope for Fendt to uprate the 312's lifting performance and its linkage geometry. For starters, the continuous 4,035daN lift stat ranks as below average for this hp class, and this lifting force also peaks in the mid linkage position rather than up at the top. As a result, the 312 Vario may struggle to heave big cultivator combis up to the top of its arc. That said, the 312 is arguably much better suited to a mixed farming/topwork role so, in most potential ownership situations, we suspect the

little tractor is unlikely to be bought as the prime cultivation workhorse for which, of course, a muscular lift ranks as a must. Likewise, the 312 hydraulic package receives similarly mixed tester reviews. On the plus side are the cross-gate lever, clear coupler labelling and very effective oil-drip



For a Fendt, the transmission and linkage controls are both refreshingly straightforward to fathom and operate. Golf ball-like stubby lever in the foreground works the CVT.

Fendt cab is starting to look dated in this sector of the market, and the interior noise levels under load only rate as 'average'.

Digital dash has a modern look, but it could be improved. We would like to see Fendt display more information on the middle screen.



FURTHER DETAILS from our field test

This is not a summary of overall assessments but a list of positive and less positive details

Plus

- + Practical and sturdy top link bracket on front linkage
- + Door and window opening actions have a quality feel
- + Large front mudguards
- + Clear fuel consumption indicator



+ External linkage and pto controls reside on both mudguards – the ideal solution.



+ Spool levers are clearly marked and allow precise control. Lever positioning is not the most convenient.



+ Spool couplers are easy to identify courtesy of simple colour coding that looks designed to last.

- + Cooled bottle storage box
- + Convenient ball holders on linkage
- + Decent-sized mirrors
- + Handy electric and signal sockets
- + Excellent stabilisers

Minus

- Separate heating and ventilation controls can confuse
- Steering wheel obstructs view of the digital dash



- Offside access is steep and the steps narrow. Most Fendt operators won't be tempted to take this route.



- Passenger seat restricts access through the left-hand door. It's also tricky to fold away.

- No display of worked area
- Lack of lidded stowage bins
- Left armrest is not adjustable
- No auto systems for four-wheel drive and differential lock
- LED lights on dash are too dim
- Flimsy sun blind
- Self-cancelling indicators are too quick to respond



- Cab filter access is not the easiest. There are better systems available from other manufacturers.



No complaints with linkage operation and quality of the linkage build. Lifting power, however, could do with a spec boost.

A suspended front axle (with level control) appears on the Fendt options list, as does a front linkage.

containers, whereas we're not so keen on the basic tandem gear pump set-up that represents a throwback to the old Farmer 300. With this in mind it is no surprise that the output figure comes up as a just below average 21.5kW, even though this performance should be sufficient for most tractor applications. Spools are not time-controlled, but there is mechanical flow adjustment for two valves.

Down amongst the Fendt running gear, the tractor's front axle relies on a simple self-locking differential, and there is no auto engage for four-wheel drive and diff lock. As for the brakes, at 5m/sec² they're good – in fact, almost too good because they only require a modest 50daN pedal force and have little in the way of modulation. We like the effective parking brake, though, with its intrusive beeper warning if the operator attempts to pull away with the anchor still applied.



Of the other running gear features, plus points go to steering sensitivity and the optional front axle suspension with level control (£2,386). Less impressive are the machine's nett payload – a gross weight of 7,500kg less the 5,190kg kerb weight leaves just 2,310kg of carrying capacity – while the 11.10m turn circle is no better than average for this size of tractor. Our test 312 was booted up with 480/65R24

fronts and 540/65R38 rears, its wheelbase measured 233cm, and track width was set at 186/181cm.

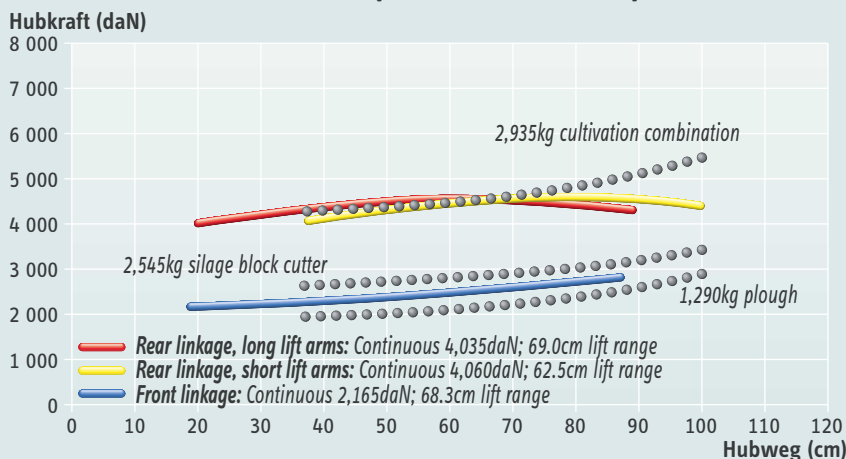
After climbing the Fendt too-vertical-for-comfort steps, the 312's operator enters a cabin that blends old with new in an intriguing manner. Stowage space is at a premium, and the twin-dial ventilation system borders on the antiquated. The passenger seat is tricky to fold up but it's comfy enough, while the large-diameter steering wheel offers a generous amount of adjustment. The only problem with this operator-friendly steering wheel is that in most positions it does an effective job of obscuring the already faintly lit LED readouts beneath. All of the above taken into account, then, the cab's 'average' test score should come as no big surprise, a mediocre result not helped by a similarly no-better-than-par recorded noise level of 75.5dB(A). Bottom line is that the little Fendt could do with undergoing the same cabin-enhancing treatment as recently meted out on its bigger 900 brothers.

On maintenance, we return to the positive. There are 210 litres of fuel capacity, and the tractor's 11 litres of engine oil only need changing at 500 hours. The 30 litres of transmission oil and 60 litres of hydraulic oil come up for a swap at 2,000 hours and 1,000 hours respectively. All maintenance points are located within easy reach.

Summary: If the ultimate test verdict on a tractor's quality depends on its engine and transmission, then the CVT Fendt 312 Vario has nothing to worry about when it comes up in front of any jury, no matter how discerning; in our test, the Deutz motor returned excellent output and fuel consumption stats, and the transmission earned praise from all of our test team as well. Countering the above considerable strengths, though, the hydraulics/linkage and cab could do with an upgrade when stacked against the current competition. What does this mean for those potential purchasers in the market for a 100-110hp model? Well, the 312 is no out-and-out draft work lugger for operating heavier mounted kit, that's for sure. Where, we suggest, the little Fendt will be most at home is with an ag business looking for a 'jack of all' – and a premium quality, robustly designed jack at that. Versatile, efficient and frugal, the 312 is a tidy and compact package that's built to clock high hours across a range of mixed farming applications.

MN, HW

Fendt 312 Vario: Lift power and lift requirement



Fendt 312 Vario: The red curve shows the recorded lift capacity (90% of maximum lift) as continuous lift power on the link ends, while the yellow curve displays the recorded lifting power with the lift rods shortened – and there isn't too much separating the two. Main difference is that the 'short arm' curve starts at 37.5cm rather than at 20.0cm. A heavy cultivator drill may cause the 312's rear linkage to struggle at the upper end of its arc.

Fendt 312 Vario

Technical data

Engine: 81kW/110hp (to ECE R24 standard) at 2,100rpm, watercooled, four-cylinder Deutz TCD 2012L4-4V engine with common-rail injection, four-valve/cyl technology, external exhaust recirculation (Tier IIIa), turbocharger and intercooler. Four-litre piston displacement; 210-litre fuel tank

Transmission: Stepless Vario ML75 gearbox. Up to 40km/hr maximum travel speed at 1,750rpm engine revs; 25km/hr in reverse. Powershuttle and cruise control

Brakes: Wet ring piston brakes, automatic 4WD engagement; hand brake is dry drum brake. Air brake and optional engine brake

Electrics: 12V battery (90Ah), 150-amp alternator. 3.0kW/4.1hp starter motor

Linkage: Cat II (switchable to III); ELC with draft link control and auto shock absorption

Hydraulics: Two gear pumps. 30 litres/min and 48 litres/min (combined), 200 bar; two double-acting and flow-controlled spool valves. Available oil for external use by towed/mounted implements is 40 litres

Pto: 540/540E/1,000 or 540/1,000/ground speed; 1 3/8in; electrohydraulic engagement

Axles and running gear: Rear planetary axle; front axle with Locomatic self-locking diff; front axle suspension system and cab suspension are options. Front test tyres 480/65 R24, rear test tyres 540/65 R38

Service and maintenance: 11 litres engine oil (500-hour intervals), 35 litres transmission oil (1,000 hours), 60 litres hydraulic oil (1,500 hours); 20-litre cooling system

Price: £57,417 excluding VAT for base spec. Front linkage adds £1,862 or £2,033, front pto £2,034 and front suspension £2,886



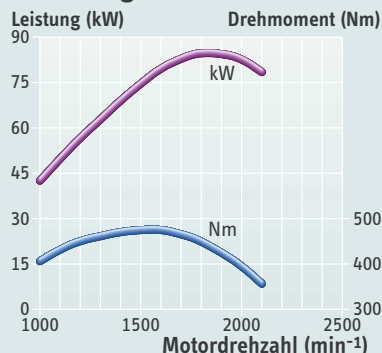
Results from the test station

Pto output:	
Maximum (at 1,800rpm)	84.8kW
At rated engine speed (2,100rpm)	78.4kW
Fuel consumption: (pto at work)	
Specific at max output	227g/kWh
Specific at rated speed	245g/kWh
Absolute max/rated speed	23.0 and 22.9l/hr
Torque:	
Max	477Nm (1,600rpm)
Torque rise	34.0%
Engine speed drop	14.3%
Start-off torque	114%
Transmission:	
No. of gears in 4-12km/hr range	Stepless
Rear lift powers: (90% of max oil pressure)	
Bottom/middle/top	4,035/4,535/4,305daN
Lift range under load	69.0cm (20-89cm)
Front lift powers: (90% of max oil pressure)	
Bottom/middle/top	2,165/2,405/2,815daN
Lift range under load	68cm (19-87cm)
Hydraulic output:	
Operating pressure	215 bar
Max flow	77.6 litres/min
Max output	21.5kW (66.4 litres/min, 194 bar)
Drawbar power:	
Max (1,800rpm)	71.5kW (280g/kWh)
At rated speed	67.0kW (301g/kWh)
Noise level: (Under load at driver's ear)	
Cab closed/open	75.5/81.5dB(A)
Braking:	
Maximum mean deceleration	5.0m/s ²
Pedal force	45daN
Turning circle:	
4WD disengaged/engaged	10.35m/11.10m
Dimensions and weights:	
Front axle	2,320kg
Rear axle	2,870kg
Unladen weight	5,190kg
GVWR/payload	7,500kg/2,310kg
Power-weight ratio	64kg/kW
Wheelbase	235cm
Track width front/rear	186/181cm
Ground clearance (without front linkage)	47.0cm

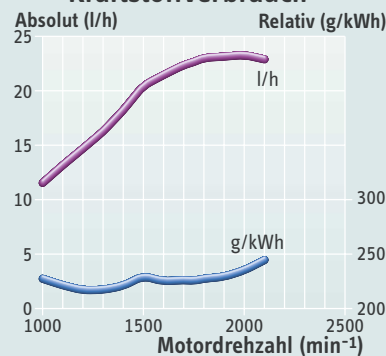
The test results

Engine: ++	
Performance characteristics	2.9
Fuel economy	1.2
Pto output/drawbar power	1.9
Strong power curve; upgraded test score due to low diesel consumption of Tier IIIa engine.	
Transmission: ++	
Gearbox ratios/functions	1.4
Shifting	1.6
Clutch, throttle	1.4
Pto	1.5
Excellent infinitely variable speed gearbox, straightforward to fathom and operate; 40km/hr at reduced speed, 50km/hr not available; three pto speeds available.	
Axles and running gear: +	
Steering	1.6
Four-wheel drive and diff lock	2.2
Hand/foot brake	2.4
Front-axle/cab suspension	1.4
Weight and payload	3.2
Turning circle is good for this power range; nicely weighted steering. No automatic 4WD and differential lock management; average payload at 7.5t gross vehicle weight rating.	
Linkage/hydraulics: O/+	
Lift power and lift height	2.9
Operation	1.4
Hydraulic output	2.1
Spool valves	2.3
Hydraulic couplers	1.3
Lift capacity and lift range on rear linkage rate no better than average in this hp sector; reasonable hydraulic output; robustly built linkage and convenient linkage operation.	
Cab: O	
Space and comfort	3.0
Visibility	2.3
Heating/ventilation	3.4
Noise level	3.2
Electrical system	2.1
Build quality	2.0
Maintenance	1.9
Nearside access is satisfactory, whereas the offside entry is awkward enough to persuade operators only to use it as a last resort. No enclosed stowage compartments. Passenger seat hinders access. Steering wheel obstructs view of digital dash. Noise levels, at 75.5dB(A), are far from the quietest in the current market.	

Leistung und Drehmoment



Kraftstoffverbrauch



Fuel economy at typical performance

Working areas	Output	Speed	g/kWh	l/hr
Standard speed pto 540rpm	100%	1,906	229	23.1
Economy speed pto 540Erpm	100%	1,500	230	20.4
Standard speed pto 1,000rpm	100%	1,885	228	23.1
Economy pto 1,000Erpm	100%	—	—	—
Engine in top speed range	80%	max	257	19.3
High output	80%	90%	236	17.6
Transport work	40%	90%	293	11.0
Low output, 1/2 speed	40%	60%	265	9.8
High output, 1/2 speed	60%	60%	205	11.7

Ability:	--	-	O	+	++
Basic standards					●
Average standards					●
High standards				●	
Field work				●	
Grassland work					●
Transport work					●
Loader work					●
Price:	Low		High		
£45,000 to £50,000					●

Typical farmer buying price after discount excluding VAT for base specification Fendt 312 Vario tractor model

Grading system:	O	average
++ very good	--	poor
+ good	-	below average

The individual marks are extracts from our assessments and do not necessarily result in a mathematically conclusive overall mark